

001

ARTERIAL STIFFNESS AND COGNITIVE DECLINE AMONG BLACK AND WHITE ELDERLY: FINDINGS FROM THE HEALTH, AGING AND BODY COMPOSITION STUDY. * A. Zeki Al Haz-zouri, K. Yaffe, and Health ABC Writing Group (University of California, San Francisco, CA 94118)

Blacks have greater arterial stiffness than non-blacks; yet race-related disparity in the prospective association between arterial stiffness and cognitive decline remains unexplored. We sought to determine if arterial stiffness is associated with cognitive decline in 2,488 community-dwelling older adults from the Health, Aging and Body Composition study and if this association differed between whites and blacks. Arterial stiffness was measured as pulse wave velocity (PWV) and analyzed in race-specific tertiles. Cognitive function, using the Modified Mini Mental State Exam (3MS), was assessed at baseline and repeated across four follow-up visits spanning 9 years. Higher 3MS scores denote better function. Hierarchical linear mixed models with random slopes were fitted to examine the associations between PWV and change in cognitive function over time, adjusted for socio-demographics and traditional cardiovascular risk factors. At the middle tertile, a PWV, race, by age interaction was significant (p -value=0.021) indicating that for middle values of PWV, decline in cognition was significantly higher for blacks than for whites. Over 9 years of follow-up, whites with the highest and middle PWV tertiles experienced an average decline in 3MS score of 4.5 and 3.6 points, respectively, versus 2.8 points for whites with the lowest PWV tertile. Over 9 years of follow-up, blacks with the highest and middle PWV tertiles experienced an average decline in 3MS score of 4.4 and 6.8 points, respectively, versus 3.5 points for blacks with the lowest PWV tertile. These results suggest that interventions to prevent arterial stiffness may be effective in delaying cognitive decline.

003-S

LONGITUDINAL COURSE OF BEHAVIOURAL AND PSYCHOLOGICAL SYMPTOMS OF DEMENTIA. *RM van der Linde, BCM Stephan, GM Savva, T Denning, C Brayne, (University of Cambridge, Department of Public Health and Primary Care, Cambridge, United Kingdom)

Behavioural and psychological symptoms of dementia (BPSD) include depressive symptoms, anxiety, apathy, sleep problems, irritability, psychosis, wandering, elation and agitation. They are common in dementia and cross-sectional studies suggest their prevalence increases with greater cognitive impairment. However, few studies have investigated the longitudinal stability and incidence of these symptoms in a population-based sample. The Medical Research Council Cognitive Function and Ageing Study is a longitudinal study of ageing representative of the population aged 65 and over of England and Wales. Information on 12 BPSD is available for 2640 participants at baseline, with follow-up interviews after 2, 6, 8 and 10 years. In those with dementia, most of the symptoms were more likely to be present at 2-year follow-up when they were seen at baseline, although the strength of this association varied across symptoms (Savva et al. 2009). Further analyses over 6-10 years follow-up are currently in progress and will include logistic regression and multistate modelling of the stability and incidence of BPSD and their association with cognitive function and progression to dementia. By increasing the knowledge about the presence of BPSD in early cognitive decline and dementia, this research will contribute to better-targeted and designed clinical trials that will facilitate the development of treatment for symptoms. Reference: Savva GM, Zaccari J, Matthews FE, Davidson JE, McKeith I, Brayne C, Medical Research Council Cognitive Function and Ageing Study: Prevalence, correlates and course of behavioural and psychological symptoms of dementia in the population.

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002

FURTHER EXPLORATION OF THE EARLY MORTALITY EXCLUSION TO CONTROL FOR CONFOUNDING BY PRE-EXISTING DISEASE. Singh PN, Shih W. (Center for Health Research, Loma Linda University, Loma Linda, CA, 92350; Dept of Biostatistics, UCLA, Los Angeles, CA, 90095)

Using an exponential hazard function, we previously reported (Am J Epidemiol 2001; 154:963-71) that under confounding by a pre-existing disease that produces an increase in mortality risk that attenuates, the early mortality exclusion can be very effective in revealing the "true" exposure-mortality relation. Using data from the Adventist Mortality Study, we found that early symptoms of chronic disease increased the smoothed instantaneous hazard of death during the first 12 y and then crossed-over during 12-26 y as described by Moreau et al. Such aging biology is better modeled by a Weibull function that we fit to a non-proportional pre-existing disease (hazard attenuates to a crossover during the first half of the follow-up) that confounded an exposure which, in its un-confounded state, proportionally decreased the instantaneous hazard. In simulations of this commonly found scenario, we asked: What is the optimal length of the early mortality exclusion? We found that: 1) exclusion of the early mortality at the point of crossover or even beyond it provides the most un-confounded measure of a protective exposure 2) confounding of the protective effect by a pre-existing disease with a Moreau distribution (i.e. middle cross-over) induces that distribution in the exposure 3) crossovers occurring during the first 8% of the follow-up did not produce substantial confounding of the exposure effect. Our simulation indicates that the decision to exclude the early mortality should be based on parameters that can be estimated from long term follow-up of those diagnosed with chronic disease. Large data sets for such analyses are widely available.

004

SOCIAL DISORDER, APOE-E4 GENOTYPE, AND CHANGE IN COGNITIVE FUNCTION AMONG OLDER ADULTS. JD Boardman, LL Barnes, RS Wilson, DA Evans, *CF Mendes de Leon (Rush University Medical Center, Chicago, IL 60612)

There is very little information on the degree to which stressful social conditions affect the expression of genetic risk factors in important aging-related outcomes. The purpose of this study was to examine whether neighborhood social conditions modify the association between APOE e4 genotype and decline in cognitive function in older age. We used data from a stratified random sample of a population-based, longitudinal study of a diverse cohort of older adults (age 65+), the Chicago Health and Aging Project (n=1730). Average age was 74, 60% was female and 50% was African American, and 50% non-Hispanic white. Participants came from a geographically-defined area of 20 adjacent census tracts. We constructed a summary measure of neighborhood disorder based on 7 self-report questions on perceived neighborhood social conditions, using data from participants that were not included in this analysis. This measure was averaged by census tract to create a neighborhood-level measure of social disorder. In a weighted, multilevel analysis (lmer package in R) controlling for age, sex, race, education, duration of neighborhood residence, baseline cognitive function and neighborhood socio-economic status, both the presence of an e4 allele (p <.001) and social disorder (p <.001) were significantly associated with decline in cognitive function. In a subsequent model, there was a significant APOE e4 by disorder interaction (p <.01), indicating that the e4 allele is more strongly associated with cognitive decline among older adults who live in neighborhoods with lower levels of social disorder. The findings are interpreted in terms of a non-causal social push gene-environment interaction model.

005

A PROSPECTIVE STUDY OF SERUM 25-HYDROXYVITAMIN D LEVELS AND MORTALITY. *L. Signorello, X. Han, Q. Cai, S. Cohen, E. Cope, W. Zheng, and W. Blot. (International Epidemiology Institute, Rockville, MD 20850; Vanderbilt University, Nashville, TN 37203)

The beneficial biological effects attributed to vitamin D suggest that it has the potential to influence overall mortality in the general population. Epidemiologic evidence addressing this question is limited, especially for African Americans who have a high burden of vitamin D insufficiency. We conducted a nested case-control study within the Southern Community Cohort Study to estimate the association between baseline serum levels of 25-hydroxyvitamin D (25(OH)D) and subsequent mortality among African Americans and non-African Americans. Cases (N=1852) enrolled from 2002-2009 and died at least 12 months post-enrollment. Controls (N=1852) were matched on race, sex, age, enrollment site, and date of blood collection. Multivariate conditional logistic regression was used to calculate odds ratios (OR) and 95% confidence intervals (95% CI) for all-cause mortality, cancer mortality, circulatory disease mortality, and mortality from all other non-external causes. We observed significant trends of increasing all-cause mortality with decreasing serum (OH)D levels. ORs for quartile 1 (<10.18 ng/mL) vs. quartile 4 (>21.64 ng/mL) levels of 25(OH)D were 1.60 (1.20-2.14) for African Americans and 2.11 (1.39-3.21) for non-African Americans. Effects were highest for circulatory disease death (quartile 1 vs. quartile 4 OR=2.53 (1.44-4.46) and 3.25 (1.33-7.93) for African Americans and non-African Americans, respectively). Prediction models estimated that the odds of total mortality minimized in the 25(OH)D range of 35-40 ng/mL. These findings suggest that vitamin D status may have an important influence on mortality for both African Americans and non-African Americans.

007

SENSORY IMPAIRMENT AND QUALITY OF LIFE. *D Dalton, K Cruickshanks, M Fischer, G Huang, B Klein, R Klein, A Pinto (University of Wisconsin, Madison, WI 53726)

Sensory impairments have been shown to be associated with lower quality of life in older adults, however, no studies have investigated this association in middle-age adults. The Beaver Dam Offspring Study (BOSS), conducted 2005-2008, included measures of hearing, vision and olfaction. Participants (n=3285) were 21-84 years of age (mean=49 yrs). Hearing impairment (HI) was defined as Pure-tone Average (PTA) either ear > 25dB, impaired vision as Contrast Sensitivity (CS) <1.55 log triplet in the better eye and impaired olfaction as identifying < 6 of 8 odorants correctly with the San Diego Odor Identification Test. Quality of life was measured using the SF-36. Overall, 401 participants were classified as having HI, 503 had impaired CS and 109 had olfactory impairment. There were 542 participants with 1 impairment, 83 with 2 impairments and 7 with all 3. In models evaluating the joint effects of the 3 sensory impairments, adjusted for age, sex, education, marital status, smoking, alcohol use, body mass index and history of chronic disease, HI and impaired CS demonstrated significant independent effects on the General Health Perception (HI p=0.012, CS p<0.05), Physical Functioning (HI p=0.049; CS p<0.001) and Vitality Indices (HI p<0.001, CS p<0.001). Impaired CS had an independent effect on the Physical Component Score (p<0.001). Impaired olfaction was not associated with lower SF-36 scores. Those having 1 or 2 impairments had significantly lower scores on the same indices. For example, the mean Vitality score decreased -3.89 with 1 impairment and -6.56 with 2 impairments. There were too few individuals with all 3 sensory impairments to make inferences. These data indicate that sensory impairments negatively impact quality of life and having 2 impairments increases the magnitude of the effect.

006

BURDEN OF CHRONIC DISEASE: A POPULATION-BASED STUDY. *J. L. St. Sauver, W. A. Rocca, D. J. Jacobson, M. E. McGree, B. P. Yawn, D. O. Warner (*Mayo Clinic, Rochester, MN, 55905)

Quantification of disease burden in a community may promote rational deployment of limited treatment and prevention resources. We used the resources of the Rochester Epidemiology Project (Am J Epi, 2011, 173:1059-68) to describe the prevalence of chronic conditions in Olmsted County, MN. We identified all individuals residing in Olmsted County in 2009 (n=142,377), and obtained all International Classification of Diseases (ICD-9) codes assigned to this population between 2005 and 2009. We categorized the ICD-9 codes into 48 groups that have been associated with health related quality of life (J Clin Epidemiol 2011, 64:309-19). We estimated the prevalence by dividing the number of individuals in each chronic disease group by the total population and multiplying by 100. We calculated age- and sex-adjusted prevalence by direct standardization to the 2000 US population, and calculated 95% confidence intervals (CIs) assuming a Poisson distribution. Considering all ages combined, the five most prevalent conditions were skin conditions (42.7%, 95% CI: 42.3%, 43.0%), osteoarthritis and joint disorders (33.6%, 95% CI: 33.3%, 33.9%), vision disorders (31.4%, 95% CI: 31.1%, 31.7%), back conditions (23.9%, 95% CI: 23.6%, 24.2%), and lipid disorders (22.3%; 95% CI: 22.1%, 22.6%). Most conditions were more prevalent in women compared with men. Individuals 0-18 years old with skin conditions had a median of 2 other chronic conditions (interquartile range (IQR): 1,3), whereas individuals >64 years with skin conditions had a median of 11 other chronic conditions (IQR: 8,15). In summary, the burden of multiple chronic conditions in this population was substantial, and increased with age.

008-S

CROSS-NATIONAL COMPARISONS OF PHYSICAL PERFORMANCE VERSUS SELF-REPORTED DISABILITY: TIMED WALK IN INDIA AND CHINA. BD Capistrant*, MM Glymour (Harvard University, Boston, MA 02115)

Background: India and China, the two largest populations, are aging rapidly, yet many standard self-report mechanisms for assessing health in old age are not well validated in these countries. We assess cross-country differences in the association between a self-reported and an objective measure of mobility. Methods: Cross-sectional data from the India and China (n=18,180) samples of adults aged 50+ from the WHO Study of Ageing and Adult Health were used to compare performance of objective (walk speed in 4 meter walk, meters/second (m/s)) and subjective (self-reported difficulty walking across a room) measures of mobility. Bivariate and multivariate linear models were adjusted for demographic, health, social, and economic factors; between-country differences were assessed by a joint F-test of a country by self-report interaction. Results: Self-reported difficulties were more prevalent in India (19.8%) than China (4.9%); mean walk speed was significantly slower in India than China. Adjusted for covariates, those reporting no difficulty walking had an average walking speed of 0.605 m/s in India and 0.775 m/s in China; moderate difficulty was associated with 0.012 and 0.089 m/s slower walk, respectively; severe difficulty was associated with a 0.005 m/s faster walk in India and 0.095 m/s slower walk in China. Country by self-report interactions were jointly significant (joint test, 2df, F=10.47). Conclusions: Mean walk speed was "mildly abnormal" by international guidelines in both countries. Self-reports may reflect observed differences in mobility between India and China, but the magnitude of self-reported mobility varied significantly between countries.

009-S

MOBILITY, DISABILITY, AND SOCIAL ENGAGEMENT IN OLDER ADULTS. *A Rosso, L Tabb, J Taylor, Y Michael (Drexel University, Philadelphia, PA 19102)

Meaningful social engagement is important in maintaining quality of life for older adults as functional limitations and disability occur. Using a community-based survey of 676 adults aged 65 years and older in Philadelphia, PA, we conducted a cross-sectional analysis of social engagement among those without mobility limitations, those with mobility limitations and no disability, and those with mobility limitations and disability. Mobility was measured by the Life-Space Assessment (LSA). Disability was dependency in activities of daily living or instrumental activities of daily living. Forms of social engagement assessed were outside the home (participation in social organizations and use of senior centers) and in home (talking to friends and relatives by phone and use of the internet). Logistic or proportional odds models were used to calculate odds ratios (OR) and 95% confidence intervals (CI) for engagement after adjustment for demographic and health variables. Low mobility was associated with lower level of social engagement of all forms (OR=0.59, CI: 0.41-0.85 for organizations; OR=0.67, CI: 0.42-1.06 for senior center; OR=0.47, CI: 0.32-0.70 for phone; OR=0.38, CI: 0.23-0.65 for internet). For social engagement outside the home, odds of engagement were further reduced in the presence of disability. Frequently talking on the phone was not significantly reduced for those with a disability. Odds of using internet were equally reduced for those with low mobility and those with disability. Social engagement is associated with low mobility even in the absence of disability; associations with disability differed by type of social engagement. Mobility limitations may be a more effective target of interventions to improve social engagement than disability.

011

RISK OF CANCER IN ASIAN AMERICANS. *A.L. Klatsky, Y. Li, H.N. Tran, D. Baer, G. D. Friedman, S. Siu, A. Kubo, N. Udaltsova, (Kaiser Permanente, Oakland, CA 94611)

Limited data suggest that Asian Americans (Asian) have lower overall cancer rates than whites, despite increased risk for liver and stomach cancer. Data are especially sparse about risk of specific Asian ethnic groups. We studied incident cancer in 129,987 persons that supplied baseline data at health examinations from 1978-1985. Self-classified ethnicity yielded 13,719 Asians with 6,062 Chinese, 1,722 Japanese, 4,308 Filipinos, 721 South Asians (mostly Asian Indians), and 906 Other Asians. We used Cox proportional hazards models with 7 covariates to estimate relative risk (RR) and 95% confidence intervals (CI). Through 2008, cancer was diagnosed in 15,080 persons including 1,181 Asians. Compared to whites, the RR (CI) for any cancer in Asians was 0.83 (0.70-0.89, $p < 0.001$). This inverse relationship was stronger for men (RR=0.76, $p < 0.001$) than for women (RR=0.91, $p=0.03$). Lower Asian cancer risk was more pronounced in smokers, ranging from RR of 0.87 (never or ex-smokers), 0.76 (<1 pack/day, and 0.64 (≥ 1 pack per day). Significant ($p < 0.05$) contributors to the lower risk of Asians included cancers of the upper airway digestive area, hematologic malignancies, melanoma, and cancers of the prostate, bladder, and brain. RRs for specific Asian groups versus whites follow: Chinese=0.88 ($p=0.004$), Japanese=0.89 ($p=0.12$), Filipinos=0.81 ($p < 0.001$), South Asians=0.45 ($p < 0.001$) and Other Asians=0.67 ($p=0.008$). Both South Asian men and women had lower risk than whites and in models limited to Asians, South Asians had lower risk than other Asian groups. We conclude: 1) Asians have lower cancer risk than whites, due to lower risk of several cancer types. 2) Each Asian ethnic group has lower risk than whites, with South Asians at the lowest risk.

010-S

CAREGIVER HEALTH RELATED QUALITY OF LIFE: RESULTS FROM A NATIONAL SAMPLE. *J. Kropko, MD Zullo & VK Cheruvu (Kent State University, Kent, Ohio, 44243)

The population of the United States is aging and more people are finding themselves in the role of caregiver. The health-related needs of caregivers have not been described on a national level. This research describes perceived and self-reported health-related quality of life (HRQoL) among caregivers compared to non-caregivers. This was a cross-sectional study using data from the 2009 Behavioral Risk Factor Surveillance System (BRFSS). Four HRQoL outcomes were examined: General Health (perceived health), was collapsed into poor vs. good, and Physical, Mental and Activity-Limiting Health (self-reported health) were reported as frequency of unhealthy days the previous month and dichotomized into <14 days (good) and ≥ 14 days (poor). Logistic regression models were used to account for the complex sampling design of the BRFSS. Caregivers were less likely to perceive poor general health (odds ratio (OR)=0.95; 95% confidence interval (CI): 0.93-0.97) and to report poor physical health (OR=0.93; CI: 0.91-0.96) and activity-limiting health (OR=0.85; CI: 0.82-0.87) but were more likely to report poor mental health (OR=1.4; CI: 1.4-1.5) compared to non-caregivers when controlling for gender, age, race, comorbidity, insurance, relationship status, activity limitation, levels of sleep, exercise, education, emotional support and life satisfaction. Better self-reported HRQoL among caregivers may be related to greater physical demand or viewing their health as good relative to the person for whom they care. Nonetheless, caregivers are at increased risk for poor mental health. While resources often target caregivers of those with extreme needs, mental health resources may need to be reallocated to caregivers to address this health risk.

012

DATA QUALITY (DQ) OF WISCONSIN CANCER REPORTING SYSTEM (WCRS) ON PROSTATE CANCER (PC). *Alex Ho, Dian Wang, Jean Owen, J. Frank Wilson (American College of Radiology, Philadelphia, PA 19103)

DQ from a cancer (Ca) registry is of great importance for monitoring Ca trends, raising Ca awareness, planning and implementing Ca control programs. As part of the cross sectional CDC Patterns of Care Study—Breast and Prostate, we assessed the PC DQ reported to WCRS. Demographic information (DI (race, ethnicity, marital status), Ca diagnosis and treatment (Rx) on 1169 Wisconsin PC patients diagnosed and treated in 2004 were obtained from WCRS. Medical records from facilities were reviewed and data were reabstracted (RAB) by certified, trained cancer registrars. New data elements (NDE) were also created beyond the WCRS existing required elements (ERE) to capture Rx data as ERE did. DQ was assessed by comparing the ERE to RAB and NDE, using Kappa statistics (k) and % complete agreement (pA). Results showed that for DI, agreement (Agt) between ERE and RAB was almost perfect (range of $k=0.9 - 1.0$, $pA= 99-100$). For tumor staging, Agt was moderate to substantial: # regional nodes examined ($k/pA: 0.6/64$), diagnostic confirmation ($k/pA: 0.7/99$), tumor grade (0.8/90), histology (0.8/98), but poor for clinical/pathologic evidence of extension and metastasis. For Rx, poor Agt was also recorded: no surgery reason (0.3/48), radiotherapy (0.2/27), lymph node surgery (0.2/37). Rx dates had pA of 80 (radiation), 57 (hormone), and 91 (surgery). Between ERE and NDE, k/pA were high: brachytherapy (0.8/95), external beam radiotherapy (0.8/93), immuno-, chemo-, hormone- therapy all had (1.0/100). In summary, DQ of WCRS was high for DI and Rx modality, but mixed for tumor staging. Improvement might be achieved through continued training and structured and standardized recording of information by clinicians and reporting facilities.

013

PRE-CONCEPTION, PRENATAL AND EARLY CHILDHOOD EXPOSURE TO MEDICAL RADIATION IN CHILDREN DIAGNOSED WITH BLOOD CANCERS OR SOLID TUMORS: SINGLE INSTITUTION STUDY, 1990-2010. *Robin Rohrer (Seton Hill University, Greensburg, PA 15601)

Background: Early exposure to medical radiation is one of the identified risks for childhood cancers but documentation is difficult and generally lacking in much of the US experience. The author of this study has developed an interview questionnaire and with medical and psycho-social staff support has interviewed willing parents in clinic and/or hospital. Documented exposures concerning possible pre-conception medical radiation exposure (both parents), in utero and early childhood medical radiation testing in the child herself/himself. It is hoped that as time and consent allows the study may also be extended back to 1970 if feasible. Methods: Each family who has consented to be interviewed completes a five page questionnaire usually at a clinic visit or while admitted to hospital. Each oral interview is conducted by the author. At present about 15% of the interviews have been conducted by phone call only. Whenever possible both parents are interviewed and most families (currently 80%) have been interviewed over two or more sessions. Results: To date the author has been able to interview for possible exposures in about 70% of children diagnosed in the last five years—interview rate is lower (so far) in the period 1990-2005 at approximately 5%. Among the families interviewed at least one exposure to medical radiation was documented was found in the majority of children. Conclusions: Exposure to medical radiation for a child later diagnosed with cancer may occur at several critical junctures. Chest or sinus x-rays or CT scans of a parent pre-conception, particularly repeat scans may have the possibility of DNA damage. Early childhood exposure through the diagnostic process (ruling out infection or trauma) may well contribute to a “perfect storm” in the still elusive causes of childhood cancer. It is the author’s hope that the completion of this single institution may provide clues to early diagnosis and very optimistically even prevention in childhood cancer.

015

IMPACT OF HIV-INFECTED CASES ON U.S. ANAL CANCER RATES. M. Shields*, R. Pfeiffer, A. Chaturvedi, A. Kreimer, and E. Engels (National Cancer Institute, Rockville, MD 20892)

Background: U.S. anal cancer incidence has increased steadily over time. Because anal cancer risk is strongly elevated in HIV-infected individuals, the U.S. HIV epidemic may have influenced anal cancer trends. We estimated the impact of the HIV epidemic on U.S. anal cancer trends during 1980-2005. Methods: Data on anal cancer cases with and without AIDS were obtained from the HIV/AIDS Cancer Match Study, which links 17 U.S. HIV/AIDS and cancer registries. HIV-infected anal cancer cases without AIDS were estimated by upweighting cases occurring before AIDS. We assessed the proportion of anal cancer cases with HIV infection in the general population and incidence in the general population overall and without HIV-infected cases. All rates were standardized to the 2000 U.S. population. Results: During 1980-2005, an estimated 1,654 of 20,533 anal cancers were HIV-infected. In 2001-2005, the proportion of anal cancer cases with HIV infection was 1.2% among females and 28.3% among males. During 1980-2005, HIV-infected cases did not impact female anal cancer trends (increase of 3.3% per year overall and 3.3% without HIV-infected cases). However, HIV-infected cases strongly influenced anal cancer trends in males, particularly among black men and men aged 20-49 years. Male incidence rates increased 3.5% per year overall (black men: 4.0%; 20-49 year-olds: 5.2%) but only 1.7% per year without HIV-infected cases (black men: 0%, 20-49 year-olds: 0.7%). Conclusions: During 1980-2005, U.S. anal cancer incidence in men was strongly influenced by the HIV epidemic, but increasing anal cancer incidence in women was independent of HIV. Effective anal cancer prevention in HIV-infected men would substantially reduce U.S. anal cancer rates.

014-S

GENE-ENVIRONMENT EFFECTS OF ALCOHOL AND RELATED METABOLIZING GENES ON ONSET AGE, RISK AND SURVIVAL OF CANCER OF THE ORAL CAVITY. *YJ Hung, CJ Yu, KW Lee, FM Fang, WT Lin, HL Huang, CH Lee (Kaohsiung Medical University, Kaohsiung 807, Taiwan)

The activity of ethanol oxidation is closely linked to the encoded proteins from the alcohol dehydrogenase 1B (ADH1B) and aldehyde dehydrogenase 2 (ALDH2) genes. The process of alcohol catabolism is imperative because the first metabolite of ethanol oxidation (ie, acetaldehyde) is carcinogenic in animals. To investigate the potential gene-environment effect of the two genes in regard to alcohol intake on the age at cancer diagnosis, the risk of contracting carcinoma and survival of oral cancer patients, we conducted a multicenter cancer series analysis and a case-control study in Taiwan. We reviewed and assessed the data of age at first carcinoma diagnosis and clinical/pathological aspects for 416 newly diagnosed oral cancer patients, and performed a follow-up program to evaluate the survival of this neoplasm. To evaluate cancer risk, we also compared these oral cancer patients with 1042 control subjects. Logistic regression models and survival related methods were used in the multivariate analyses. A 1.3 and 1.5-fold higher hazard ratio (HR) associated with earlier oral cancer onset was found among drinkers who carried ADH1B ARG48HIS 1/1 and ALDH2 GLU504LYS *2 allele, respectively. Compared with nondrinkers, ADH1B 1/1 genotype and ALDH2 *2 allele conferred a 2.0 and 2.3-fold increased risk, and a 7.4-fold gene/gene combined risk of contracting oral cancer among >35 g/day intake of drinkers. However, no notable association between the two genes and survival of oral cancer patients was detected. Our study suggests that the genetic vulnerability in regard to ADH1B and ALDH2 genes and alcohol intake are related to oral cancer occurrence, but not to cancer survival.

016

CIGARETTE SMOKING AND TP53 GENE MUTATIONS IN BLADDER CANCER. *C Samanic, DR Baris, DT Silverman, EA Platz, PT Strickland, MR Schwenn, AT Johnson AR Schned, M Kida, MA Jones, ML Nickerson, N Rothman, LE Moore (National Cancer Institute, Bethesda, MD 20892; Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205).

TP53 mutations are frequently observed in bladder tumors and thought to arise from tobacco-related carcinogens. In the Maine and Vermont components of the New England Bladder Cancer Study, a population-based case-control study, we examined the associations of cigarette smoking characteristics with the prevalence, type, and location of TP53 mutations in bladder tumors (509 incident cases; 992 controls). Mutations were identified by sequencing exons 5-8 of TP53 using DNA from tumor tissue. We also examined if cigarette smoking was more strongly associated with mutation-positive than mutation-negative bladder cancer. We used polytomous regression to estimate odds ratios (ORs) and 95% confidence intervals (95%CI) for the associations of smoking characteristics with mutation-positive and mutation-negative cases versus controls. The prevalence of TP53 mutations did not significantly differ by smoking status. We confirmed the presence of hotspot mutation sites at codons 273, 280, and 285, and report a novel site at codon 132 only among smokers. Tests for homogeneity suggested that within the subgroup of noninvasive/high-grade (n=96) cases, trends of increasing risk associated with smoking status (p=0.04), duration (p=0.08), intensity (p=0.03), and pack-years (p=0.03) were stronger for mutation-positive than mutation-negative cases versus controls. This pattern was not evident for noninvasive/low-grade (n=345) or invasive (n=67) cases. Our findings suggest that the relationship between cigarette smoking and TP53 mutations may differ within known histopathologic bladder tumor subgroups.

017-S

USE OF NON-STEROIDAL ANTI-INFLAMMATORY DRUGS AND RISK OF PROSTATE CANCER IN MONTREAL, CANADA. *JJ Mansure, EL Franco, AV Ramanakumar, AG Aprikian, W Kassouf, and M-E Parent (Epidemiology and Biostatistics Unit, INRS-Institut Armand-Frappier, University of Quebec, Montreal, Canada. H7V 1B7)

The role of non steroidal anti-inflammatory drugs (NSAIDs) in prostate cancer risk remains unclear. We conducted a case-control study in Montreal, Canada, a city of predominantly French-speaking residents. Cases were patients (n=1,429) aged 40-75, ascertained across French hospitals in the Montreal Metropolitan area, newly diagnosed with histologically-confirmed prostate cancer between 2005 and 2008. Population controls (n=1,543) were selected from French electoral lists, resided across the same electoral districts as the cases, and were age-matched to cases (± 5 years). Lifetime NSAIDs use was elicited during an in-person interview. Unconditional logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI), adjusting for potential confounders including age, ancestry, first-degree family history of prostate cancer and prostate cancer screening history. The adjusted OR for prostate cancer associated with ever use of NSAIDs was 1.22 (95% CI: 0.88-1.69). There was no association with current use or duration of use. However, men who had used NSAIDs 6-10 years before the reference date had a reduced risk of prostate cancer (OR=0.43; 95% CI: 0.21-0.89). Ever use of daily low dose of aspirin was not associated with prostate cancer risk (OR=1.02; 95% CI 0.85-1.24). Nonetheless, men having first started using it 2-5 years prior to the reference date had an 18% reduction in risk. Risk estimates were not modified by prostate cancer aggressiveness. These findings provide no strong evidence for an association between NSAIDs use and prostate cancer risk. However, timing of exposure might be relevant.

019

DIETARY FAT AND THE RISK OF PROSTATE CANCER IN THE NIH-AARP DIET AND HEALTH STUDY. *Colleen Pelsler, Alison Mondul, Albert Hollenbeck, Yikyung Park (National Cancer Institute, Rockville, MD 20852)

Observational studies have shown inconsistent results for the association of intake of total fat, saturated fat, and individual fatty acids with the risk of prostate cancer. We investigated the association between dietary fats and fatty acids and the risk of prostate cancer in the National Institutes of Health (NIH)-AARP Diet and Health Study. Among 289,020 men enrolled in this prospective cohort study, during 10 years of follow-up, there were 23,330 prostate cancer cases, including 20,395 non-advanced and 2,935 advanced prostate cancer cases (including 724 fatal cases). Diet was assessed at baseline with a self-administered, mailed food-frequency questionnaire. Cases were determined by probabilistic linkage with state cancer registries. Hazard ratio (HR) estimates and 95% confidence intervals (CIs) were calculated with Cox proportional hazards models, adjusting for potential confounders including. Intakes of total fat, and mono- and polyunsaturated fat were not associated with incidence of total, non-advanced, advanced or fatal prostate cancer. Saturated fat intake was related to an increased risk of advanced prostate cancer (HR for highest vs. lowest quintile 1.19; 95% CI 0.99-1.44; p-for trend=0.04). The positive association of saturated fat intake was more apparent with fatal prostate cancer (HR 1.47; 95% CI 1.01-2.15; p-for-trend=0.05). We observed no association with total n-3 or n-6 polyunsaturated fatty acids, or with the ratio of n-6/n-3 fatty acids. Our findings suggest that intakes of total fat, types of fat, and individual fatty acids are not associated with the risk of non-advanced prostate cancer, but saturated fat intake is related to an increased risk of advanced and fatal prostate cancer.

018-S

CARCINOGENIC EFFECT OF BETEL-QUID USE ON ANATOMICAL SITE AND HISTOLOGICAL TYPE OF AERODIGESTIVE TRACT CANCERS. *HC Tu, CL Chang, KW Lee, DC Wu, FM Fang, HL Huang, YC Ko, CH Lee (Kaohsiung Medical University, Taiwan)

Findings from genotoxic studies have showed that compounds derived from betel-quid (BQ) trigger DNA damage, inhibit p53-activated DNA repair and produce cell cycle arrest at the G2/M stage. Little is recognized about the impact of chewing and swallowing BQ juice/remnants on diverse anatomical sites along the upper aerodigestive tract (UADT) to gastrointestinal tract (GIT), and differences according to the histological types. We conducted a multicenter case-control study examining 2163 pathology-proven UADT and GIT cancer patients, and compared them with 2250 controls. Multivariate generalized additive models, piecewise regression and polytomous logistic models were used to study dose-effect structures and cancer risks. Contrary to non-significant GIT-adenocarcinoma risk (aOR=0.9), BQ chewers had a 1.7 to 16.2-fold higher risk of UADT-squamous cell carcinomas than non-chewers. We found a curvilinear and a linear BQ dose-risk relationship, respectively, in oral/pharyngeal/esophageal and laryngeal cancers. Chewers of betel inflorescence were at a higher UADT cancer risk. A greater first-pieceswise increased risk of esophageal cancer was identified in areca-fluid swallows than in non-swallowers (continuous aOR=1.12 vs. 1.03). BQ use accounted for 66.1-78.7% and 17.8-33.2% of the oral/pharyngeal and esophageal/laryngeal cancer cases. Alcohol consumption was found to supra-additively modify the risk of BQ chewing in determining the development of oral, pharyngeal and esophageal cancers. Our study suggests that the interplay of BQ and alcohol use, along with chewing habit, affects cancer risks on anatomically diverse sites of UADT and GIT cancers, and histologically diverse types.

020

RISK OF SECOND PRIMARY CANCERS AFTER TESTICULAR CANCER IN EAST AND WEST GERMANY. *C Rusner, B Streller, C Stegmaier, K A McGlynn, A Stang (Institute of Clinical Epidemiology, Medical Faculty, Martin-Luther-University of Halle-Wittenberg, 06097 Halle (Saale), Germany)

Survival of testicular cancer improved dramatically when cisplatin was introduced in the 1970s. However, chemotherapy and radiation therapy are potentially carcinogenic. The aim of this study was to estimate the risk of developing second primary cancers in testicular cancer patients by analyzing data of population-based cancer registries in Germany. Especially, we provide estimates of a virtually cisplatin free era in East Germany from 1961 to 1989. We identified 16,990 cases of testicular cancer in East Germany (1961-1989 and 1996-2008). In Saarland (a federal state in West Germany) 1,401 cases were registered from 1970 to 2008. We estimated standardized incidence ratios (SIRs) with 95% confidence intervals (95% CIs). A total of 301 second primary cancers of any location were reported in East Germany (1961-1989), with a corresponding SIR of 2.0 (95%CI=1.7 to 2.2). From 1996 to 2008, 159 cancers (any location) were observed (SIR=1.7, 95%CI=1.4 to 2.0). In Saarland, a total of 104 cancers (any location) were reported (SIR=1.3, 95%CI=1.1 to 1.6). Especially, increased risk was found for contralateral testicular cancers (SIR=13.9, 95%CI=11.2 to 17.0) from 1961 to 1989 in East Germany. In Saarland, the corresponding SIR was 6.0 (95%CI=3.3 to 10.1). While SIRs among seminomas were higher in East Germany, we observed a higher SIR among nonseminomas in Saarland. Other cancer site specific SIRs will be reported. In conclusion, testicular cancer patients are at increased risk of second primary cancers which may be explained by etiologic, therapeutic, or both factors. These findings support the recommendation to intensively follow men with testicular cancer, especially for cancers of the contralateral testis.

021

RISK OF SECOND BREAST CANCER ACCORDING TO HORMONE RECEPTOR STATUS IN GERMANY. *C Rusner, K Wolf, U Bandemer-Greulich, B Holleczeck, G Schubert-Fritschle, A Stang (Institute of Clinical Epidemiology, Medical Faculty, Martin-Luther-University of Halle-Wittenberg, 06097 Halle (Saale), Germany)

Hormone receptor (HR) status of breast cancer is a relevant factor with regard to treatment decisions and further prognosis. Two recent population-based studies reported an increased risk of contralateral HR-negative breast cancers after a HR-negative primary breast cancer. The aim of this study was to provide hormone receptor specific risks of second breast cancers in Germany. We extracted breast cancer data from the cancer registries of the Federal States of Brandenburg and Saarland and the area of Munich for the period from 1998 to 2007 including 54,055 women. Regional data from in situ carcinoma (CIS) were pooled to estimate the risk of primary invasive ipsilateral and contralateral breast cancers among women with CIS. We estimated standardized incidence ratios (SIRs) with 95% confidence intervals (95% CIs). There was an elevated risk of second - especially HR-negative - invasive breast cancer for women whose first breast cancer was HR-negative (Munich: SIR=11.3, 95%CI=7.6 to 16.2; Saarland: SIR=7.3, 95%CI=3.6 to 13.0; Brandenburg: SIR=7.0, 95%CI= 4.8 to 10.0). For women whose first breast cancer was HR-positive, the risk of a second breast cancer was decreased in two registries (Munich: SIR=0.8, 95%CI=0.6 to 0.9; Saarland: SIR=0.3, 95%CI=0.2 to 0.5; Brandenburg: SIR=1.0, 95%CI= 0.8 to 1.2). After a diagnosis of CIS, the risk of primary invasive contralateral breast cancer (SIR=4.4, 95%CI=3.6 to 5.4) was higher than ipsilateral (SIR=2.2, 95%CI= 1.6 to 2.9). In summary, we observed a difference in risk of second breast cancers by HR status of the primary cancer. These findings may be explained by HR specific differences in aetiology, treatment and prognosis.

023-S

PENETRANCE OF BREAST AND OVARIAN CANCERS IN BRCA 1/2 MUTATION CARRIERS IN KOREA: USING PROBAND'S PHENOTYPE EXCLUSION LIKELIHOOD(PEL) METHOD. *Choonghyun Ahn, Boyoung Park, Sung Won Kim, Min Hyuk Lee, Jong Won Lee, Daehee Kang, Sue K. Park, Korean Breast Cancer Society (Seoul National University Medical College, Seoul, Korea, 110-799)

Purpose: The incidence of breast cancer is increasing rapidly in Korea. Because BRCA1/2 mutations are highly probable to cause breast cancer and ovarian cancer, finding who has BRCA1/2 mutations is crucial to find high-risk patients. We calculated penetrance of breast cancer and ovarian cancer in BRCA1/2 mutations is essential to estimate who has BRCA1/2 mutations, because the penetrance is essential to estimate who has mutations. **Method:** We used Proband's phenotype Exclusion Likelihood(PEL)ⁱ method to get accurate penetrance using pedigree data of probands who had been involved in Korean hereditary breast cancer (KOHBRA) study. We used Python to implement the estimation model of PEL method. **Result:** Penetrances of breast cancer were 24.1% at age 50 years and 36.9% at age 80 years in BRCA1 mutation carriers, and 19.2% at age 50 years and 36.8% at age 80 years in BRCA2 mutation carriers. Penetrances of ovarian cancer were 2.5% at age 50 years and 8.0% at age 80 years in BRCA1 mutation carriers, and 0.34% at age 50 years and 1.7% at age 80 years in BRCA2 mutation carriers. **Conclusion:** The penetrance based on PEL method was lower than the penetrance by calculating other penetrance estimation methods due to the different inclusion criterion using full pedigree of probands, leading to more frequent inclusion of subjects without BRCA1/2 mutation. ⁱF. Alarcon et al. (2009), PEL: An Unbiased Method for Estimating Age-Dependent Genetic Disease Risk from Pedigree Data Unselected for Family History, [Genetic Epidemiology] ,33,379-385.

022

AGE-PERIOD-COHORT ANALYSIS OF INVASIVE BREAST CANCER INCIDENCE IN THE UNITED STATES, 1935-2008. *RE Gangnon, B Sprague, N Stout, O Alagoz, A Trentham-Dietz (University of Wisconsin, Madison, WI 53726)

Breast cancer incidence in the US has recently declined after decades of steady increases. The age-period-cohort (APC) framework, in which temporal trends are decomposed into age, year of diagnosis (period) and year of birth (cohort), was applied to invasive breast cancer incidence data from the Connecticut Tumor Registry (1935-1979) and the national Surveillance Epidemiology and End Results cancer registries (1973-2008). Numbers of incident breast cancer cases were modeled using a generalized additive log-linear Poisson regression model with smooth terms for age, period and cohort and an offset term for (log) female population. For model identification, period effects were set to zero prior to 1982, the introduction of screening mammography. For women over age 40, the period effect shows (1) a sharp increase in incidence with a peak relative risk (RR) of 1.15 (95% confidence interval (CI)=1.13-1.17) in calendar year 1987; (2) still elevated risk in the 1990's (calendar year 1993: RR=1.07, CI=1.04-1.10 versus 1999: RR=1.07, CI=1.03-1.10); and (3) a drop in risk in recent years (calendar year 2008: RR=0.87, 0.83-0.91). Starting at birth year 1920, the cohort effect steadily increased until leveling off recently for older women (ages >50: peak RR=1.49, 1.42-1.56 for birth year 1949 versus RR=1.42, CI=1.32-1.52 for 1957) and for younger (<50) women (peak RR=1.28, 1.18-1.37 for birth year 1966 versus RR=1.26, CI=1.11-1.43 for 1977). Using this model, we attribute recent declines in breast cancer incidence to a combination of a sharp decline in period effects, which began in 2001 (prior to the release of the Women's Health Initiative results), and a stabilization of risk profiles for women born after 1950.

024

PERINATAL FACTORS AND BREAST CANCER RISK AMONG HISPANICS. *M. Sanderson, A. Pérez, M.L. Weriwoh, L. Alexander, G. Peltz, V. Agboto, C.D. Jones, W. Khoder. (Meharry Medical College, Nashville, TN 37208).

We assessed whether perinatal factors were associated with breast cancer among Hispanics, a group with fairly low incidence rates of breast cancer. We used data from a case-control study of breast cancer among Hispanics age 30 to 79 conducted between 2003 and 2008 on the Texas-Mexico border. In-person interviews were completed with 188 incident breast cancer cases ascertained through surgeons and oncologists, and 974 controls who were designated as high-risk (n=510) and low-risk (n=464) for breast cancer (with respective response rates of 97%, 83% and 74%). Multiple imputation and multinomial regression were used for data analysis. After adjustment for age, menopausal status and mammography screening, relative to birthweight 2,500-3,999 grams, there were non-significant decreases in breast cancer risk for birthweight of $\geq 4,000$ grams (high-risk controls odds ratio [OR] 0.75, 95% confidence interval [CI] 0.39-1.41; low-risk controls OR 0.61, 95% CI 0.32-1.18). Non-significant reductions in breast cancer risk were also seen for preterm birth (high-risk controls OR 0.30, 95% CI 0.07-1.26; low-risk controls OR 0.30, 95% CI 0.06-1.41). Although based on small numbers, twins were at substantially increased breast cancer risk (high-risk controls OR 2.02, 95% CI 0.74-5.54; low-risk controls OR 6.07, 95% CI 1.50-24.5). Our results tended to differ from previous studies of this topic perhaps due to the different hormonal milieu among Hispanics relative to Caucasians, African Americans and Asians in whom all previous studies of this topic have been conducted. Confirmation of our findings in larger studies may assist in determining how hormonal mechanisms responsible for breast cancer differ by race/ethnicity.

025-S

ORAL CONTRACEPTIVE USE AND BREAST CANCER RISK OVERALL AND BY MOLECULAR SUBTYPE AMONG YOUNG WOMEN. *E. Beaber, K. Malone, M. Tang, W. Barlow, P. Porter, J. Daling and C. Li (Fred Hutchinson Cancer Research Center, Seattle, WA, 98109)

Prior studies suggest that recent oral contraceptive (OC) use is associated with a modest increased breast cancer risk among young women. However, risks associated with modern OC formulations and by molecular subtype have not been well characterized. We conducted a population-based case-control study of invasive breast cancer among women ages 20-44 residing in the Seattle-Puget Sound area from 2004-2010 (985 cases and 882 controls). We collected detailed information on contraceptive use and participant characteristics via an in-person interview. Multivariate-adjusted unconditional logistic regression was used to calculate odds ratios (OR) and 95% confidence intervals (CI). Current OC use (within 1 year of reference date) for ≥ 5 years was associated with a 60% (95% CI=1.1-2.5) increased breast cancer risk and there were no statistically significant differences in risk by OC formulation. Lifetime duration of OC use for ≥ 15 years was associated with a 50% increased risk (95% CI=1.1-2.2) and risk increased with each additional year of use. Risk magnitudes were generally greater among women ages 20-39 and for triple-negative breast cancer. Women ages 20-39 who were current OC users for ≥ 5 years had a particularly elevated risk of triple-negative breast cancer (OR=3.7, 95% CI=1.1-11.7). These results suggest that current use of modern OC formulations for ≥ 5 years and OC use for long durations confer an increased breast cancer risk among women ages 20-44, with possible stronger associations among younger women and for triple-negative breast cancer. Our results support the continued monitoring of OC use and breast cancer risk as OC formulations continue to change.

027

INTERACTIONS BETWEEN COMMON GENETIC VARIANTS AND CIGARETTE SMOKING BEFORE FIRST PREGNANCY WITH BREAST CANCER RISK IN U.S. RADIOLOGIC TECHNOLOGISTS. *CL Yu, P Bhatti, M Ha, P Rajaraman, MS Linet, A Hutchinson, BH Alexander, MM Doody, SJ Chanock, AJ Sigurdson (Mid-Atlantic Permanente Research Institute, Rockville, MD 20852)

The role of cigarette smoking in female breast carcinogenesis remains unclear. The increased risk may occur only from smoking before first pregnancy, when undifferentiated breast tissue may be more susceptible to tobacco carcinogens. In a nested case-control study of 633 breast cancer cases and 835 controls among U.S. radiologic technologists (USRT), we hypothesized the risk from smoking before first pregnancy may be modified by common single nucleotide polymorphisms (SNPs), including 34 SNPs identified through genome-wide association studies (GWAS) and 49 candidate SNPs (13 related to oxidative stress, 17 inflammation, 14 DNA repair, and 5 tobacco metabolism). Odds ratios (ORs) and 95% confidence intervals (CIs) were estimated by logistic regression; likelihood ratio tests assessed interaction. Breast cancer risk increased significantly with increasing cumulative pack-years smoked before first pregnancy (OR for every 5 pack-years=1.10; 95% CI 1.01-1.21) but not after (OR=0.97, 95% CI 0.92-1.01). Five SNPs significantly ($P < 0.05$) modified breast cancer risk associated with smoking before first pregnancy, including four GWAS SNPs (*CD82*-rs7936636, *LSP1*-rs3817198, *STXBP4*-rs6504950, 13q33-rs2391406) and one DNA repair SNP (*XRCC1*-rs25487). However, no interaction remained statistically significant after Bonferroni correction. Our study provides limited evidence that common breast cancer susceptibility loci modify the association between cigarette smoking before first pregnancy and breast cancer risk.

026-S

HISTORY OF PRIOR SCREENING MAMMOGRAPHY AND RISK OF MASTECTOMY AMONG WOMEN WITH BREAST CANCER. *Dookeran KA, Rauscher GH, Silva A. (Division of Epidemiology and Biostatistics, University of Illinois at Chicago; Chicago, IL 60612).

BACKGROUND: We examined whether screening with mammography was associated with less aggressive surgical treatment (i.e. mastectomy use) among 989 non-Hispanic Black, Hispanic and non-Hispanic White women with breast cancer, residing in Chicago and diagnosed in 2005-2008. METHODS: Reported mammography history in the 5 years prior to initial breast cancer discovery was categorized as none (0), occasional (1-3), or regular use (4 or more). Surgery type was defined from self-reports and medical records as breast conserving surgery vs. mastectomy. Logistic regressions were adjusted for age, race/ethnicity, income, education, health insurance and other access variables. Model-based standardization (predictive margins) was used to estimate adjusted risk differences (RD). RESULTS: Mastectomy rates were 51%, 46% and 32% respectively for women reporting no, occasional and regular mammography use ($p < 0.0001$). Compared to non-use, regular use was associated with a 20 percentage point reduction in mastectomy rates (RD = -0.20 $p < 0.0005$). A statistically evident reduction in risk was apparent for women in their forties (RD= -0.24, $p = 0.03$) and sixties (RD= -0.47, $p < 0.0005$), and qualitatively apparent for women in their fifties (RD= -0.11, $p > 0.20$). Mediation analyses (Karlson, Holm and Breen, 2010) revealed that asymptomatic detection and earlier stage at diagnosis accounted for about one-fourth (28%, $p = 0.001$) of mammography's influence in reducing mastectomy risk. CONCLUSIONS: Screening mammography reduces risk of mastectomy among women with breast cancer, but the association is only partially explained by asymptomatic detection and earlier stage at diagnosis.

028

REPRODUCTIVE FACTORS HELP TO EXPLAIN RACIAL/ETHNIC DISPARITIES IN BREAST CANCER AGGRESSIVENESS. Garth H Rauscher*, Debra A Tonetti. (Division of Epidemiology and Biostatistics, University of Illinois at Chicago).

Non-Hispanic (nH) Black and Hispanic women are more likely than their nH White counterparts to be diagnosed with more aggressive tumors that lack estrogen and progesterone receptors (ER and PR). We hypothesized that racial/ethnic variation in reproductive factors would partially account for the greater tendency for ER/PR negative breast cancer in minority patients. The "Breast Cancer Care in Chicago" study included 989 recently diagnosed nH Black, Hispanic and nH White breast cancer patients residing in Chicago and diagnosed in 2005-2008. Results are focused on 242 nH White, 244 nH Black and 101 Hispanic (N=587) postmenopausal patients with available medical record data on ER/PR status. Among postmenopausal patients, 12% of nH Whites, 28% of nH Blacks, and 22% of Hispanics had ER/PR negative disease ($p < 0.0005$). In age-adjusted models, greater number of live births ($p = 0.05$), earlier age at first birth, earlier age at last birth, increasing time since last birth and earlier age at menopause were each associated with ER/PR negative tumors ($p < 0.01$). Mediation analysis using the method of Karlson, Holm and Breen (2010) revealed that age at menopause and timing and number of live births together appeared to account for about 40% of the nH Black-nH White disparity in receptor negative disease (proportion mediated = 40%, $p = 0.02$), but did not appear to account for the Hispanic-nH White disparity. Reproductive differences contribute to racial/ethnic disparities in postmenopausal hormone receptor negative breast cancer. Results highlight the contribution of social and behavioral factors on tumor biology, and provide clues about the etiology of these disparities.

029-S

BASELINE HPV-16 VIRAL LOAD AS A PREDICTOR OF INFECTION CLEARANCE AND HIGH-GRADE LESION DEVELOPMENT AMONG AFRICAN WOMEN. *RA Hanisch¹, SL Cherne², PS Sow³, Q Feng², NB Kiviat², SE Hawes¹ (¹Department of Epidemiology, University of Washington, Seattle, WA; ²Department of Pathology, University of Washington, Seattle, WA; ³Department of Infectious Diseases, University of Dakar, Senegal)

Background: Cervical human papillomavirus (HPV) type 16 viral load may be indicative of other HPV infection characteristics, including time to clearance and development of high-grade squamous intraepithelial lesions (HSIL) and cancer in women. **Methods:** Baseline HPV-16 viral loads were measured in 121 HPV-16 positive study participants (77 HIV-negative, 44 HIV-positive) who experienced longitudinal follow-up. Outcomes included time to HPV clearance and development of HSIL or worse (HSIL+). Viral load was measured by real-time PCR and reported as viral genome copies per cell. Cox proportional hazards modeling was used to calculate hazard ratios (HR) for \log_{10} transformed values of HPV-16 viral load. **Results:** During follow-up, which averaged 1.96 years, 79 (65%) subjects cleared their infection and 36 (30%) developed HSIL+. In age-adjusted multivariate analyses, development of HSIL+ was associated with baseline HPV-16 viral load (HR=1.18, 95% CI 0.91-1.55 per \log_{10}) and HIV infection (HR=1.42, 95% CI 0.64-3.17), although these associations did not achieve statistical significance. Clearance of HPV-16 infection was inversely associated with baseline HPV-16 viral load (HR=0.74, 95% CI 0.64-0.86 per \log_{10}) and HIV infection (HR=0.60, 95% CI 0.35-1.04). **Conclusions:** Increased baseline HPV-16 viral load was marginally associated with development of HSIL+ and strongly associated with lack of HPV-16 clearance. Further studies are needed to more clearly define the role of viral load in the natural history of HPV infection.

032

ASSOCIATION BETWEEN ARSENIC EXPOSURE FROM DRINKING WATER AND ELECTROCARDIOGRAPHIC ABNORMALITY OF HEART RATE-CORRECTED QT-INTERVAL PROLONGATION: RESULTS FROM THE HEALTH EFFECTS OF ARSENIC LONGITUDINAL STUDY. *F Wu, Y Chen, F Parvez, A Ahmed, M Eunos, T R. McClintock, T I Patwary, T Islam, A K Ghosal, S Islam, R Hasan, D Levy, G Sarwar, V Slavkovich, A van Geen, J. H. Graziano, and H Ahsan (New York University School of Medicine, New York, NY)

Arsenic exposure from drinking water has been linked to elevated risks of cardiovascular disease, and the association is more evident for heart disease. However, the underlying mechanism by which arsenic may lead to heart disease is unclear. Prolongation of QT interval and related changes on electrocardiogram (ECG) have been recognized as a risk factor for arrhythmia and sudden cardiac death. We evaluated the association between history of arsenic exposure from drinking water and prolongation of heart rate-corrected QT (QTc), PR, and QRS intervals in 1,715 participants enrolled in 2000 from the Health Effects of Arsenic Longitudinal Study. ECG evaluations were conducted during 2005-2010 with an average of 5.9 years from baseline. Arsenic exposure was measured through baseline well water and urine samples collected at baseline and two subsequent biennial follow-up visits. A dose-response relationship was found between baseline well arsenic and QTc prolongation, defined as a QTc \geq 450 ms in men and \geq 460 ms in women (P for trend = 0.04); the adjusted odds ratio (95% confidence interval [CI]) was 1.17 (1.01-1.35) for one standard deviation (SD) increase in well arsenic (108.7 μ g/L), controlling for potential confounders and changes in urinary arsenic since baseline. The positive association between arsenic exposure and QTc prolongation was more significant in women; the odds ratios were 1.24 (95% CI, 1.05-1.47) and 1.24 (95% CI, 1.01-1.53) for one SD increase in baseline well water arsenic (P for trend = 0.01) and baseline urinary arsenic (P for trend = 0.04), respectively. There was no apparent association of either baseline well arsenic or baseline urinary arsenic with PR or QRS prolongation. The findings suggest that past long-term arsenic exposure from drinking water with an average level of 95 μ g/L (range: 0.1-790 μ g/L) is associated with subsequent QT-interval prolongation, especially in women.

030-S

CRITICAL WINDOWS OF SUSCEPTIBILITY, GENETIC LOCI AND BREAST CANCER RISK. S Warren Andersen*, A Trentham-Dietz, RE Gangnon, JM Hampton, JD Figueroa, M Garcia-Closas, HG Skinner, CE Engelman, BE Klein, LJ Titus, KM Egan, PA Newcomb (UW, Madison WI, 53726)

Research suggests that women may be more susceptible to breast cancer risk during critical windows, such as between age at menarche and first childbirth (standardized AFB) and reproductive lifespan defined as the time from menarche to natural menopause excluding anovulatory phases of pregnancy, lactation and oral contraceptive use. Susceptibility during these windows may be influenced by single nucleotide polymorphisms (SNPs). We assessed these hypotheses in 1663 breast cancer cases diagnosed between 1995-2000 and 1508 community controls who participated in a three state, US population-based study. Information on risk factors was collected through structured telephone interviews. DNA samples were collected by mail. In White participants, 13 SNPs identified by genome-wide association and follow-up studies were genotyped. Odds ratios (OR) and 95% confidence intervals (CI) adjusted for age and state were calculated using logistic regression. Interaction P-values were obtained by adding a cross-product term to statistical models. Women in the quintile for longest standardized AFB interval compared to the shortest had a 1.4-fold (CI:1.18-1.90) increased breast cancer risk. The risk allele of rs10941679 at 5p12 was suggested to modify the relation between standardized AFB and breast cancer risk (P=0.04). The reproductive lifespan OR for postmenopausal women was 1.94 (CI:1.32-2.86) comparing the highest and lowest quintiles. No interactions were detected between SNPs and reproductive lifespan (all P>0.05). Our results confirm that two critical windows are associated with breast cancer risk but that these associations are not materially affected by GWAS-identified SNPs.

033

DUST STORMS AND THE RISK OF ASTHMA ADMISSIONS TO HOSPITALS IN ARABIAN PENINSULA. Thalib L, *Al-TaiarA (Department of Community Medicine and Behavioral Sciences, Faculty of Medicine, Kuwait University, Kuwait)

Objective: Arid areas in the Arabian Peninsula is one of the largest sources of global dust, yet there is no data on the impact of this on human health. This study aimed to investigate the impact of dust storms on hospital admissions due to respiratory and asthma over a period of five-year in Kuwait. **Methods:** A population-based retrospective ecological study of daily emergency asthma admissions and admissions due to respiratory causes in the public hospitals in Kuwait were analyzed in relation to dust storm events. Dust storms days were defined as the mean daily PM10 > 200 μ g/m³ based on measurements obtained from all six monitoring sites in the country. **Findings:** During the five-year study period, 569 (33.6%) days had dust storms events and they were significantly associated with an increased risk of same-day asthma and respiratory admission, adjusted relative risk 1.04 (95% CI: 1.02-1.06) and 1.06 (95% CI: 1.05-1.07), respectively. This was particularly evident among children and young adult. **Conclusion:** Dust storms have significant impact on respiratory and asthma admissions. Evidence is more convincing and robust compared to that from other geographical settings which highlights the importance of public health measures to protect people's health during dust storms and reduce the burden on health services due to dust events.

034-S

ASSOCIATION BETWEEN AIRBORNE PM_{2.5} CHEMICAL COMPONENTS AND BIRTH WEIGHT. *Keita Ebisu and Michelle L. Bell (Yale University, School of Forestry and Environmental Studies, 195 Prospect Street, New Haven, CT, 06511)

Previous studies investigated how exposure to airborne particulate matter <2.5 μm (PM_{2.5}) during pregnancy affects birth outcomes with inconsistent results. Discrepancies across studies might relate to differences in PM_{2.5} chemical components, which are spatially heterogeneous. We explored which PM_{2.5} chemical components affect birth outcomes. Exposure during gestation and each trimester was calculated for PM_{2.5} chemical components, particulate matter <10 μm (PM₁₀) and PM_{2.5} total mass, carbon monoxide (CO), nitrogen dioxide (NO₂), ozone, and sulfur dioxide (SO₂) for births in 2000-2007 for 13 states in the northeastern and mid-Atlantic U.S. Associations between exposures and risk of low birth weight (LBW) were estimated by logistic regression, adjusted by family and individual characteristics and region. Sensitivity analyses included co-pollutant adjustment and analysis of first births only. Interaction terms were used to investigate whether risk differs by race or sex. Several PM_{2.5} chemical components showed associations with LBW. Risk increased 4.8% [95% confidence interval (CI): 3.6-6.2] and 5.5% [95% CI: 4.1-6.8] per interquartile range increment of aluminum and elemental carbon, respectively. PM₁₀, PM_{2.5}, CO, NO₂, and SO₂ also showed associations with LBW. Pollutants differed in which trimester was associated with the highest risk. Effect estimates for NO₂ and PM_{2.5} elemental carbon were higher for whites than African-Americans. PM_{2.5} elemental carbon's estimate was higher for males than females. Most of our study area complies with Environmental Protection Agency PM_{2.5} standards; however, we identified an association between PM_{2.5} and LBW. Findings indicate that some PM_{2.5} chemical components may be more harmful than others.

036-S

SMARTPHONE TECHNOLOGY FOR IMPROVING AIR POLLUTION EXPOSURE ESTIMATES. *M. Glasgow, L. Mu, P. Nayak, C. Crabtree-Ide, M. Demirbas, E. Yoo, A. Szpiro, A. Rudra, J. Merriman, J. Wactawski-Wende, and C. Rudra (SUNY Buffalo, Buffalo, NY 14214).

Background : Inability to account for a person's changing location over time is a major limitation of the integrity of air pollution exposure assessment. Time-activity measurement is key for improving such estimates because of spatial variability of air pollution levels and person location. Thus, the current study explores the feasibility of using smartphones to collect person-level time-activity data. **Methods**: With Skyhook, Inc.'s hybrid geolocation system, we built a background-running application (app) for Android™ smartphones to log the best estimate of a participant's location (geocoordinate-time data) in 5-minute intervals over 90 days. Privacy periods ($t \leq 24$ hours) are participant-defined. We are recruiting smartphone owners in the Buffalo-Niagara region in summer and winter cohorts ($n \geq 30$ /season) and monitoring data daily. We collect information on demographics, health, smoking, diet, physical activity, home environment exposures, smartphone characteristics and use, and home and workplace addresses. We compare the app's data to self-reported 24-hour location history during a weekday and a weekend day (randomly assigned). The app's data will help us design and optimize algorithms for land-use regression and kriging models to make mobility-based exposure estimates for comparison to residence-based estimates. **Results & Discussion**: After finding app bugs and data collection issues among participants in a pilot study ($n = 8$), we updated the app accordingly for a full study. The app is low-cost, low-burden, and efficient in data collection. The app's intensity and feasibility for collecting time-activity data allows future improvements of the accuracy of air pollution exposure assessments in large study populations.

035

POPULATION DETERMINANTS OF MERCURY LEVELS IN KOREAN ADULTS: 2008-2009 KOREAN NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY *Kyong Park, *Seongbeom Cho, Dariush Mozaffarian (Yeungnam University and Seoul National University, South Korea)

High level of Methylmercury (MeHg) may result in toxic effects on neurodevelopment and possibly other health outcome. The major environmental source of MeHg is dietary consumption of fish. To evaluate national levels and major determinants of MeHg in Korean adults, we analyzed dietary habits and geographic residence, demographic factors, and lifestyle habits, assessed by self-administered questionnaires in the 2008-2009 Korean National Health and Nutrition Examination Survey, a nationally representative cross-sectional survey. Blood total mercury (Hg) concentration was measured using a cold-vapor atomic absorption spectrometric method among 3,997 men and women aged 20-87 years. Thirty-nine percent of Korean adults had levels >5 μg/L, the human biomonitoring (HBM)-I reference value, and 37.8% of women of childbearing age (20-49 years) had levels >5 μg/L. In multivariable-adjusted analyses, fish consumption (1.3% higher per week) was a significant predictor of higher Hg. Non-dietary independent predictors of higher Hg were male gender (8.3% higher levels); alcohol drinking (9.6% higher than non-drinkers); the highest quartile of income (7.8% higher than the lowest quartile); college graduation (2.7% higher than middle school graduation or lower); obesity (8.1% higher than normal); older age (1% higher per 10 years); and living in the southeast region (17% higher than midwest). Both dietary and non-dietary factors are associated with MeHg exposure in South Korea. Associations of these factors could relate to types of fish selected (e.g., higher vs lower MeHg fish or marine mammals such as whale meat) or geographic variation in MeHg levels of locally caught fish.

037-S

DETERMINING THE DIURNAL PATTERNS OF INDOOR AIR POLLUTION IN AN URBAN COMMUNITY IN DHAKA. H. Salje¹, E. Gurley^{1,2}, N. Homaira², P. K. Ram³, R. Haque², W. Petri⁴, J. Bresee⁵, W. J. Moss¹, J. Lessler¹, S. P. Luby^{2,5}, P. Breyse¹, E. Azziz-Baumgartner^{2,5} (Johns Hopkins Bloomberg School of Public Health, ²International Centre for Diarrheal Diseases Research, Bangladesh, ³University at Buffalo, ⁴University of Virginia, ⁵Centers for Disease Control and Prevention.)

Exposure to fine particulate matter (PM_{2.5}) from the burning of biomass fuels is associated with increased risk of respiratory disease and mortality among children. However, it is unclear whether households that use cleaner fuels such as natural gas or have electric stoves still experience elevated levels of PM_{2.5} in communities where biomass burning exists due to the ambient dispersal of particulates. To address this gap, we collected minute-by-minute PM_{2.5} concentrations over 24-hour periods from 257 households in an urban Dhaka community once a month between May 2009 and April 2010, reflecting over four million exposure measurements. We used generalized additive models to characterize the diurnal variability in the effect of cooking fuel on indoor PM_{2.5} concentrations. Biomass use was associated with up to a 1.7 times (95% confidence intervals: 1.6 - 1.8) increase in household PM_{2.5} around morning, lunch and evening periods compared to use of clean fuels. Households that used clean fuels had a clear trimodal pattern in diurnal PM_{2.5} concentrations with peaks of up to 89 μg/m³ (84 - 94), over three times the WHO recommended level, at the same times as when biomass was found to be a significant predictor of PM_{2.5} in biomass burning households. Cooking fuels of neighbors may therefore partially determine household PM_{2.5} exposure levels. These findings have potentially important implications for community stove intervention projects.

038-S

THE EFFECT OF EXTREME HEAT DURING SUMMER ON BIRTH WEIGHT AMONG TERM BABIES IN NEW YORK STATE, 1991-2006. S. Lin, *A. Soim, S.A. Hwang (New York State Department of Health, Troy, NY, 12180)

The relationship between meteorological factors and low birth weight (LBW) is not well understood. Few studies examined the effect of high ambient temperatures during the warm season on birth weight (BW). The objective of this study was to assess the effect of extreme heat on BW. Using a case-control study design, cases were defined as LBW (BW < 2,500 g) term babies (gestational age > 37 weeks). Controls were normal BW term babies. Cases and controls were born in 10 New York State weather regions between 1991 and 2006. Two heat wave (HW) indicators were assigned for each region: 1. at least 3 consecutive days with maximum temperature 90°F or above (HW90); 2. at least 2 consecutive days with maximum temperature equal or above the 97th percentile of the maximum temperature distribution (HW97). HW frequency and duration were also examined. Exposure odds ratios (OR), linear regression parameter estimates, and 95% confidence intervals (CI) were calculated using logistic regression and linear regression, while controlling for other weather factors, air pollution, and maternal socio-demographic variables. HW97 showed the strongest and most consistent association with LBW (OR = 1.05, 95%CI: 1.01-1.08 for the entire pregnancy, and OR = 1.10, 95%CI: 1.05-1.16 for the first trimester). Linear regression parameter estimates showed that HW97 in the 1st trimester was associated with a significant 11.25 g decrease in BW. A similar pattern was observed for HW90 but fewer estimates were statistically significant. No dose-responses for HW frequency or duration were observed. Extreme heat events during pregnancy may be associated with LBW among term babies with the strongest effect if the event occurred in the 1st trimester of pregnancy.

040

PROSPECTIVE STUDY OF URINARY TOTAL ARSENIC CONCENTRATION AND LUNG-RELATED MORTALITY IN BANGLADESHI ADULTS. *M. Argos, F. Parvez, M. Rahman, T. Islam, J. Baron, J. Graziano, and H. Ahsan (University of Chicago, Chicago, IL, 60637)

Background: Chronic arsenic exposure through drinking water is a growing public health issue affecting millions of people worldwide, including 35 to 57 million in Bangladesh. Objectives: Utilizing data from the Health Effects of Arsenic Longitudinal Study and the Bangladesh Vitamin E and Selenium Trial, we evaluated the association between chronic arsenic exposure and lung-disease mortality using a prospective design and individual-level assessment of arsenic exposure. Design: Study participants, aged 18-75 years at enrollment, have been chronically exposed to arsenic at various doses through the consumption of groundwater. Individual-level arsenic exposure was measured at baseline by urinary total arsenic concentration. Vital status was assessed through December 2011, and cause of death was determined using a verbal autopsy interview. Cox proportional hazard regression models were used to estimate hazard ratios and their 95% confidence intervals (CI) for various categorizations of lung disease mortality with respect to arsenic exposure. Results: The mean follow-up time was 6.7 years (181,159 total person-years), with 181 lung-related deaths assessed. A 1 standard deviation increase in urinary total arsenic concentration was associated with a 16% increase in lung disease mortality (95% CI: 1.06, 1.28), with stronger trends observed among smokers. Conclusion: Significant associations between arsenic exposure and lung-related mortality were observed in this study. While initiatives to reduce exposure to arsenic through drinking water are on-going, investigation into solutions to mitigate the resulting health effects of arsenic exposure deserve urgent attention.

039

ENVIRONMENTAL QUALITY AND INFANT MORTALITY. Jagai JS* (U.S. EPA, RTP, NC 27711), Messer LC, Rappazzo K, Lobdell DT

The relationship between environmental conditions and human health varies by environmental media. In order to account for multiple ambient environmental conditions, we constructed an Environmental Quality Index (EQI) for health research. We used U.S. county level data representing five environmental domains (air, water, land, built and sociodemographic) and principal components analysis to construct the EQI and domain specific indices for each county (n=3141). Fixed slope, random intercept multilevel logistic models assessed relationships between county-level EQI and domain specific indices with infant mortality (IM) using U.S. linked births/infant deaths data for 2002 (4,027,479 birth records; 27,527 infant deaths). In models adjusted for maternal age, education, marital status, and infant sex, residence in a county with poor environmental quality (4th quartile) compared to the best quality (1st quartile) was not associated with IM (odds ratio (OR) = 0.98; 95% confidence interval (95%CI): 0.91, 1.07). When examining domain specific indices and IM, residence in counties with the worst air and built environment conditions, compared to residence in counties with best conditions, was associated with increased odds of IM (air: OR = 1.04, 95%CI: 0.96, 1.14; built: OR = 1.09, 95%CI: 1.02, 1.17). However, the opposite relationship was estimated for water, land, and sociodemographic domains (OR = 0.89, 95%CI: 0.84, 0.94; OR = 0.77, 95%CI: 0.73, 0.82; OR = 0.88, 95%CI: 0.82, 0.95, respectively). Race-stratified models were run and results will be presented. We combined data for multiple environmental domains to construct one index representing overall county-level environmental conditions; domain-specific models showed mixed associations with infant mortality. (This abstract does not necessarily reflect EPA policy.)

041

BLOOD LEAD AND GLOMERULAR FILTRATION RATE IN HEALTHY YOUNG WOMEN. Pollack AZ, Mumford SL, Mendola P, Perkins NJ, Wactawski-Wende J, Schisterman EF (NICHD, Bethesda, MD)

Chronic kidney disease is an important public health problem. Cadmium, lead, and mercury effects on functional kidney and liver biomarkers at low exposure levels among a population of healthy premenopausal women have not been evaluated. BioCycle Study participants (n=252) were followed for up to two menstrual cycles. Kidney (blood urea nitrogen (BUN), glomerular filtration rate (eGFR), glucose, protein) and liver (albumin, alkaline phosphatase (ALP), alanine transaminase (ALT), aspartate transaminase (AST), bilirubin) biomarkers were measured in fasting serum samples up to 8 times each cycle. Cadmium, lead, and mercury were measured in whole blood at baseline. Linear mixed models of log-transformed biomarkers were adjusted for age, body mass index, race, alcohol consumption, daily caloric intake, and smoking. Metals were modeled together due to hypothesized shared pathways. Median cadmium, lead, and mercury were 0.31 µg/l, 0.88 µg/dl, and 1.10 µg/l. Mild to moderately decreased kidney function (eGFR < 90) was seen in 34% of women. A 25% increase in lead level was associated with a 1.17% decrease in eGFR (95% confidence interval (CI): -2.24, -0.10) and a 2.32% decrease in BUN (95% CI: -4.03, -0.60). Cadmium was associated with decreased bilirubin while mercury was associated with decreased ALT, glucose, and increased BUN and protein. Cadmium and mercury associated changes in liver and kidney biomarkers did not indicate impairment. In this population of healthy, largely nonsmoking young women, low lead levels were associated with decreased eGFR, a key renal function marker. These findings support the possible role of lead as a potential risk factor for adverse renal function.

042

THE ROLE OF AMBIENT OZONE IN EPIDEMIOLOGIC STUDIES OF HEAT-RELATED MORTALITY. *J.M. Snowden; C.E. Reid; C. Kontgis; I.B. Tager. (Oregon Health and Science University, Portland, OR 97239)

Background: There is a large and growing literature investigating the role of heat and heat waves on mortality. Researchers have conceived of the role of ozone in studies of heat in various ways, sometimes treating it as a confounder, sometimes as an effect modifier, and sometimes as a co-exposure. Taken as a whole, there is a lack of consensus about the roles that temperature and ozone play, as relates to each other, in causing mortality. Objectives: We apply directed acyclic graphs to the topic of heat-related mortality to graphically represent the subject matter behind the research questions and to provide insight on the analytical options available for dealing with ambient ozone. Discussion: Based on the subject matter encoded in the graphs, we assert that the role of ozone in studies of temperature and mortality is a causal intermediate that is affected by temperature and can also affect mortality, rather than a confounder. Conclusions: We conclude by discussing the possible questions of interest implied by this causal structure (e.g., direct effects not mediated through ozone versus total effects of temperature on mortality) and proposing areas of future work to further clarify the role of air pollution in epidemiologic studies of extreme temperature.

044-S

FACTORS ASSOCIATED WITH EXCLUSIONARY CRITERIA IN A RANDOMIZED STUDY OF MSM COUPLES' VERSUS INDIVIDUAL HIV COUNSELING AND TESTING. *Kristin M Wall, Brandon O'Hara, Robert Stephenson, Patrick Sullivan (Emory University, Atlanta, GA)

Introduction: Often inadequate attention is given populations not included in primary analyses due to exclusion criteria, which can affect the external generalizability of study results and limit the ability of researchers to properly identify the target population. Methods: In this study, male couples were recruited and randomized to receive either couples' (CVCT) or individual (VCT) voluntary HIV counseling and testing. Couples in which either partner reported history of recent intimate partner violence (IPV) or feeling coerced to test with his partner were excluded from randomization and underwent VCT. We describe this population excluded from randomization and model factors associated with reporting either exclusion criteria (IPV or coercion). Results: Forty-six of the 190 respondents reported either exclusion criteria. In multivariate analyses, being ages 30-39 (OR = 5.77; 95%CI: 2.15-15.52) versus 18-29, having a high school/GED education (OR = 11.83; 95%CI: 2.26-61.91) or some high school or less (OR = 10.27; 95%CI: 1.70-62.27) versus a college education or higher, and a frequency of anal/oral sex in past year with main partner of 1-10 times (OR = 5.84; 95%CI: 1.65-20.71) or 1-4 times per month (OR = 5.01; 95%CI: 1.03-24.31) versus ≥ 3 times per week were significantly associated with reporting either exclusion criteria. Discussion: Description of the excluded, non-randomized study population and identification of factors associated with having either exclusion criteria indicate that the external generalizability of study results may be limited to more educated, more sexually active, and younger and older segments of the MSM target population.

043

POSTTRAUMATIC STRESS DISORDER AND HIV RISK BEHAVIOR AMONG ARMY NATIONAL GUARD SOLDIERS: THE MEDIATING ROLE OF DEPRESSION. *BDL Marshall, MR Prescott, I Liberzon, MB Tamburrino, JR Calabrese, and S Galea (Columbia University, New York, NY, 10032)

The objective of this study was to examine the relationship between posttraumatic stress disorder (PTSD) and engagement in HIV risk behavior among a sample of Ohio Army National Guard (OHARNG) soldiers, and to determine whether new onset depression after exposure to a traumatic event mediated this association. We analyzed data collected from a representative sample of OHARNG enlisted between June 2008 and February 2009. Participants completed interviews assessing engagement in activities defined by the Behavioral Risk Factor Surveillance System (BRFSS) as HIV risk factors (e.g., intravenous drug use, unprotected anal intercourse, sex work, or treatment for an STD) and were screened for PTSD and depression based on DSM-IV criteria. Logistic regression was used to estimate the direct and indirect effects of PTSD on HIV risk behavior. Of 2,282 participants, 147 (6.4%) reported at least one HIV risk behavior. PTSD was independently associated with HIV risk behavior (adjusted odds ratio [AOR] = 2.1, 95%CI: 1.1 – 3.9), as was depression (AOR = 2.2, 95% CI: 1.5 – 3.2). After depression was included as a mediator, the association between PTSD and HIV risk decreased in magnitude (AOR = 1.8, 95%CI: 0.9 – 3.4), suggesting partial mediation (Sobel test $p < 0.01$). Soldiers with PTSD may be at greater risk of HIV infection due to increased engagement in HIV risk behavior. New onset depression following exposure to trauma appears to mediate this relationship. Integrated interventions to address mental health problems and reduce engagement in HIV risk behavior are in need of development and evaluation.

045

CHARACTERIZING HETEROSEXUAL COMMUNITY VENUES WITH RECENT, PREVALENT AND NO HIV CASES TO INFORM TARGETED HIV TRANSMISSION CONTROL STRATEGIES. *JM Jennings, JM Ellen, J Prekh, S Polk (Johns Hopkins University, Baltimore, MD, 21218)

Background Venues with recent HIV transmission may serve as key targets for control strategies. The objectives were to determine transmission-related characteristics associated with community venues classified as having recent, prevalent, or no HIV infection. Methods A venue-based, cross-sectional study of 18-35 year-olds was conducted in Baltimore from 2008-2009. Community venues, defined as high HIV-risk, outdoor heterosexual sex partner meeting venues, were identified using the Priorities for Local AIDS Control Efforts (PLACE) method. Participants at venues were interviewed and tested for HIV infection. Venue informants were also interviewed. Venues were classified as having 1) recent HIV infection > one participant had a new HIV diagnosis, 2) prevalent HIV infection if > one participant had HIV but none were new HIV diagnoses and, and 3) no HIV infection if no participant tested positive for HIV. Venue-level associations between the venue types and transmission-related characteristics reported in the past 6 months were statistically tested. Results 1391 participants were enrolled at 87 venues. 3% (60) of participants were HIV positive; 58% (35) were recent diagnoses. At the venue-level, 24% (21) were recent HIV infection venues, 20% (16) were prevalent HIV infection venues, and 56% (48) had no HIV. Characteristics which significantly distinguished between venue types were report by \geq one participant of IDU or sharing needles ($P=0.009$) or an IDU or HIV positive sex partner ($P=0.007$). Characteristics which did not significantly distinguish between venues types included report by \geq one participant of exchange of drugs/sex ($P=0.126$) and report by \geq one participant or venue informant of the sales or buying of sex ($P=0.560$) or drugs ($P=0.086$) at the venue. Conclusions Some transmission-related characteristics were significantly different between the three types of venues, however, more work is required to identify characteristics that distinguish between recent and prevalent HIV infection venues.

046-S

FACTORS RELATING TO TIME TO ENTRY INTO MEDICAL CARE AFTER DIAGNOSIS OF HUMAN IMMUNODEFICIENCY VIRUS (HIV). *M. Lowe, and CA Porucznik (University of Utah, Salt Lake City, UT, 84108)

HIV treatments are more effective if started early in the course of infection. However, individuals who test positive often delay entry into medical care. Delays in care result in poorer health outcomes and increased long-term health costs. We used the time from the first HIV diagnosis and the first reported CD4 cell count or HIV viral load test to measure the length of time to entry into medical care and examine factors related to late entry. Data were taken from the Utah HIV/AIDS Reporting System database from 2006 to 2010, and Cox proportional hazards regression was used to calculate hazard ratios and identify variables associated with delayed entry into medical care. Of the 522 newly HIV diagnosed individuals, 340 (65.1%) persons entered care within the first 90 days, 109 (20.9%) after 90 days, and 73 (14.0%) persons never entered care. In the multivariate model, delayed care was associated with the transmission category of no identified risk (NIR) [Hazard Ratio (HR)=0.62; 95% confidence interval (CI)= 0.43–0.88] while a combined transmission category of men who have sex with men and inject drugs [HR=1.27; 95% CI= 0.99–1.63] was marginally associated with earlier entry to care; sex and race/ethnicity were included in the model as potential confounders. Approximately one-third of newly diagnosed individuals did not enter care within the first 90 days demonstrating the need for better linkage to care by medical care providers and HIV counselors who provide test results. Individuals with NIR may benefit from more extensive or additional post-HIV test counseling or case management to identify barriers to entering medical care.

048

UNEQUAL PROGRESS IN DECLINING HIV INFECTION DEATH RATES BY SOCIOECONOMIC STATUS IN 26 STATES: 1993–2007. *EP Simard, M Fransua, D Naishadham, and A Jemal (Surveillance Research Program, American Cancer Society, Atlanta, GA)

Overall declines in HIV death rates may mask important patterns for subgroups, and prior studies of disparities in HIV mortality and socioeconomic status (SES) utilized county-level information which does not capture the importance of individual-level SES. The authors examined temporal trends and inequalities in HIV death rates by sex, race/ethnicity, and individual-level of education (as a proxy for SES). Using data reported to the National Vital Statistics System, HIV deaths among non-Hispanic white (NHW), non-Hispanic black (NHB), and Hispanic men and women aged 25-64 years in 26 states during 1993–2007 (N=92,497) were evaluated. Age-standardized death rates and rate ratios (RRs) were calculated to assess mortality by educational attainment between the least versus the most educated (<12 versus >16 years of education) decedents and by race/ethnicity between NHBs and NHWs. Between 1993-1995 and 2005-2007, overall HIV death rates significantly declined by over 80% for NHW men and Hispanic men and women, 66% for NHB men, 59% for NHW women, and 25% for NHB women. Declines varied by educational attainment, ranging from 10% for the least educated NHB women (non-significant) to 93% for the most educated NHW men. There was a significant trend in the magnitude of declines by level of education (P<.001) for all groups except Hispanic women, resulting in widening gaps between the least and most educated. For example, among men the education disparity (RR) increased from 1.04 (95% CI, 0.89-1.21) to 3.43 (95% CI, 2.74-4.30) among NHBs, and from 0.98 (95% CI, 0.91-1.05) to 2.82 (95% CI, 2.34-3.40) for NHWs. Differences in HIV mortality rates between similarly-educated NHBs and NHWs also significantly widened over time. We document persistent and emerging inequalities in declining HIV death rates. Mortality remains alarmingly high among low SES NHB men and women, underscoring the need for interventions for these groups.

047

CHILDHOOD TRAUMA AND THE STRUCTURE OF BEHAVIORAL SEQUELAE AMONG HIV-INFECTED WOMEN OF COLOR. *Lynne C. Messer, E. Byrd Quinlivan, Heather Parnell, Katya Roytburd, Daniel Westreich (US EPA, Research Triangle Park, NC 27711)

Among HIV-positive women of color (WoC), childhood trauma is associated with later-life substance abuse, depression and abusive adult relationships, but causal mechanisms remain obscure. We examine the total effect of childhood trauma on substance use and depression, as well as the direct effect of childhood trauma on these outcomes not mediated by adult and / or ongoing partner abuse. We use data from the Guide to Healing project, an intervention designed to recruit and retain HIV-positive WoC into appropriate HIV care. Childhood and adult trauma (WHO measure), depression (PHQ9), partner abuse (Index of Psychological Abuse) and substance use data were collected from approximately 250 unique HIV-positive WoC receiving clinical care at the University of North Carolina's Infectious Disease clinic (April 2010-January 2012), along with data on social support and demography. Women were equally distributed across education categories (less than high school (HS), HS, more than HS) and 65% were under 50 years old. About 10% were in non-permanent housing and the majority (72%) were unemployed. Depression, child trauma, adult trauma and partner abuse scales were internally reliable (Cronbach's alpha = 0.87, 0.82, 0.70 and 0.90, respectively). Marginal structural models with stabilized inverse probability weighted linear repeated measures regressions will be used to estimate the total, direct effects of childhood abuse on adult substance use, and depression, which were not mediated by ongoing abuse. This study illustrates how early life violence conditions adult behavioral and emotional sequelae.

049-S

MODELING CLINICAL RETENTION IN THE NORTH AMERICAN HIV POPULATION. *P. Rebeiro, K. Althoff, J. Gill, H. Krentz, K. Gebo, J. Martin, M. Horberg, R. Hogg, J. Thorne, M. Klein, T. Sterling, R. Moore, S. Gange for North American AIDS Cohort Collaboration on Research and Design (NA-ACCORD) (Johns Hopkins University, Baltimore, MD 21205).

Retention in care is key to preventing adverse clinical outcomes in HIV-infected persons. We aimed to compare effect estimates between regression approaches (beta-binomial, linear mixed effects, and Markov transition) modeling correlations differently and identify factors associated with gaps in clinical retention among persons followed in NA-ACCORD clinical cohort studies. We used data from adults with >1 CD4 count or HIV-1 RNA (HIV-lab) from 2000-2008. Gaps in retention were defined each year if individuals did not have HIV-labs measured twice in 12 months, >90 days apart. Models were used to estimate odds ratios (OR), 95% confidence intervals (CI), and intra-class correlations (r). Among 61,438 persons, we identified differences in retention status in age, race/ethnicity, HIV risk, CD4 cell count, baseline highly active antiretroviral therapy (HAART), and country of care. Overall retention prevalence was 83% for the transition model. In adjusted Markov regression, females (OR=0.9, CI:0.9-0.9), older persons (OR=0.9, CI:0.9-0.9 per year), and HAART users (OR=0.8, CI:0.8-0.8) were less likely to have gaps, while Black persons (OR=1.03, CI:1.0-1.1, vs. White), and injection drug users (OR=1.2, CI:1.2-1.2) were more likely to have gaps in retention. Within-individual behavior correlation was high (r=0.8). Similar ORs and correlations resulted from mixed effects (r=0.5) and beta-binomial (r=0.3) models, but sex was not significant. Using laboratory assessments as proxies for clinical care, results from these models elucidate demographic targets for improved clinical retention.

050

HEALTH OUTCOMES FOLLOWING A HEALTH INFORMATION EXCHANGE INTERVENTION FOR HIV PATIENTS. *SN Tshwenko, H Parnell, LC Messer (Duke University, Durham, NC 27705)

Data sharing through electronic networks (Health Information Exchange (HIE)) among HIV care agencies may improve the quality of HIV care. This study describes changes in quality- and health-related outcomes for HIV-positive persons following an HIE intervention. Using an Interrupted Time Series design, we conducted 1274 consecutive interviews in 76 two-week intervals at Wake Forest University Health Sciences (2008-2011). The HIE went live (interruption) on December 1, 2009 resulting in 42 pre- and 34 post-interruption time points. Full segmented regression models produced beta coefficients and 95% confidence intervals (95%CI) that estimated for each outcome, the discontinuity at the time of interruption as well as independent linear pre- and post-interruption trends. Study subjects had a mean age of 43.1 years; 57% were male, 73.4% Black and 71.4% at least high school educated. Following interruption, the percentage of clients adherent to anti-retroviral (ARV) drugs rose by 4.5 points (95%CI: 3.4, 5.6). Case management services increased by 15 visits per 100 clients (95%CI: 14.1, 16.6) immediately after interruption and continued to rise by 1 visit per 100 clients (95%CI: 0.9, 1.2) per month thereafter. Clinic-level CD4 count dropped by 36 cells (95%CI: -41.4, -30.8) right after interruption but rose by 2 cells (95%CI: 1.5, 2.5) per month thereafter versus 1.2 cells (95%CI: 1.0, 1.5) per month pre-interruption. Finally, clinic-level log viral load remained stable across the pre- and post-interruption time series. The HIE intervention has led to significant increases in ARV adherence and case management services. Although CD4 count level dropped immediately post-interruption, there was a stronger positive trend post- compared to pre- interruption.

052-S

EFFECT OF COPAYMENT ON ANTIRETROVIRAL MEDICATION ADHERENCE FOR NEWLY TREATED HIV-POSITIVE ADULTS WITH COMMERCIAL INSURANCE. *J. Todd, W. Miller, V. Pate, and M. Brookhart (University of North Carolina, Chapel Hill, North Carolina, 27599.)

Antiretroviral (ARV) therapy is very effective in reducing morbidity and mortality among HIV-positive patients. Adherence to therapy is extremely important in controlling virus replication, and in limiting the progression of the disease. We examined trends in antiretroviral usage in a large commercial claims database from 2000-2008, as well as the association between antiretroviral copayment and treatment discontinuation. We created a cohort of new users of antiretroviral drugs in the MarketScan commercial claims database. Our exposure was initial treatment copayment, defined as the total copayment for all drugs within a 14 day window of the first drug prescribed. Treatment discontinuation was our outcome, defined as a gap of 15 days from the end of the previous prescription. Graphical methods were used to explore trends in ARV usage. To assess the effect of copayment upon ARV adherence, we used Kaplan-Meier methods and Cox proportional hazards regression to determine the time to treatment discontinuation. We identified 12585 new users of ARVs from 2000-2008. The median age was 41 (Interquartile range: 34, 48), 25% of the cohort was female, and the median initial copayment was \$40 (IQR: \$20, \$75). Non-nucleoside reverse transcriptase inhibitor-based therapy was the most prevalent type of ARV regimen in the cohort through the study period, comprising 43% of regimens in 2008. We found a small effect of initial treatment copayment for patients with very high copayments over \$90, with an adjusted hazard ratio of 1.15 (95% confidence interval: 1.07, 1.23). Such results may bring into question the utility of very high copayments, for patients and insurance payers alike.

051-S

HIV TESTING OF PATIENTS RECEIVING AN STD TEST IN A NORTH CAROLINA COMMUNITY HEALTH CENTER. *P. Klein, A. Bishop, P. Leone (University of North Carolina, Chapel Hill, NC, 27599)

Background: The CDC recommends routine HIV screening in clinical settings. However, HIV testing of high-risk persons, such as those tested for an STD, remains low. Community health centers (CHCs) may show better adherence to CDC guidelines than other clinical settings. Methods: Patients receiving an STD test June 1, 2009 through May 31, 2010 at a CHC in North Carolina, were evaluated for concurrent HIV testing. Results were compared with a North Carolina emergency department (ED) HIV testing program using Fischer exact tests. Demographic characteristics associated with concurrent HIV/STD testing were assessed with multivariate logistic regression with robust variance estimator to account for patients with multiple clinic visits. Results: Over 1000 syphilis tests were performed; 79% (n=806/1020; 95% confidence interval [CI]: 76.5-81.5%) included a concurrent HIV test. Nearly 2500 gonorrhea/Chlamydial infection (GC/Ct) tests were performed; 35% (n=861/2444; 95%CI: 33.3%-37.1%) included a concurrent HIV tests. The CHC showed better adherence to CDC recommendations than the ED, where only 28.3% of syphilis testers and 3.8% of GC/Ct testers were concurrently tested for HIV (p<0.001). Younger STD testers were more likely to have a concurrent HIV test than older STD testers (syphilis: adjusted odds ratio [aOR] per 10-year increase in age=0.49, 95%CI: 0.41-0.58; GC/Ct: aOR per 10-year increase in age=0.74, 95%CI: 0.67-0.82). Conclusions: Adherence to HIV testing recommendations in the CHC setting is high, but can still be improved. Continued provider education and systematic facilitators may increase HIV testing in this high risk population. Lessons learned from the CHC setting can inform HIV testing strategies in other clinical settings.

053

IMPACT OF THE PENALTY POINTS SYSTEM ON ROAD TRAFFIC CRASHES-RELATED INJURIES IN KUWAIT: 2003-2009. *Saeed Akhtar and Ali H. Ziyab (Faculty of Medicine, Kuwait University, Jabriya, Kuwait)

We examined the effect of penalty points system (PPS) implemented in early July 2006 on the number of road traffic crashes (RTCs) related injuries (severe or fatal) in Kuwait. The monthly counts of RTCs-related injuries occurred between January 2003 and December 2009 were analyzed. We used an interrupted seasonal autoregressive integrated moving average model (SARIMA) to estimate the intervention parameter along with its 95% confidence interval (CI) after accounting for seasonal and trend components in the data series. Based on the SARIMA model, we computed the number of injuries that would have occurred in subsequent 42 months, if PPS had not been implemented. During the study period, a total of 4696 RTCs-related injuries occurred. The Poisson rates of injuries (per 10 million of mean mid-year population and per 10 million of mean registered vehicles) were significantly (p < 0.001) less in post ($\lambda_{\text{post-PPS}} = 7$ and 16) than pre-PPS ($\lambda_{\text{pre-PPS}} = 9$ and 23 respectively) implementation period. The intervention parameter's estimate was -7.68 (95% CI: -14.77, -0.60), suggesting that 322 (95% CI: 25, 620) individuals would have been injured in RTCs in post-PPS enactment 42 months, had it not been implemented. This prevented number of injuries, as a proportion of the 2213 total such RTCs-related injuries observed in the post-PPS enactment period translates to 14.6% (95% CI: 1.1 %, 28.0 %) reduction. These findings suggest that PPS implementation in Kuwait resulted in a significant reduction in the number of RTCs-related injuries in ensuing period. Future studies may focus on evaluating the long term effect of PPS implementation.

054

INJURY RATES IN TEAM SPORT EVENTS: TACKLING CHALLENGES IN ASSESSING EXPOSURE TIME. *S Stovitz, I Shrier. (University of Minnesota, Minneapolis, MN & McGill University, Montreal, Canada)

Purpose: Sport events are a risk factor for injury. The definition for exposure time at risk is determined by the research question. For most questions, game exposure time is best assessed with actual minutes of exposure (play) per athlete. However, athlete-level playing time is often unavailable and exposure time must be estimated on a group level. We compare and contrast injury rates within and across sports calculated via two common methods for estimating game exposure time. **Methods:** We used published game injury counts and rates gathered from the NCAA Injury Surveillance System for collegiate women's soccer, hockey and basketball. They defined exposure time as "one athlete participating in one game" (athlete participating, AP). We recalculated injury rates, defining exposure time as the number of athletes on the field at one time, i.e. the only time they are at risk (athlete at risk, AAR). **Results:** Compared to the AP method used in the original publications, the AAR method results in game injury rates that are nearly 3-fold higher in hockey, 2-fold higher in basketball and approximately 1.5-fold higher in soccer. Whereas the published reports listed soccer as having a per game injury rate 1.3 times higher than hockey and approximately 2 times higher than basketball, recalculation using AAR method reveals that soccer has a game injury rate 0.6 times that of hockey and only 1.5 times that of basketball. **Discussion:** Recognition that the two methods for estimating exposure time lead to different results (due to answering different questions) is necessary to properly assess risk factors for injuries in team sport events, appropriately target injury prevention efforts and accurately combine studies using different methods in systematic reviews or meta-analyses.

056-S

THAT MUST HAVE BEEN SOME TOOTHACHE! ESTABLISHING STATE-BASED EPIDEMIOLOGIC SURVEILLANCE OF DENTAL COMPLAINTS IN EMERGENCY DEPARTMENTS. * J Roesler, A Adeniyi, C Che (MN Dept of Health, St. Paul, MN 55101)

BACKGROUND Pain from toothaches represents a significant problem. People lacking access to private dental services may use emergency departments (EDs) for both traumatic and non-traumatic dental care. Prior studies indicate that ED visits for dental problems have been increasing; the majority are non-traumatic in nature. In establishing an ongoing epidemiologic surveillance system for oral health, we examine baseline incidence and characteristics of ED-treated traumatic and non-traumatic dental emergencies. **METHODS** We used statewide hospital treatment and discharge data. ED-treated cases were identified using ICD-9-CM diagnostic codes, V-codes, and procedure codes. Using 2007-2011 data, we describe non-traumatic dental related complaints. We also analyzed the incidence and characteristics of trauma related dental data, beginning in 1998. **RESULTS** Bivariate and multivariate analyses of the data will be presented. Results include calculation of risk ratios and trends of selected population groups presenting to the ED. **CONCLUSIONS** Oral pain is a significant problem. Prior studies indicate that ED visits for dental problems have been increasing and most are non-traumatic. EDs are an important point of care for dental-related complaints, particularly for individuals who lack private insurance. ED providers regularly triage, diagnose, provide basic treatment, and ensure appropriate follow-up care for dental problems. More training for emergency medicine providers about the importance of dental care during and after ED visits is needed. Use of risk ratios allow identification of high risk groups that may benefit from targeted interventions and early and ongoing preventative dental care.

055-S

EFFECT OF RATING OF MANAGEMENT ATTITUDE AND COMMITMENT ON INJURY RATE AND SEVERITY IN SMALL AND MEDIUM SIZED CONSTRUCTION COMPANIES. *KE Schofield, BH Alexander, SG Gerberich, AD Ryan (University of Minnesota, Minneapolis, MN 55455)

Hazards in the construction industry can be modified by human and organizational elements. We evaluated worker compensation claims data covering (1,360) construction companies from 2004-2009 to determine association of safety professionals' evaluations of management attitude and commitment to safety on injury rate and severity. Employee hours at-risk and claims were used to determine injury rates. Rating of management attitude was done by safety professionals, employed by the insurance carrier, upon initial visit to member companies. A company had no rating until the initial visit. Based on an evaluation process to characterize hazard control practices of a company, and interactions between the company and safety professional, an attitude and commitment rating was assigned. Rate ratios (RR) and 95% confidence intervals (CI) were estimated as a function of injury rate using a Poisson regression model. Generalized estimating equations were used to account for correlated observations within companies. Models include confounding covariates of company size, union status, and trade. Ratings were categorized as: good; poor; and not yet rated. Compared to good, results for these categories, respectively, were RR=0.94 (CI=0.74-1.19) and RR=1.11 (CI=1.03-1.21) for overall injuries, and RR=1.15 (CI=0.85-1.55) and RR=1.13 (CI=0.99-1.28) for lost-time injuries. Our results indicate subjective rating of attitude and commitment from a single visit may not be indicative of injury risk. However, workers were at increased risk of injuries prior to contact with the safety professional. Initial contact by a safety professional may allow for improved procedures to control risk of injury.

057-S

BOOMERS & THEIR HARLEYS? TRENDS IN MOTORCYCLE CRASH INJURY. *J Roesler, L Seymour, A Gaichas, A Adeniyi, M Kinde. (MN Health Dept, St Paul, MN 55101).

BACKGROUND Motorcycles are the most dangerous type of motor vehicle. Nationally, these vehicles are involved in fatal crashes at a rate of 35.0 per 100 million miles of travel, compared with a rate of 1.7 per 100 million miles of travel for passenger cars. An increasing annual trend has been noted in motorcycle deaths, especially among those >40 years. A better understanding of the problem is needed. **METHODS** A Crash Outcomes Data Evaluation System (CODES) project was implemented where crash data for individuals (provided by law enforcement) were linked with hospital emergency department (ED) / inpatient treatment information. Other data are linked, including vehicle characteristics, traumatic brain registry outcomes, and trauma center data. The 2004-2005 CODES data involving motorcycles was examined, as well as hospital data back to 1998, the traumatic brain / spinal cord injury registry back to 1993, and mortality data back to 1990. **RESULTS** From 1997-2006 the number of licensed motorcycle operators increased by 20%, proportionate to the growth in population. During the same time period the number of licensed motorcycles increased by 75%; the number of fatalities increased by 183%. The results provide insight and update the continued increasing trend in motorcycle rider mortality, morbidity, and disability. The results will explore in detail the interaction between other variables including operator age, speed, injury severity, and type/manufacturer of motorcycles. **CONCLUSIONS** This analysis provides both epidemiologic understanding and potential policy implications, such as helmet and alcohol usage. Policy, educational, enforcement and other interventional strategies incorporating these findings should be implemented.

058

DIFFICULTY IN INTERPRETING CHRONIC DISEASE TREATMENT EFFICACY COULD BE ADDRESSED BY MENDELIAN RANDOMIZATION. *CM Schooling (CUNY School of Public Health at Hunter College, 2180 Third Avenue, New York, NY 10035, USA), G Freeman, BJ Cowling (School of Public Health, The university of Hong Kong, Hong Kong SAR, China)

Prevention and treatment of common non-communicable chronic diseases (NCDs) has been revolutionized by the development of therapies. Recently several randomized controlled trials (RCTs) designed to assess the efficacy of new therapies targeted at well-established NCD risk factors have reported lower benefits than expected. Subsequent observational analysis of the same trial data has not clarified these unexpected findings. Mendelian Randomization (MR) provides an approach to estimating causal effects from observational or trial data, and thus provides complementary information to an RCT. An RCT assesses the efficacy of a therapy, but does not confirm the underlying mechanistic pathway, an MR study does not assess efficacy, but assesses causal effects on an underlying mechanistic pathway. We suggest that incorporating an MR study into an RCT at the design stage would improve etiologic understanding of current therapies, and enhance the search for therapies for the significant amount of non-communicable chronic disease which remains untreated.

060

CAN WE TRUST ESTIMATES OF RISK DIFFERENCES AND THEIR CONFIDENCE INTERVALS, IF BASED ON LOGISTIC REGRESSION? S. Johansson, A. Noor, *A. Grimby-Ekman (Department of Public Health and Community Medicine, Gothenburg University, SE-405 30 Gothenburg, Sweden)

Musculoskeletal pain is a common symptom causing a large amount of sick-leave and reduced quality of life for the individual. Identifying possible risk factors is therefore an important task, and also to estimate the effect of these factors. In a study of neck pain the desired effect measure was chosen to be the risk difference, an absolute effect measure. As neck pain is a common outcome odds cannot be used to approximate the risk. Therefore the risks were calculated based on the parameters in the logistic regression. These calculations are usually not implemented in statistical computer programs and neither is the calculation of their confidence intervals (CI:s). In addition the properties of the estimates and their CI:s are not well-known. The aim of this study was to compare the properties of three estimation methods for these CI:s. In the neck pain study, chosen as an illustration, the outcome (pain/no pain) were measured repeatedly over time for each individual. The risk difference with 95% CI, were therefore estimated based on a random intercept logistic model (SAS 9.2, Proc Nlmixed). Using simulations three different methods of calculating CI:s for risk differences were compared; Wald procedure, Mover method (method of variance estimates recovery) and Fishers z-transformation based method. The coverage and length of the confidence intervals were compared, for various sample sizes, risk levels and random intercepts. The results showed that the Mover method generally was the method which performed best, although in some cases it produced conservative confidence intervals.

059

INNOVATIVE APPROACHES TO SAMPLE AND RECRUIT ADULTS LIVING IN A PREDOMINANTLY POOR, RURAL, UNDERSERVED REGION INTO A HEALTH STUDY. *Vanessa Short, Lei Zhang (Mississippi Department of Health, Jackson, MS 3921)

The use of random-digit-dialing (RDD) for conducting health surveys is increasingly problematic due to the replacement of landlines with cellular phones. Adults in cellular-only homes tend to be young, have low incomes, and be members of minority populations, so RDD may increase the risk for coverage bias in areas with high percentages of minority and low income households. The Mississippi Delta Cardiovascular Health Examination Survey (Delta CHES) is a population-based study of 1,300 adults living in the MS Delta, a predominantly African-American, rural, impoverished area. The objective is to assess the prevalence of cardiovascular disease and its risk factors. The Delta is a difficult place to ascertain study data due its rurality, low landline phone coverage and low education of many residents. Thus, innovative approaches using a 2-stage address-based sampling method are used to reduce potential biases of traditional RDD. The sampling frame was purchased and contains all residential addresses in the Delta that receive mail and phone numbers of households, when known. GIS was used to construct an address frame that matched the geographies of the study population. A call or an in-person visit to households is made to enumerate adults who live in the household to determine if there are eligible persons. The Kish sampling method is then used to randomly select one eligible adult per house to participate. A subsequent data collection visit is scheduled at participants' homes. Due to the unique sampling and recruitment methods, Delta CHES could serve as a model on how to avoid using RDD to recruit and enroll participants from rural or other disadvantaged and difficult to reach populations.

061-S

RECORD-LEVEL BIAS ANALYSIS FOR UNCONTROLLED CONFOUNDING IN CANCER POOLING PROJECTS WITH MULTIPLE INVESTIGATORS. C. A. Thompson*, V. W. Setiawan, Z. F. Zhang, and O. A. Arah; for the Epidemiology of Endometrial Cancer Consortium (E2C2) (UCLA School of Public Health, Los Angeles, CA 90095)

Large pooling projects are pivotal to cancer epidemiology although some sub-studies usually lack comprehensive data on important variables for adequate confounding control. Despite this, cancer consortiums rarely undertake bias analysis to explore the influence of systematic error on their target estimates. One common obstacle to this type of analysis is the lack of methods that allow for a shared framework for bias adjustment that are accessible to all investigators across the consortium. In this paper, we present an accessible framework of Monte Carlo techniques that may be used to apply record-level bias adjustment at the pre-analytic stage, building on a non-parametric causal structure and prior specifications that can be adjusted according to study-specific expectations and according to the contributing investigator's preference. The resulting augmented raw data can then be used in any statistical software package for a comprehensive bias analysis, with flexibility regarding model fitting and covariate choices. We illustrate these methods for adjustment of uncontrolled confounding by smoking status on the relationship between BMI and Endometrial cancer, using data from the Epidemiology of Endometrial Cancer Consortium, a large multi-study pooling project. The concept of a bias analysis "workhorse" being implemented in a large consortium pooling project is a novel one, and its potential benefits to both the cancer consortium and greater academic audience are considerable. As pooling of data becomes increasingly commonplace for studying rare exposures and outcomes, making bias analysis of uncontrolled confounding more accessible should be a priority for all involved.

062-S

ACCOUNTING FOR MISCLASSIFIED OUTCOMES USING MULTIPLE IMPUTATION WITH INTERNAL VALIDATION DATA. *JK Edwards, SR Cole, DB Richardson (UNC, Chapel Hill, NC, 27599)

Outcome misclassification is widespread in epidemiologic studies, but methods to account for it are rarely used. We describe how multiple imputation can be used to reduce bias if validation data are available for a subgroup of study participants. This approach is illustrated using the Herpetic Eye Disease Recurrence Factors Study, a cohort of 308 participants nested in a larger randomized trial of acyclovir to prevent ocular HSV (48% female, 85% white, and median age of 49). Self-reported (n=45) and physician-diagnosed (n=64) outcomes were available for all 308 participants. The odds ratio (OR) comparing physician-diagnosed outcomes between acyclovir and placebo groups was 0.62 (95% confidence interval (CI): 0.35, 1.09). To evaluate the proposed multiple imputation approach, we discarded physician diagnosis except for a 30% validation subgroup (n=91). Multiple imputation (OR=0.60; 95% CI: 0.22, 1.65) was compared to a naïve analysis using self-reported outcomes (OR=0.90; 95% CI: 0.47, 1.73), analysis restricted to the validation subgroup (OR=0.57; 95% CI: 0.20, 1.59), and direct maximum likelihood to account for outcome misclassification (OR=0.57; 95% CI: 0.21, 1.58). In simulations, multiple imputation and direct maximum likelihood had greater statistical power than analysis restricted to the validation subgroup, yet all three provided unbiased estimates of the OR under scenarios with differential or nondifferential misclassification. Multiple imputation also permitted unbiased estimation of risk ratios, which has not been addressed in the existing literature on direct maximum likelihood methods. Multiple imputation has advantages with regard to flexibility and ease of implementation for epidemiologists familiar with missing data methods.

064

CORRECTING FOR DISEASE MISCLASSIFICATION IN CASE-CONTROL STUDIES: APPLICATION TO CLEFT LIP/PALATE AND MATERNAL CIGARETTE SMOKING BIRTH CERTIFICATE STUDY. *A. Jurek and G. Maldonado (University of Minnesota, Minneapolis, MN 55455)

Disease misclassification can occur in any epidemiologic study. It is known that current correction formulas cannot be directly applied to case-control studies because they do not account for case-control sampling. We begin by showing why an incorrect answer results when case-control sampling is ignored. We then present a simple method to correct for disease misclassification in case-control studies to properly account for case-control sampling. First, we use the sampling fractions to reconstruct the entire study population data. Then we correct the entire study population data for disease misclassification. Finally, we sample from it to yield the observed data corrected for disease misclassification. We illustrate our method using a birth certificate case-control study of cleft lip/palate and maternal cigarette smoking. We calculated odds ratios corrected for cleft lip/palate misclassification. Based on limited validation data for cleft lip/palate classification rates, we specified various sensitivity values between 40% and 70%. The observed data constrained specificity values to be very high (> 99%). Classification rates were assumed to be differential. When correcting for disease misclassification, current correction formulas, which ignore the case-control sampling, can yield incorrect results. For example, an odds ratio corrected for disease misclassification while ignoring sampling fractions was 1.5, whereas accounting for both disease misclassification and sampling fractions yielded an odds ratio of 1.1. To properly account for disease misclassification in case-control studies, one must be careful to account for case-control sampling.

063

CIGARETTE SMOKING QUESTIONNAIRES FOR EPIDEMIOLOGICAL STUDIES. *Z Sponsiello-Wang¹, R Weitkunat¹, C Coggins², G Kallischnigg³, and R Dempsey^{1,4} (*¹PMI R&D, Quai Jeanrenaud 5, 2000 Neuchâtel, Switzerland; ²Carson Watts Consulting, NC, USA; ³ARGUS-Statistics and Information Systems in Environment and Public Health, D-10785 Berlin, Germany; ⁴PMI Operations, Neuchâtel, Switzerland.)

Cigarette smoking is one of the most investigated risk factors in epidemiology. As for many other areas, the definition and measurements of smoking exposure have not been fully standardized. Consequently, the assessment of cumulative smoking exposure has been and still is being undertaken in various ways. While a very detailed assessment may be required for studies with a focus on particular health effects of smoking, comparability of the core measurements and results across studies would be advantageous. To address the problem of heterogeneity of smoking exposure assessments, a core set of questions to assess cumulative cigarette smoking is proposed. The practical and short questionnaire covers the major dimensions of cigarette smoking, and complies with the major current criteria used for defining smoking history and status. Our procedure appears to provide a useful, sufficient, and coherent standard and allows for deriving various definitions and metrics of smoking exposure, without the need for applying complex questionnaires. By capturing the essential information on individual smoking behaviors and histories, the smoking questionnaires should facilitate standardization of exposure assessment across studies and thus comparability of results. Our procedure should be of considerable value in studies where a very high level of detail of smoking exposure assessment is not required or where smoking is not the major subject of investigation, thus providing a basis for making methods and results more comparable across studies.

065

METHODS AND MANAGEMENT: CVD EPIDEMIOLOGY AND SCIENCE ADMINISTRATION AT THE NATIONAL INSTITUTES OF HEALTH. *Sejal Patel (National Institutes of Health, Bethesda, MD 20892)

Many leading epidemiologists including Mervyn Susser, Kenneth Rothman, and Neil Pearce have remarked on the shift in purpose, orientation, and practices that took place in epidemiology during the 1960s. Describing it as a “new paradigm” or as the transition from “traditional to modern epidemiology,” these commentators have described epidemiological practices since 1960s as characterized by rigorous methodologies and experimental designs and an orientation around individual-level risk factors, to name just a few features. Historians and epidemiologists have also correctly attributed these shifts to the professionalization of the field as a basic biomedical science and its increasing orientation around the chronic diseases, among other historical factors. This presentation contributes to an understanding of the history of CVD epidemiology by describing how science administration at the National Heart Institute during this formative period contributed to these critical shifts in epidemiology. It will explain how new federal mandates to provide reliable projections of program payoff and other forms of budgetary oversight and accounting led administrators to privilege certain types of scientific programs over others. Within this political context of the NIH, population- or community-based interventions in CVD epidemiology became more administratively challenging due to their broad scope, for example. The goal of this presentation is to improve investigators’ understanding of how the politics of science administration shape scientific fields and endeavors such as epidemiology and population-level studies of health and disease. It will also contribute to a fuller understanding of the history of epidemiology as a profession and a scientific approach to health and disease.

067

LIMITATIONS OF COMMUNICATING RISKS WITH SUMMARY EFFECT MEASURES. *I Shrier (McGill University), S Stovitz (University of Minnesota)

Clinicians must effectively communicate treatment risks and benefits so that patients can make decisions consistent with their values. When comparing treatment choices for dichotomous outcomes, relative risk (RR) and relative risk reduction (RRR) can be difficult to interpret, and risk differences (RD) are generally preferred. More recently, the number needed to treat (NNT: reciprocal of RD) was proposed as simpler for patients to understand. Advocates also claim NNT incorporates “both baseline risk without treatment and risk reduction with treatment”. When discussing how to interpret summary effect measures, authors usually assume a constant effect across BR, and by omission, suggest that BR provides no additional value toward making an informed decision under these conditions. The theory that any summary effect measure obviates the need to also present BR is based on “expected utility theory”. This presentation will highlight why decisions based on individual value systems require that patients know their BR regardless of the summary effect measure. For example, some patient-important outcomes are independent of treatment but dependent on BR (e.g. anxiety); the value associated with a particular risk difference may be dependent on BR; the paradigm of uncertainty is different from that of certainty; and values for gains and losses are asymmetrical. Since BR is essential, it appears most rational to present BR and risk under treatment rather than BR and a summary effect measure; summary effect measures should only be considered adjunctive information. In medical reporting, summary effect measures are useful to clinicians and patients only if they are constant enough across the BR for them to be valid when converted to absolute risk under different treatment options.

069

EXPOSURE ASSESSMENT METHODS FOR DRINKING WATER NITRATE IN THE NATIONAL BIRTH DEFECTS PREVENTION STUDY. *P. Weyer, J. Brender, S. Horel, J. Kantamneni, J. Sharkey, M. Shinde, A. Vuong, P. Langlois, P. Romitti, National Birth Defects Prevention Study (University of Iowa, Iowa City, IA, 52242)

Previous studies of drinking water nitrate and birth defects do not account for types of water consumed. Using maternal interview reports of Iowa and Texas participants in the National Birth Defects Prevention Study, we completed an assessment of periconceptional drinking water nitrate exposures. Residences of mothers reporting use of public water supplies (n=2985) were geocoded and linked to municipal water service areas, and nitrate monitoring results were linked to respective periconceptional periods for each mother. For mothers reporting only drinking bottled water (n=1722), we collected representative samples of bottled waters from retail outlets and distribution sites in Iowa and Texas cities where they resided, analyzed the bottled water for nitrate, and assigned median nitrate values for each city. Municipal and bottled water nitrate values were used to calculate individual exposure levels (total nitrate from drinking water) taking into account temporal and spatial variation in nitrate levels for municipal sources. Almost 36% of the control-women reported drinking bottled water exclusively compared with 27% to 38% of the various case-group mothers studied. Median nitrate values varied greatly between municipal and bottled water sources (5.05 mg/L versus 0.33 mg/L as nitrate respectively). If exclusive bottled water drinkers were assigned the municipal water nitrate in their respective residential areas, the median water nitrate for this group would be 2.75 mg/L. Not taking into account sources of drinking water may lead to significant differential misclassification of exposures between cases and controls.

068

CLARIFYING THE USE OF AGGREGATED EXPOSURES IN MULTILEVEL MODELS: SELF-INCLUDED VS. SELF-EXCLUDED MEASURES. *E. Suzuki, E. Yamamoto, S. Takao, I. Kawachi, and S. V. Subramanian (Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama, Japan)

There is an increasing interest in modeling aggregated and individual-level characteristics simultaneously. One can construct two different types of multilevel models by how we define and construct the aggregated variables: self-included model and self-excluded model. In the former, researchers define aggregated variables by including oneself (i.e., self-included measure), and in the latter, researchers define them by excluding self-estimates (i.e., self-excluded measure). This study shows the relations between the two models, facilitating understanding of the potential roles of aggregated variables in the appropriate scientific questions that one is addressing. We illustrate the results with an empirical data about workplace social capital and employees' systolic blood pressure. Although the differences between the two aggregated measures may be mathematically subtle, the distinction has a notable implication since they are closely related to the specific scientific questions and the hypothetical interventions that one is addressing. Reflections on these points would provide the distinct causal interpretations of the estimated coefficients in the two types of multilevel models; researchers assume group-level interventions when using a self-included model, whereas researchers assume individual-level interventions when using a self-excluded model. When investigating the potential roles of aggregated variables, researchers should carefully determine and explain which models are used in each occasion in terms of the hypothetical intervention.

070

METHOD TO ASSESS MULTIPLE CLASSES OF ENVIRONMENTAL CHEMICALS AND LIVER DISEASE: NHANES 2003-2006. K. Christensen* (US Environmental Protection Agency, Washington, DC, 20460), C. Carr, A. Sanyal, C. Gennings (Virginia Commonwealth University, Richmond, VA 23298)

Biomonitoring studies show that humans carry a body burden of multiple classes of contaminants which, while ubiquitous, are not often studied together. Many of these chemicals are thought to affect liver function. We used data from the 2003-2006 National Health and Nutrition Examination Survey to evaluate the relationship between alanine aminotransferase (ALT) and 53 environmental contaminants across six classes (metals; perfluorinated compounds [PFCs]; phthalates; phenols; coplanar and non-dioxin-like polychlorinated biphenyls [PCBs]) using a novel method. Logistic regression models were constructed for each chemical separately, then as a class, using quartiles to represent exposure and adjusting for age, sex, race, income, and BMI. We then used an optimization approach to compile a weighted sum of the quartile scores, both within and across chemical classes, which was validated using a holdout dataset. Using the optimization approach to construct weighted quartile scores, all chemical class-level scores were significantly associated with elevated ALT, with the exception of phthalates. When including all chemicals in one model, 80% of the effect was across four classes of chemicals (metals: mercury; PFCs: PFNA; phthalates: MEHP; phenols: benzophenone-3). When PCBs were included (2003-2004 data), 6 chemicals accounted for 83% of the weight (mercury, PFNA, BPA, benzophenone-3, PCBs 126 and 196). Validation with a holdout dataset indicated that the weighted quartile sum estimator efficiently identifies true associations rather than spurious effects of confounders, with good coverage and power. Disclaimer: This abstract does not necessarily reflect EPA policy.

071-S

NESTING MATTERS: A COMPARISON OF METHODS FOR ANALYZING NON-NESTED CLUSTERS USING THE SEER-MEDICARE DATABASE. J. Lund*, T. Stürmer, and M. A. Brookhart (University of North Carolina, Chapel Hill, NC 27599)

Non-nested clustering of data within multiple levels is common in pharmacoepidemiology. When the correlation of observations within non-nested levels is ignored, parameter estimates are unbiased, but standard errors may be too small. We illustrated the impact of three methods used to handle non-nested clustering of patient observations within physicians and hospitals. We drew upon an existing Surveillance, Epidemiology, and End Results (SEER)-Medicare cohort of stage II/III colorectal cancer patients diagnosed from 2004-2007 to examine the association between stage of disease and the receipt of oxaliplatin, a novel chemotherapy. We described the extent of clustering and compared the estimated standard errors (SEs) and relative efficiency (RE) under three scenarios where clustering was: 1) ignored, 2) adjusted for assuming perfect nesting using a standard generalized estimating equation (GEE) approach, and 3) adjusted for using a GEE method allowing for non-nested clusters. Our analysis included 4,819 patients clustered among 1,579 physicians (interquartile range (IQR): 1-4 patients), and 795 hospitals (IQR: 1-8 patients). Physicians were not perfectly nested within hospitals and treated patients who received care from various hospitals (IQR: 1-2 hospitals). Individuals diagnosed with stage II disease were 0.65 times as likely as those with stage III disease to receive oxaliplatin. The SEs under the three scenarios were 0.04, 0.04, and 0.08 and the REs for scenario 1 vs. 3 and 2 vs. 3 were both 32%, indicating less than nominal confidence interval coverage. Appropriately adjusting for the correlation structure of observations within non-nested clusters is required for correct inference.

073

IMPACT OF AGING ON RESPONSE TO CANCER PREVENTION STUDY-II (CPS-II) QUESTIONNAIRES. Elizabeth Kirkland, *Daniela Dudas, Denise Hudson, W. Ryan Diver, Susan M. Gapstur (Epidemiology Program, American Cancer Society, Atlanta, GA 30303)

In longitudinal cohort studies, response rates to mailed questionnaires might vary according to sex, age and over-time during follow-up. Teasing apart the associations of response rates with sex, age and time may have important implications on when to end active follow-up. The American Cancer Society (ACS) CPS-II Nutrition Cohort is a nationwide study of 184,000 men and women, aged 40 to 92 years at enrollment in 1992. Response rates were computed for living participants who received biennial questionnaires from 1997 to 2007. We examined the relationship between age (i.e., five-year age groups) and response rates in men, women and combined. We also examined the relationship between age and response rates for five-year birth cohorts in men, women and combined. In analyses of men and women combined, overall response rates decreased from 91% in 1997 to 85% in 2007. There was an inverse u-shaped relationship between age and response rate to each biennial questionnaire for the five-year age groups ranging from 40-44 through 90-94 years. For age groups <80 years, the highest response rates were observed in 1997. In general, these results were similar in men and women. In women, response rates to questionnaires over time declined for each birth cohort, however the rate of decline was greatest for older birth cohorts; for birth cohort 1940-1944 response rates to 1997 and 2007 questionnaires were 91% and 86% respectively, whereas for birth cohort 1915-1919, response rates were 89% and 72% respectively. In men, the rate of decline was similar among birth cohorts; for birth cohort 1940-1944 response rates to 1997 and 2007 questionnaires were 87% and 81% respectively, whereas for birth cohort 1915-1919, response rates were 89% and 80% respectively. These results illustrate differences in response rates by sex and age as well as over-time, implying the importance of cohort fatigue in longitudinal cohort studies. Further research is needed to better understand the reasons for non-response.

072

METHODS USED TO ACHIEVE A HIGH RESPONSE TO CANCER PREVENTION STUDY-II (CPS-II) MAILINGS. *Daniela Dudas, Denise Hudson, Elizabeth Kirkland (Epidemiology Program, American Cancer Society, Atlanta, GA 30303)

Some longitudinal cohort studies rely on mailed follow-up questionnaires to capture outcome and update exposure. High response to these questionnaires improves study precision, validity and power. This analysis examines the methods used in six biennial cycles of follow-up to achieve high response rates in the American Cancer Society (ACS) CPS-II Nutrition Cohort. The Nutrition Cohort has 184,000 men and women (mean age 63 years in 1992). First follow-up cycle occurred in 1997 with subsequent biennial cycles through 2007. In 1997, questionnaires were mailed up to six times followed by a phone survey to non-responders with a response goal of 90%. First five mailings used non-profit cost and the sixth used certified mail. For mailings 1-4, questionnaire length was 8 pages (long form). For fifth mailing, randomly assigned non-responders received either the long or a 4-page short form (also used in mailing six and phone survey). Same process was followed for subsequent cycles with three exceptions: long form varied in length from 24 pages in 1999 and 2003 to 12 pages in 2001 and 2005; as of 2003, non-responders to long form were asked to complete only the short form; and, in 2001 and 2003, refusals were contacted using the short form. Overall response in 1997 was 91%, with mailings 1-6 and phone contributing 62, 11, 5, 2, 3, 6 and 2% respectively. For the fifth mailing, response to short form was 14% versus 10% for long. Certified mail had a 49% return rate. Overall response to subsequent cycles ranged from 90% in 1999 to 85% in 2007. First mailing of 1999 long form, which included a food frequency questionnaire (FFQ), and the 2001 long form had return rates of 62% and 69% respectively. We excluded 2001 long form non-responders from the 2003 FFQ mailing yielding a 71% response to first mailing. Refusal conversions contributed 1% to the overall response in 2001 and 2003. Following the methods outlined here, CPS-II observed an 85% to 91% response rate for biennial questionnaire 1997-2007. Two thirds of all data come from first mailing.

074

A COUNTERFACTUAL APPROACH TO BIAS AND MODIFICATION. *E. Suzuki, T. Mitsuhashi, T. Tsuda, and E. Yamamoto (Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama, Japan)

The counterfactual approach provides a clear and coherent framework to think about a variety of important concepts related to causation. In particular, the counterfactual approach to confounding has been widely accessible to epidemiologists since the publication of a paper entitled "Identifiability, exchangeability, and epidemiological confounding" by Greenland and Robins in 1986 (*Int J Epidemiol.* 1986;15(3):413-419). In this study, we aim to further clarify the concepts of bias (confounding bias and selection bias) and modification in the counterfactual framework. We describe hypothetical data frequencies in observational studies as well as randomized controlled trials in terms of response types. These descriptions demonstrate a subtle but significant difference between three distinct types of epidemiologic measures, i.e., association measures, quasi-effect measures, and effect measures. In observational studies, even under the situations in which the information about total population is available, one can only calculate association measures, which is subject to confounding bias. Thus, one aims to analytically block a "path" between confounder and exposure, which hopefully yields quasi-effect measures. By contrast, in ideal randomized controlled trials, one can assume to obtain effect measures. Whenever the information about a portion of subjects is unavailable due to loss to follow-up, one should be also concerned about a possibility of selection bias in each occasion. Finally, we show how one can define the concept of modification for each of the three types of epidemiologic measures, i.e., association-measure modification, quasi-effect-measure modification, and effect-measure modification.

075

ESTIMATING EXPOSURE EFFECTS IN CASE-CONTROL STUDIES FROM RANDOMLY POOLED BIOMARKERS. *Perkins NJ, Schisterman EF. (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD 20852)

Pooling designs have been proposed for epidemiologic studies involving biomarkers and offer a variety of benefits over analysis of individual samples. These benefits include reducing assay costs and increasing efficiency. The majority of the pooling literature relies on pooling biospecimens based on the outcome of interest, so that pools are homogeneous with regard to outcomes. However, most studies hope to address secondary hypotheses on outcomes for which the samples would not be pooled by case status. Existing methods for analyzing pooled data are based on homogeneous pools, thus heterogeneous, mixed pools for a secondary outcome would be omitted from that analysis. This omission of data would reduce the efficiency of secondary analysis and could possibly lead to insufficient data to perform such analysis at all. Using parametric assumptions, normal and gamma distributions, we adapt set-based logistic regression concepts to develop techniques to flexibly estimate exposure effects from pools, both homogeneous and heterogeneous with regard to outcome status. Including heterogeneous pools increases the efficiency of risk estimation over relying solely on homogenous pools available. We performed a simulation study to quantify the benefit of including mixed pools and examined the relation of proportion mixed to matched pools, a reflection of the correlation of the primary pooling outcome and the secondary outcome. Pooled cytokines were used to illustrate these methods. A reduction in the standard error is displayed by including the heterogeneous pools versus using only homogeneous pools.

077-S

EVALUATING THE USE OF CAPTURE-MARK-RECAPTURE FOR DETERMINING THE NUMBER OF MISSING ARTICLES IN SYSTEMATIC REVIEWS. *J Dykeman, P Faris, M Dykeman, N Jette, S Wiebe (University of Calgary, Calgary, Alberta, T2N 4N1)

Background: Capture-mark-recapture (CMR) is used to estimate population size based on overlap between data sources. Using CMR after abstract screening in systematic reviews has been previously proposed to determine if additional databases (DB) should be searched. Our aim was to evaluate CMR at the initial search level of a systematic review. Methods: A systematic review of antiepileptic drug withdrawal in the seizure-monitoring unit was used. DB included MEDLINE (M), EMBASE (E), Web of Science (W), CINAHL (N), and Cochrane Trials Register (C). Binary (0,1) variables were used to indicate which of the DB identified each of the abstracts. Poisson regression models containing significant interaction terms for these codes ($p < 0.05$) were fit and the intercept was taken as the CMR estimate (CMRE, ie. number of missing abstracts). Combinations of three, four, and five DB were used to examine the evolution of the estimate. Results: A total of 10033 unique abstracts were identified by the systematic review. Combining M-E-W, M-E-N, and W-N-C produced a CMRE of 63258, 25652, and 10029, respectively. Combining M-E-W-N and E-W-N-C produced similar CMRE of 17453 and 17772, respectively. Using all 5 DB increased the CMRE to 31694. Conclusion: From a practical standpoint the evolution of the CMRE is nonsensical. Combination of the same number of DB should have behaved similarly and the suggestion of more than 30,000 missing abstracts is unlikely. Heterogeneity between databases (eg. indexed journals, abstract classification) introduces substantial dependencies that violate the assumptions of CMR. Use of CMR should likely be contained to review stages after abstract screening, but further evaluation is needed.

076

UNDERSTANDING AND ESTIMATING CAUSAL EFFECTS IN COMPLEX, MULTI-STAGE SURVEY SAMPLES: A CAUSAL DIAGRAM FRAMEWORK. *K.E. Wirth, E.J. Tchetgen Tchetgen (Harvard School of Public Health, Boston, MA, 02115)

Obtaining representative information from hidden and hard-to-reach populations is fundamental to describing the epidemiology of many sexually transmitted diseases, including HIV. Unfortunately simple random sampling is impractical in these settings as no registry of names exists from which one could sample the population at random. However, complex, multi-stage sampling designs can be used as members of these populations tend to congregate at known locations which themselves can be more easily enumerated and sampled at random. For example, female sex workers may be found at brothels, bars, and street corners whereas injection drug users often come together at shooting galleries. Despite its logistical appeal, complex sampling schemes lead to unequal probabilities of selection across individuals and failure to account for this differential selection can result in biased estimates of population means and relative risks. Inverse probability weighting to account for selection can lead to substantial loss in efficiency. As a result, researchers implement a variety of strategies in an effort to balance validity and efficiency; some fully or partially account for the survey design while others do nothing and simply treat the sample as a realization of the population of interest. We use causal diagrams to show that the presence of selection bias in survey samples will depend not only on the sampling design but also on subject-matter considerations unique to the main scientific question. Finally, we present a novel likelihood-based approach for analyzing complex survey sampled data which optimizes statistical efficiency at no cost to validity.

078-S

THE ROLE OF RECURSIVE PARTITIONING IN ITEM REDUCTION DURING DEVELOPMENT OF AN EVIDENCE-BASED CHECKLIST. *J Dykeman, M Hrabok, EMS Sherman, S Wiebe (University of Calgary, Calgary, Alberta, T2N 4N1)

Background: Methods of item reduction during checklist development typically involve quantifying item covariance. However, methods based on discrimination could play an important role in identifying item redundancy. Our aim was to evaluate the usefulness and validity of recursive partitioning for item reduction. Methods: A systematic review identified 147 articles reporting neuropsychological outcomes of epilepsy surgery. Two reviewers answered yes-no questions on methodology, validity, and clinical utility for each article. Recursive partitioning was used to minimize redundancy across items. 19 items were selected a priori to represent design (4 items), sample (4 items), surgical intervention (5 items), and clinical utility (6 items). Negative predictive value (NPV) and positive predictive value (PPV) were used as indicators of discriminative ability. The reference standard used for the calculation of NPV and PPV were all items of a given grouping being present in the paper. A split sample (74 training articles/73 validation articles) was used for internal validation. Results: The items representing design, sample, and surgical intervention were meaningfully reduced to 4 items compared to the original 13 with NPV and PPV of 100% during both training and validation. Clinical utility was reduced to 2 items with a NPV of 100% during both training and validation, but there was a reduction in PPV from 96.1% (training) to 91.5% (validation). Conclusion: There were 6 items identified which represented the information originally captured by 19 questions with relatively little misclassification. Along with appropriate validation, recursive partitioning is an effective method of item reduction.

079-S

BEVERAGE INTAKE PATTERNS AMONG SOUTHERN ARIZONA AND SONORA, MEXICO RESIDENTS. *J Roberge, RB Harris, V Hartz, OA Contreras, LE Gutiérrez-Millán, MM Meza-Montenegro, JL Burgess, and MK O'Rourke (The University of Arizona, Tucson, AZ, 85724)

Introduction: Consumption of water and other beverages are a necessary part of the daily diet. Water intake composes the largest component of total beverage intake among United States residents. However, few studies have examined fluid intake patterns among adults in the southwestern U.S. and northern Mexico. Purpose: This study seeks to better understand patterns of fluid intake by geographic location and demographics. Methods: Data come from the Binational Arsenic Exposure Survey (BAsES) which was conducted in southern Arizona (n=219) and Sonora, Mexico (n=245) in 2008. Beverage data were reported from an interviewer administered 24-hour dietary recall. Results: Arizonans reported consuming about 1.5 L/day of water and 3 L/day of all fluids. In contrast, participants from Hermosillo, Mexico consumed about 0.5 L/day of water and 1.5 L/day of all fluids while participants from the Yaqui Valley region in Mexico consumed about 0.33 L/day of water and 1 L/day of all fluids. Median water intake did not vary significantly by age or body mass index within geographic locations. Participants from Mexico consumed 35% of their fluids from water while those from Arizona consumed 55% of their fluids from water. Carbonated beverages comprised 24% of the fluid intake among participants from Mexico and 11% among those from Arizona. Conclusion: Water was the primary contributor to total fluid intake among Arizonans, while carbonated beverages were the primary contributor among Mexican participants. This analysis highlights the need to consider ethnicity and geographic region when studying fluid intake and that the high consumption of sodas poses a public health threat in Sonora.

081

USUAL DIETARY ISOFLAVONE INTAKE IS ASSOCIATED WITH DECREASED C-REACTIVE PROTEIN CONCENTRATIONS AMONG HEALTHY PREMENOPAUSAL WOMEN. AC Filiberto*, SL Mumford, AZ Pollack, AJ Gaskins, C Zhang, NJ Perkins, RW Browne, J Wactawski-Wende, EF Schisterman (NICHD, NIH, Rockville, MD)

Intervention data suggest an anti-inflammatory role for supplemental isoflavones; however, few studies have examined the effects of usual dietary isoflavone intake, particularly in young women. Our objective was to evaluate the association between usual dietary intake of isoflavones, found primarily in soy, and C-reactive protein (CRP) levels, one of the most commonly used markers of inflammation and the only validated predictor of cardiovascular disease risk in healthy women. Healthy, regularly menstruating women enrolled in the BioCycle study were followed for up to 2 menstrual cycles (n=259), with CRP and reproductive hormone levels measured in serum at up to 16 points. Diet was assessed up to 4 times per cycle using 24-hour recalls. Isoflavone intake was inversely associated with CRP concentrations after adjusting for age, race, body mass index, anti-inflammatory drug use, total calories, total fiber intake and reproductive hormone levels using marginal structural models with inverse probability of exposure weights. Compared to the lowest quartile (Q1: 0.0-0.25 mg/day), women in the highest quartile of intake (Q4:1.59-78.8mg/day), had on average 28% lower CRP levels (95% Confidence Interval: -35, -22%). Of clinical significance, 10% of women in Q1 were classified as having elevated CRP (> 3mg/L) according to the American Heart Association criteria compared to 4% of women in Q4 (p=0.004). These data suggest that dietary isoflavones at intakes characteristic of the US population are associated with beneficial effects on inflammation, and subsequently may have the potential to improve health status among young women.

080-S

LIFETIME PHYSICAL ACTIVITY AND GLOBAL DNA METHYLATION IN THE SISTER STUDY. *White, Alexandra J.; Sandler, Dale P.; Bolick, Sophia C.E.; Xu, Zongli, Baldwin, Karen; Taylor, Jack A.; DeRoo, Lisa A. (Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Epidemiology Branch, Laboratory of Molecular Carcinogenesis, National Institute of Environmental Health Sciences, NIH, Research Triangle Park, NC)

DNA methylation patterns may vary over the lifespan, but factors that affect global DNA methylation are not clearly understood. DNA hypomethylation is thought to cause genomic and chromosomal instability that could be associated with cancer risk. Physical activity has been associated with reduced cancer risk, possibly due to its role in decreasing hormone levels and improving immune function. Changes in DNA methylation may represent an intermediate step between lifestyle and environment factors and disease. To investigate whether DNA methylation is associated with physical activity, we measured global DNA methylation using bisulfite converted DNA and pyrosequencing of LINE-1 elements in the peripheral blood of 647 white non-Hispanic women enrolled in the Sister Study. Physical activity (average hours per week) was retrospectively assessed for three time periods: childhood (ages 5-12), teenage years (ages 13-19) and the previous twelve months. Compared with women with physical activity levels below the median for all three time periods, those at or above the median physical activity for 1 ($\beta = 0.20$, 95% CI: -0.10, 0.49), 2 ($\beta = 0.22$, 95% CI: -0.08, 0.52) or all 3 ($\beta = 0.33$, 95% CI: 0.01, 0.66) time periods had increased global methylation. Maintaining higher levels of physical activity over the three time periods was associated with increased global DNA methylation consistent with other reported associations between exercise and decreased cancer risk.

082

ADHERENCE TO THE MEDITERRANEAN DIET AND BODY FAT IN PREMENOPAUSAL WOMEN: THE BIOCYCLE STUDY. *NS. Boghossian, EH. Yeung, SL. Mumford, C. Zhang, AJ. Gaskins, J. Wactawski-Wende, and EF. Schisterman (Epidemiology Branch, Division of Epidemiology, Statistics, and Prevention Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, MD)

Adherence to the Mediterranean Diet (aMED), high in fruits, vegetables and monounsaturated fats, has been associated with decreased risk of metabolic disorders. Associations between this dietary pattern and body fat have not been previously investigated. 248 healthy premenopausal women underwent a dual energy x-ray absorptiometry (DXA) scan which measured %body-fat (%BF), %trunk-fat (%TF), and %leg-fat. The ratio of trunk to leg fat mass (T/L) was derived as a measure of central to total adiposity. Each woman's aMED score (range 0-9) was calculated from up to eight 24-hr dietary recalls (>97% had ≥ 7 recalls). Linear regression was used to determine whether aMED and its specific components were associated with total and central adiposity. Participants averaged (SD) an aMED score of 4.2(1.7) and %BF of 29.5% (6.0). A significant inverse association was found between aMED and all the examined adiposity measures. A 1-unit increment in aMED was associated with a 0.82% decrease (95% CI: -1.35,-0.29) in %TF and a 0.05 decrease (95% CI: -0.09,-0.01) in T/L after adjusting for energy intake, age, race, physical activity and education. In analysis with separate components of the aMED score as exposure, %TF was lower with increased nut consumption (p=0.007) but was higher with increased intake of meat products (p=0.03). We observed an inverse association between aMED and adiposity measures assessed by DXA. These results provide support that the aMED benefit on chronic disease may be through its association with body fat and its distribution.

083-S

EFFECTS OF TAIWAN STYLE FRUCTOSE-RICH BEVERAGES INTAKE ON SERUM URIC ACID AND BODY MASS INDEX IN ADOLESCENTS. *WT Lin, CL Chang, MC Huang, CY Lee, HL Huang, TY Liu, CH Lee (National Yang-Ming University, Taipei, Taiwan)

Bubble tea related shops in Taiwan are densely in position in areas with a short walking distance from dwellings and schools, exposing adolescents to immediate surroundings with high and easy Taiwan style fructose-rich beverages (FRB) accessibility. Data from the nationwide Nutrition and Health Survey has shown that 59.8% and 30.3% of male and female teenagers have hyperuricemia. Furthermore, a notable increase in the obesity prevalence has been detected in recent decades. To study the effect of FRB intake on serum uric acid (SUA) levels and body mass index (BMI) among adolescents, a large-scale cross-sectional study was conducted during 2007-2009. We evaluated data from 2727 representative adolescents who were multistage-sampled from 36 Junior High schools in Taiwan. We collected demographic, physical and dietary variables, and anthropometric and clinical outcomes. Data was analyzed using survey-data modules and multivariate regression and logistic models adjusted for the complex survey design and covariates. We found that 87.7% of adolescents were sugar-sweetened beverages (SSB) drinkers, with 25.1% drinking >500 cc/day of such beverages. As compared to non-drinkers, SSB drinkers had a 3.2-4.9 elevated risk of obesity. Adolescents who consumed >500 cc/day of heavy FRB had a 0.42 mg/dl higher SUA level and a 2.0-2.1 increased risk of hyperuricemia than non-drinkers. The intake of FRB was also found to interact with obesity in determining higher levels of SUA (2.2-2.4 mg/dl increases). Our study suggests that high FRB intake has a notable effect on elevated levels of BMI and SUA. The intake of FRB and BMI were likely to interactively strengthen SUA levels among obese adolescents.

086

PHYSICAL ACTIVITY AND HYPERTENSIVE DISORDERS OF PREGNANCY AMONG BRITISH WOMEN. *J Liu, T Trivedi, SN Blair, A Ness, C Macdonald-Wallis, DA Lawlor (University of South Carolina, Columbia, SC, 29208)

Introduction: Benefits of physical activity (PA) on hypertensive disorders of pregnancy (HDP) remain unclear because of small sample sizes and differences in the assessment of PA and HDP. Methods: Data came from 8,417 pregnant women enrolled in the Avon Longitudinal Study of Parents and Children (ALSPAC) in 1991/2 who had singleton live births. Repeated blood pressure and proteinuria measures allowed us to apply standard criteria to classify women into normotensive, gestational hypertension, and preeclampsia. Two measures of PA at 18 weeks of pregnancy were used: (a) participating in ≥ 3 hrs of activity that resulted in breathlessness and sweating and (b) weighted activity index, a sum of the products of METS score of each leisure-time activity and duration. Results: 15.6% of women had gestational hypertension; 2.2% had preeclampsia. In unadjusted analyses, women reporting ≥ 3 hrs of activity had lower odds of gestational hypertension (0.92 (95% CI: 0.82, 1.04)) and preeclampsia (0.84 (0.63, 1.04)). Confounder adjustment resulted in marked attenuation (0.98 (0.86, 1.11); 0.94 (0.70, 1.27), respectively). Women in the highest 20% of the activity index compared with the lower 80% had lower odds of gestational hypertension and preeclampsia in unadjusted analyses (0.86, (0.74, 0.99) and 0.66 (0.45, 0.97)), with little attenuation upon adjustment (0.88 (0.76, 1.03) and 0.68 (0.46, 1.01)). Conclusions: Our findings provide some support for an association of greater leisure time PA with reduced odds of HDP. The difference in attenuation between two self-report measures may be related to more detailed questions used in weighted activity index. Using objective measure of PA might demonstrate stronger associations.

085-S

PHYSICAL ACTIVITY DURING PREGNANCY AND ITS ASSOCIATION WITH GESTATIONAL WEIGHT GAIN AMONG SOUTH CAROLINA MOTHERS. Harris ST*, Liu J, Wilcox S, Moran R, and Gallagher A (University of South Carolina, Columbia, SC)

Purpose: To investigate the association between physical activity (PA) during pregnancy and meeting gestational weight gain (GWG) recommendations. Methods: Data came from the 2009 South Carolina Pregnancy Risk Assessment Monitoring System (n=883). PA levels were assessed in three ways: 1) PA during pregnancy (yes vs. no); 2) total months of PA (0, 1-5, 6-9); and 3) physical activity index (PAI), a product of total months of PA and MET scores of the reported activity. The ratio of observed to expected GWG based on the 2009 Institute of Medicine's guidelines was used to assess GWG adequacy: inadequate, adequate, and excessive GWG. This approach took into account gestational age at delivery. Multinomial logistic regression models were used to adjust for confounders. Results: During pregnancy 32.1% of women reported that they exercised or played sports at least 3 times a week; 33.4%, 19.4%, and 47.2% of women gained inadequate, adequate, and excessive weight. Compared to women who did not exercise during pregnancy, women who reported exercise had a lower odds of excessive GWG (odds ratio: 0.44, 95% confidence interval: 0.23-0.88). Women with a PAI ≥ 19 or those who exercised for 6-9 months had about 70% lower odds of excessive GWG. Conclusions: Women who exercised during pregnancy were more likely to meet GWG recommendations than women who did not. Our findings provide evidence to support the need to promote or increase PA during pregnancy to reduce the high proportion of women who are gaining excessive weight.

087

BODY MASS INDEX AT AGE 21 IN RELATION TO ALL-CAUSE MORTALITY AMONG BLACK AND WHITE ADULTS. S Cohen*, L Signorello, E Cope, W Blot (International Epidemiology Institute, Rockville, MD 20850; Vanderbilt University, Nashville, TN 37203)

Increased risk of mortality has been reported among whites who are obese in middle-age while recent evidence indicates that this association may be less pronounced in blacks. Obesity in early adulthood is also associated with increased mortality among whites, but little is known about whether early adulthood obesity conveys the same excess risk in blacks. We examined all-cause mortality in relation to body mass index (BMI) at age 21 among 54,764 blacks, many of low-income, and a geographically and socioeconomically comparable group of 25,126 whites enrolled in the Southern Community Cohort Study. Participants (age 40-79) joined the study from 2002-2009 at Community Health Centers in 12 southeastern United States or via general population mailings sent to randomly selected residents of the same states. 5,469 deaths through February 2011 were identified by linkage to the Social Security Administration and National Death Index. Hazard ratios (HRs) and 95% confidence intervals (CI) were obtained from Cox Proportional Hazards models for mortality in association with BMI at age 21 (<18.5, 18.5-24.9, 25-29.9, and 30+ kg/m²) after adjusting for socioeconomic status and cigarette smoking. Mortality increased with rising BMI at age 21 regardless of race (HR [95% CI] for BMI > 30 v. 18.5-24.9 kg/m² = 1.61 [1.39-1.87] for black males, 1.84 [1.46-2.30] for white males, 1.60 [1.36-1.87] for black females, and 1.78 [1.43-2.21] for white females). Thus, early adulthood obesity may convey long-term adverse health consequences regardless of race emphasizing the need for public health initiatives to curb the rising prevalence of obesity in children and adolescents.

HEALTHY PEOPLE 2020 PHYSICAL ACTIVITY OBJECTIVES: CHILDREN AND ADOLESCENTS. *A. Ryskulova, R. Klein, R. Hines (NCHS, CDC), J. Fulton (NCCDPHP, CDC), J. Wargo (President's Council on Fitness, Sports, & Nutrition)

Physical inactivity is an important health issue in the U.S. and more children today are overweight or obese than ever before. Reflecting the importance of physical activity (PA) among children and adolescents Healthy People 2020 included several objectives on PA guidelines compliance and screen time reduction. Multiple data sources were used to provide baselines for the specified HP2020 objectives: 2005-08 National Health and Nutrition Examination Survey, 2009 Youth Risk Behavior Survey, and 2007 National Survey of Children's Health. About 18% of adolescents met current Federal PA guidelines in 2009. Males, white adolescents, and 9th grade students were more active than their counterparts. About 33% of adolescents participated in daily school physical education and 9th graders were more likely to participate in it than older students. Among children ages 0-2 40.6% viewed no television or videos on an average week-day, about 76% of children ages 2-5 and 6-14 viewed TV, videos or played videogames for no more than 2 hours a day, among adolescents the percentage of those who did not exceed 2-hour a day limit was 67.2%. More than 90% of children ages 6-14 and 75% of adolescents in grades 9-12 used a computer or played computer games outside of school (for nonschool work) for no more than 2 hours a day. Healthy People 2020 was launched on December 2, 2010. National data for the PA topic area are currently available for public use. The PA objectives will be tracked during the decade to measure their progress toward 2020 targets.

090-S

ARE POSITIVE ATTITUDES AND PURCHASES OF ORGANIC, LOCALLY GROWN, NON-PROCESSED, AND SUSTAINABLY PRODUCED FOODS ASSOCIATED WITH HIGHER DIETARY QUALITY AMONG YOUNG ADULTS? *J. Pelletier, M. Laska, D. Neumark-Sztainer, and M. Story (University of Minnesota, Minneapolis, MN 55454)

To examine whether attitudes and purchases of foods that are organically grown, made with organic ingredients, not processed, locally grown, and/or sustainably grown (i.e., alternative food production practices) are associated with dietary quality among young adults, we used a cross-sectional, online survey of 1,201 community college and public university students in the Twin Cities metropolitan area of Minnesota. Measures of alternative production practices were summed into two scales (attitudes and purchases) and divided into low, moderate, and high groups. Validated food frequency screeners developed by the National Cancer Institute assessed dietary intake. We examined differences in attitudes and purchases across demographic characteristics with χ^2 tests and examined adjusted mean dietary intake across levels of attitudes and purchases with F tests. About half (49%) of young adults placed moderate to high importance on alternative food production practices, and 57% purchased those foods at least occasionally. In general, attitudes and purchases were similar across sociodemographic characteristics. More positive attitudes and more frequent purchases of food from alternative production practices were associated with higher intake of fruits, vegetables and dietary fiber; higher frequency of breakfast consumption; and lower intake of added sugars, fast food and sugar-sweetened beverages. However, most young adults continue to fall short of recommended dietary intake levels, indicating that barriers to achieving a healthy diet continue to exist for young adults.

RELATIONSHIP BETWEEN THE BODY ADIPOSITY INDEX AND BODY MASS INDEX AMONG ASIAN IMMIGRANT WOMEN. *M. Bhatta, S. Shakya, and L. Assad (Kent State University, Kent OH 44242)

Body Mass Index (BMI), the widely used measure of body fat, has limited accuracy, especially among Asian populations. A new parameter, the body adiposity index (BAI = ((hip circumference in centimeters)/((height in meters)^{1.5})-18)), has been defined and proposed as a measure of % body fat. Compared to BMI, which uses height and weight as the principal anthropometric measurements, BAI is based on hip circumference and height, which seem to strongly correlate with %body fat. In this analysis we assessed the relationship between BMI and BAI in a cohort of 18-55 year old recent (<4 years) South Asian immigrant women in the U.S. (N=103). We used the World Health Organization BMI cut-off points of <18.50, 18.50-<25.00, \geq 25.00-<30.00 and \geq 30.00 kg/m² to define underweight, normal, overweight, and obese. To define the same categories for BAI classification, we used the age and sex specific cut-off points of >21%, 21-33%, >33-39% and >39% for women 20-39 years and >23%, 23-35%, >35-41%, and >41% for women 40-59 years, respectively. Overall, the Spearman correlation coefficient for BMI and BAI was 0.6931 ($p<0.0001$). Among those BMI underweight (n=8), 12.5% were BAI underweight and 87.5% were BAI normal weight. Among those BMI normal weight (n=43), 2.3% were BAI underweight, 86.1% were BAI normal weight, 9.3% were BAI overweight, and 2.3% were BMI obese. Among those BMI overweight (n=39), 15.4% were BAI normal weight, 64.1% were BAI overweight, and 18.0% were BAI obese. Among those BMI obese (n=13), 53.9% were BAI obese, 30.1% were BAI overweight, and 15.4% were BAI normal weight. While BMI and BAI were significantly correlated and, in general, BMI underestimated compared to BAI, we observed a bidirectional misclassification between BMI and BAI categories. Implications of these misclassifications will need to be assessed in future research of BAI and health outcomes.

091-S

LATENT CLASS ANALYSIS OF FOOD SHOPPING BEHAVIORS AND THE RELATIONSHIP WITH FOOD CONSUMPTION. *N. VanKim, D. Erickson, M. Laska (University of Minnesota, Minneapolis, MN 55454)

We used a diverse sample of 2- and 4-year college students (n=1,201) to identify patterns of food shopping and to understand how these patterns are related to food consumption. The following variables were used in a latent class analysis: buying fresh fruits, not processed foods, organically grown foods, foods from sustainable agriculture; shopping at convenience stores, supermarkets, Target; and buying food from a vending machine on campus, a beverage on campus, food or beverage near campus. Using standard fit criteria (Akaike information criterion and Bayesian information criterion) and prevalence and interpretability, we retained a six-class solution: "Class 1: traditional shopper (18.2%)", "Class 2: non-shopper (21.7%)", "Class 3: conscientious convenience shopper (15.1%)", "Class 4: conscientious, fresh foods shopper (12.7%)", "Class 5: conscientious, fresh foods, convenience shopper (13.7%)", and "Class 6: convenience shopper (18.7%)". We fit logistic regression models to the following consumption indicators: fruit and vegetable, fast food, and soda pop. Models were adjusted for school type, race/ethnicity, gender, parental education, relationship status, having children, employment, and adult self perception. Compared to class 1, classes 2 and 4 were more likely to consume fast food [adjusted odds ratio (95% confidence interval): 4.76 (1.92-11.82); 6.94 (2.71-17.76), respectively]. Classes 2, 3, and 4 were less likely than class 1 to drink soda pop [0.41 (0.20-0.83); 0.10 (0.03-0.31); 0.24 (0.09-0.63), respectively]. There were no differences in fruit and vegetable consumption. These findings highlight unique patterns in food shopping and consumption that could be useful for improving dietary habits of college students.

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INCREASED RISK OF IGA NEPHROPATHY AMONG INDIVIDUALS WITH CELIAC DISEASE. *Welander A, Sundelin B, Fored M, Ludvigsson JF (Karolinska Institutet, Unit for Clinical Epidemiology, Stockholm, Sweden).

Individuals with celiac disease (CD) suffer an increased risk of end-stage renal disease. An association between CD and IgA nephropathy (IgAN) has been suggested; however, results have been inconclusive and no previous study has considered the risk of IgAN in biopsy-verified CD. Therefore, our aim was to investigate the risk of future biopsy-verified IgAN among individuals with biopsy-verified CD. We performed a population-based prospective cohort study. We identified 27,160 individuals with CD (Marsh stage III) and no previous renal disease through small-intestinal biopsy reports obtained between July 1969 and February 2008 in all (n=28) Swedish pathology departments. Individuals with IgAN were identified by biopsy reports acquired at Swedish pathology departments specialised in renal pathology (n=4). Cox regression analysis was used to determine the risk of future IgAN among individuals with CD compared with age- and sex-matched reference individuals. Of 27,160 individuals with CD, 7 developed biopsy-verified IgAN (0.03% vs 0.008% among reference individuals). We found an increased risk of biopsy-verified IgAN among individuals with CD (hazard ratio (HR) 3.03; 95% confidence interval (CI) 1.22-7.56). The risk increase remained statistically significant after adjustment for prior liver disease and country of birth. We conclude that individuals with CD suffer a threefold increased risk of future IgAN. Our findings warrant awareness of renal function in the care of individuals with CD.

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PREVALENCE OF CELIAC DISEASE IN THE UNITED STATES: PRELIMINARY RESULTS FROM NHANES 2009-2010. *D. DiGiacomo, C. Tennyson, P-H. Green, R-T. Demmer (Columbia University, New York, NY 10032)

Background: Clinical reports suggest the prevalence of celiac disease (CD) in the United States is increasing, affecting ~1% of the population. However data on the true prevalence of CD are limited. We analyzed a nationally representative sample to estimate the prevalence of CD. Methods: The Continuous National Health and Nutrition Examination Survey (NHANES) 2009-2010 enrolled 7,342 men and women 6-80 years old who provided a blood sample for tissue transglutaminase (TTG IgA) and endomysial antibodies (EMA IgA) testing. Participants also responded to questionnaires on physician-diagnosed CD and gluten-free diet (GFD). CD was defined as either i) self-report CD on a GFD with or without positive antibodies, and/or ii) positive EMA IgA and TTG IgA. Undiagnosed CD was defined as positive TTG/EMA IgA in an individual without known CD and not on a GFD. The weighted prevalence of CD was estimated using SAS survey procedures. Results: Participants were mean age 41±1.3 years, 51% female, 72% White, 12% African American, 16% Hispanic. Forty participants were defined as having CD, reflecting a prevalence of 0.83% [95% CI: 0.65%, 1.00%], and representing an estimated 1,959,071 citizens. The prevalence of CD did not differ by gender but was higher in Whites (1.06%) as compared to African Americans (0.33%) and Hispanics (0.19%); p<0.0001. Among the 40 celiac cases, 34 (85%) were undiagnosed. Undiagnosed CD was more common among Whites (91%), men (100%) and participants younger than 20 years (100%). Conclusions: The estimated prevalence of CD in the general U.S. population is 0.83%, corresponding to nearly 2 million individuals, 85% of which appear to be undiagnosed.

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ASSOCIATION BETWEEN SMOKING STATUS AND FREE, TOTAL, AND PERCENT FREE PROSTATE-SPECIFIC ANTIGEN. *Jun Li, Trevor Thompson, Djenaba A. Joseph, Viraj A. Master (Centers for Disease Control and Prevention, Atlanta, GA, 30341)

Background: There are scant data available on the relationship between smoking and total prostate-specific antigen (tPSA), free PSA (fPSA) and percent-free PSA (%fPSA). Given the high prevalence of smoking and frequency of PSA screening, it is important to determine any association between smoking and PSA values using nationally representative data. Materials and Methods: Included in the final study population were 3,820 men aged ≥ 40 years who participated in the 2001-2006 National Health and Nutrition Examination Survey and met eligibility criteria for PSA testing. The distributions of tPSA, fPSA, and %fPSA were estimated by sociodemographic and clinical characteristics. Multivariate linear regression models were fit to determine the adjusted relationship between smoking and tPSA and %fPSA while controlling for these characteristics simultaneously. Results: For all ages combined, the median tPSA and fPSA were 0.90 (0.81-0.90) ng/ml and 0.26 (0.25-0.28) ng/ml, respectively. The multivariate linear regression analysis showed that tPSA was 7.9% and 12.2% lower among current and former smokers, respectively, than that among never smokers. High body mass index and diabetes were also statistically significantly associated with lower tPSA level. About one third of the men had a %fPSA<25. Current smokers had significantly lower %fPSA compared with former smokers. Conclusions: Our findings that smoking is inversely associated with tPSA may have potential implications for the interpretation of PSA levels in men who are current or former smokers. Given the high prevalence of smoking, obesity, and diabetes, additional research on the combined effect of these health risk factors is warranted.

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PAP TEST AWARENESS AND INVOLVEMENT BY HMONG AMERICAN WOMEN IN LA CROSSE, WISCONSIN. J. Sun*, G. Gilmore, A. Evans, K. Rees, and V. Her (Drexel University, Philadelphia, PA, 19102).

We interviewed Hmong American women in La Crosse County, Wisconsin to determine Pap test coverage and perception, and we examined how socioeconomic status (SES) impacted those outcomes. We collected surveys from 186 female Hmong American residents, ages 18-64 at the time of the survey (January/February 2011). We found that the percentage of Hmong American women who have had Pap tests in the past three years was 59.1% (110/186), while 62.9% (117/186) knew about the Pap test and its importance. Using Fisher's exact test to assess the independent effects of each participant's SES, we found family incomes (P=0.02 and <0.001), educational level (P<0.001 and <0.001), and years living in the United States (P=0.007 and 0.002) were significant factors associated who had a Pap test in the past three years and possessed knowledge about the PAP test, respectively. Health insurance coverage (P=0.006) showed a statistically significant association with Pap experience but did not relate to knowledge of the Pap test. Using multinomial logistic regression, age (P=0.0045), educational level (P=0.02), and health insurance coverage (P=0.056) correlated with the experience of having had a Pap test in the past three years, but health insurance was not significant in determinate the knowledge of Pap test. From this study, we found that the prevalence of Pap test among Hmong American women (59.1%) is lower than that for other American women (82.8%). SES, especially level of education, played an important part in determining whether or not Hmong American women have taken the Pap test and have knowledge of Pap test, though multinomial regression did not suggest family income level was a statistically significant factor.

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PHYSICAL ACTIVITY DURING EARLY PREGNANCY AND INFANT BIRTH SIZE. *M. Slater, L. Spector, A. Linabery, C. Blair, and J. Ross (University of Minnesota, Minneapolis, MN, 55455)

Objective: To examine the relationship between maternal physical activity during the first half of pregnancy and infant birth size. **Methods:** Self-reported physical activity data collected between 2008 and 2010 and newborn anthropometrics from offspring birth records were obtained from 308 mothers in Minneapolis, Minnesota. Physical activity was categorized into light, moderate, or vigorous intensity based on metabolic equivalent (MET) score. Continuous MET-hours per week were calculated overall and by activity category. Z-scores standardized for gestational age and sex were calculated for birthweight, length, and head circumference using national birth data charts. We used linear regression to estimate associations between maternal physical activity and standardized newborn birth size, adjusting for potential confounders. **Results:** Total, light, and moderate physical activity were not associated with any of the birth outcomes. However, vigorous physical activity was positively associated with birthweight, length, and head circumference (all $P < 0.05$), but not ponderal index ($P = 0.8$). An increase of three MET-hours per week of vigorous activity was estimated to result in a ~50 gram increase in birthweight, a ~1/3 centimeter increase in length, and a ~1/6 centimeter increase in head circumference. **Conclusion:** Women who engaged in greater amounts of vigorous physical activity during the first half of pregnancy tended to give birth to larger infants. Future studies are warranted to confirm these results and explore potential biological mechanisms of enhanced fetal growth associated with vigorous physical activity. Supported by NIH T32 CA099936, K05 CA157439, and the Children's Cancer Research Fund, Minneapolis, MN.

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PREDICTORS OF PERCEPTION OF PREGNANCY RISK AMONG NULLIPAROUS WOMEN. *H. Bayrampour, M. Heaman, K. Duncan, S. Tough (University of Manitoba, Winnipeg, MB, Canada R3T 2N2)

Objectives: The literature suggests that perception of pregnancy risk impacts pregnant women's health care use, health behaviors, and adherence to medical procedures and recommendations. Yet, a gap remains in the understanding of perception of pregnancy risk and its contributing factors. The objectives of this study were to determine factors associated with perception of pregnancy risk and to examine the role of maternal age in pregnancy risk assessment, using a new conceptual framework based on a review of relevant literature and the Psychometric Model of risk perception. **Methods:** Between December 2009 and January 2011, a convenience sample of nulliparous pregnant women in their third trimester with a singleton pregnancy was recruited from variety of settings in Winnipeg, Manitoba. Stepwise multivariate linear regression analyses were conducted to address the research objectives. **Results:** Results of regression analyses revealed that pregnancy-related anxiety, maternal age, medical risk, perceived control (internal), and gestational age were significant predictors of perception of pregnancy risk accounting for 47-49% of the variance in risk perception. An interaction between the pregnancy-related anxiety score and maternal age was determined. **Conclusion:** There are several factors contributing to perception of pregnancy risk, of which at least half are not yet identified. Future studies are warranted to explore these factors. This knowledge may have implications for developing more effective risk communication models.

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MATERNAL VITAMIN D STATUS IS ASSOCIATED WITH FETAL SIZE IN A LARGE US COHORT. *A.D. Gernand, H.N. Simhan, M.A. Klebanoff, J.C. Diesel, L.M. Bodnar (University of Pittsburgh, Pittsburgh, PA, 15261)

Inconsistent associations between maternal vitamin D status and fetal size have been published in small studies. Our objective was to examine the association between maternal serum 25-hydroxyvitamin D (25(OH)D) concentrations at ≤ 26 weeks' gestation and measures of fetal and placental size in a large cohort of term, singleton, liveborn infants in the Collaborative Perinatal Project (1959-65; $n = 2105$). Maternal serum 25(OH)D was measured by LC/MS-MS. We adjusted for maternal race/ethnicity, prepregnancy BMI, height, and smoking in linear and logistic regression models. Nonlinearity was assessed with spline regression. Birth weight increased by 3.32 (95% CI: 0.82, 5.83) grams per 1-nmol/L increase in maternal 25(OH)D up to 37.5 nmol/L, then leveled off thereafter ($p = 0.02$). Birth weight was 43.1 (95% CI: 7.3, 79.0) g lower for women with 25(OH)D ≤ 37.5 vs. > 37.5 nmol/L. The association between maternal 25(OH)D and risk of small-for-gestational-age (SGA) was modified by the gestational age of vitamin D assessment ($p = 0.04$). 25(OH)D ≤ 37.5 in the first trimester was associated with a 2-fold increased risk of SGA (95% CI: 1.1, 3.5) compared with > 37.5 nmol/L. There was no relationship between second trimester 25(OH)D and SGA. Maternal 25(OH)D was not associated with placental weight or the placental-fetal ratio. These data suggest maternal vitamin D deficiency during the first trimester may be a risk factor for pathologic growth (SGA), while deficiency in the first or second trimester may influence physiologic fetal growth in full-term infants. As associations with placental weight were not observed, additional mechanistic research of the maternal vitamin D association with fetal growth is warranted.

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RATES OF VACCINATION OCCURRING DURING PREGNANCY. *A. Naleway, R. Gold, M. Henninger, S. Kurosky, K. Riedlinger (The Center for Health Research, Portland, OR, 97227), for the Vaccine Safety Datalink.

The need for research on the safety and effectiveness of vaccination during pregnancy is widely recognized. Large, population-based data systems like the Vaccine Safety Datalink (VSD) may be useful for this research, but identifying pregnancies using electronic medical record data can be challenging. We developed an algorithm to identify pregnancy outcomes and dates in the VSD, and validated the algorithm by calculating the percent agreement in pregnancy outcome type, end date, and gestational age between the algorithm and manual medical record review. We then used the algorithm to describe vaccinations administered during pregnancy. We identified 595,929 pregnancies ending in 2002-2006 among women 12-55 years of age. Of these pregnancies, 75% ended in live births, 12% in spontaneous abortions, and 9% in elective abortions. We were able to confirm a pregnancy on or near the algorithm-specified date for 99% of live births, and 90%-93% of other pregnancy outcomes. Trivalent influenza vaccine, which is recommended during pregnancy, was the most commonly administered vaccine (98.5 doses per 1,000 pregnancies), followed by diphtheria-pertussis (6.6 per 1,000) and hepatitis B vaccine (4.3 per 1,000). A total of 882 contraindicated vaccines were administered during pregnancy, and the majority of these were measles-mumps-rubella (0.64 per 1,000), varicella (0.49 per 1,000), and the live attenuated influenza vaccine (0.19 per 1,000). In conclusion, the VSD algorithm accurately identifies pregnancies at participating sites and is a useful tool for studying patterns of vaccination during pregnancy.

PLACENTAL ABRUPTION IS ASSOCIATED WITH MATERNAL SLEEP DURATION AND COMPLAINTS OF VITAL EXHAUSTION DURING PREGNANCY. C Qiu^{*1}, SE Sanchez², B Gelaye³, SM Cripe⁴, DA Enquobahrie^{1,3}, CV Ananth⁵, MA Williams⁴ (¹Swedish Medical Center, Seattle, WA; ²Hospital Nacional dos de Mayo, Lima, Peru; ³University of Washington, Seattle, WA; ⁴Harvard School of Public Health, Boston, MA; and ⁵Columbia University, NY, NY)

INTRODUCTION: Sleep disorders have been associated with cardiovascular complications and preterm birth (PTB). Causal mechanisms underlying these associations have yet to be elucidated, though evidence suggest that insufficient sleep results in metabolic alterations known to contribute to placental abruption (PA), an important determinant of PTB. We examined associations of PA with sleep duration and complaint of vital exhaustion among Peruvian women. **METHODS:** The study included 164 PA cases and 160 controls. Information about habitual sleep duration and vital exhaustion during the first 6 months of pregnancy were elicited during interviews conducted following delivery. Women were categorized according to short, normal and long sleep duration (≤ 6 , 7-8 and ≥ 9 h); and frequency of feeling exhausted (never, monthly, weekly, and daily). Odds ratios (OR) and 95% confidence intervals (CI) were calculated. **RESULTS:** Short and long sleep durations were associated with increased odds of PA. The ORs for PA in relation to short (≤ 6 h) and long (≥ 9 h) sleep duration were 2.0 (95% CI 1.1-3.7) and 2.1 (95% CI 1.1-4.1), compared with normal sleep duration (7-8 h). Complaints of vital exhaustion were positively associated with PA (Ptrend=0.001). Positive associations of PA risk with short and long sleep durations were evident regardless of the presence or absence of vital exhaustion complaints. **CONCLUSION:** Our findings support recent calls for expanded efforts to study and address sleep habits and disorders among pregnant women.

CORRELATES OF SHORT AND LONG SLEEP DURATION DURING EARLY PREGNANCY. C Qiu^{*1}, MA Williams^{1,2}, L Meryman¹, RS Miller¹, DA Enquobahrie¹ (¹Swedish Medical Center, Seattle WA; and ²Harvard School of Public Health, Boston, MA)

Objective: Mounting evidence implicate short and long sleep duration as risk factors for adverse pregnancy outcomes. Little is known about the determinants of short and long sleep duration. We sought to identify maternal characteristics associated with early pregnancy short and long sleep duration. **Methods:** Pregnant women (n=1,329) receiving prenatal care at participating clinics provided information about sleep duration before and during pregnancy during in-person interviews that were completed in early pregnancy. We calculated adjusted odds ratios (OR) and 95% confidence intervals (95%CI) from multivariable models designed to identify factors associated with short (≤ 6 h) and long sleep (≥ 9 h) duration, respectively. **Results:** Approximately 18.9% of pregnant women reported sleeping ≤ 6 h, and 25.3% of women reported sleeping ≥ 9 h/night during early pregnancy. Maternal Non-Hispanic African-American race/ethnicity (OR=4.0; 95%CI 1.2-13.0), history of migraines (OR=1.6; 95%CI 1.2-2.3), elevated perceived stress (OR=1.7; 95%CI 1.1-2.6), and pre-pregnancy obesity (OR=1.9; 95%CI 1.1-3.1) were associated with short sleep duration. Factors associated with long sleep duration included maternal age < 25 years (OR=3.2; 95%CI 1.2-8.4), Medicaid payment status (OR=3.4; 95%CI 1.1-10.2), nulliparity (OR=1.6; 95%CI 1.2-2.2), and physical inactivity during pregnancy (OR=1.9; 95%CI 1.2-3.0). **Conclusions:** Several maternal characteristics were associated with short and long sleep duration during early pregnancy. Our results have important implications for developing strategies aimed at promoting improved sleep hygiene, health and pregnancy outcomes.

MATERNAL SLEEP DURATION IN EARLY PREGNANCY IS ASSOCIATED WITH PREGNANCY WEIGHT GAIN. IO Frederick^{*1}, DA Enquobahrie^{1,2}, B Gelaye³, C Qiu¹, MA Williams³ (¹Swedish Medical Center, Seattle WA; ²University of Washington, Seattle, WA, and ³Harvard School of Public Health, Boston, MA)

Objective: While prospective cohort studies have consistently shown associations of short and long sleep duration with pregnancy complications and outcomes, little is known about the relationship between sleep duration and total pregnancy weight gain (PWG). We evaluated relationships of maternal sleep duration during early pregnancy with total pregnancy weight gain (PWG) and the rate of PWG during 2nd and 3rd trimesters. **Methods:** We collected information about sleep duration from 3,402 women interviewed during early pregnancy, and abstracted height and weight measures from medical records. Pre-pregnancy body mass index (BMI), total PWG, and the rate of PWG in the 2nd and 3rd trimesters were categorized based on Institute of Medicine (IOM) guidelines. Odds ratios (ORs) and 95% confidence intervals (95%CI) for inadequate and excessive PWG in relation to sleep duration were estimated using multinomial logistic regression. **Results:** Overall, 56.1% of the cohort had excessive total PWG. The risk of excessive PWG was increased among women who reported sleeping ≤ 5 h/night compared with those reporting 9 h/night of sleep during early pregnancy (OR=1.73; 95%CI 1.07-2.82). Women who reported sleeping ≥ 10 h/night, compared with the referent group (9 h/night) were also more likely to have inadequate PWG (OR=1.66; 95%CI 1.01-1.74). Short (≤ 5 h/night) sleep durations was associated with inadequate (OR=2.72; 95%CI 1.06-6.97) and excessive (OR=2.26; 95%CI 1.25-4.09) rates of PWG during the 2nd and 3rd trimesters. **Conclusions:** Further work is needed to explore mechanisms by which sleep habits influence maternal energy balance during pregnancy.

COMBINED EFFECTS OF PRE-PREGNANCY BODY MASS INDEX AND WEIGHT GAIN DURING PREGNANCY ON THE RISK OF INFANT DEATH. *Regina Davis, MPH, MCHES, Sandra Hofferth, PhD, Edmond Shenassa, ScD (University of Maryland, College Park, MD 20742)

More than 28,000 U.S. babies die before their first birthday each year. Programmatic and Policy focus on prematurity and birth weight stem largely from their known relationship to infant mortality and morbidity. A large body of literature exists linking poor gestational weight gain to prematurity and low birth weight, but few studies have examined infant death as an important pregnancy outcome of inadequate gestational weight gain. As a measure of healthy gestational weight gain, the Institute of Medicine (IOM) published guidelines which provide a recommended weight gain for each category of pre-pregnancy Body Mass Index. Using data from the Pregnancy Risk Assessment Monitoring System in 35 states and New York City, we investigated the association between the 2009 IOM guidelines and infant death by maternal pre-pregnancy body mass index (BMI) among 160,111 women who delivered a singleton infant from 2004-2008. Descriptive and logistic regression analyses were used to assess the risk of infant mortality associated with inadequate gestational weight gain compared to normal weight gain. Nearly 25% of women experienced inadequate weight gain. Infants born to women with inadequate gestational weight gain had odds of infant death that were 1.61 times (p<0.0001, 95% Confidence Interval: 1.29, 1.99) the odds for infants born to women with normal weight gain. Increased odds remained after adjustment for gestational age, low birth weight, parity, maternal age, maternal education, prenatal care, maternal race, marital status, diabetes, hypertension, tobacco use, and alcohol consumption. There is a significant association between inadequate gestational weight gain and infant death.

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CHARACTERISTICS OF WOMEN WHO CONTINUE TO CONSUME ALCOHOL DURING PREGNANCY. T.Nagulesapillai, *S.McDonald, and S.Tough (University of Calgary, Calgary, Alberta, T2N 1N4)

Alcohol is a teratogen and consequently clinical guidelines recommend that no alcohol be consumed during pregnancy. The objective was to assess the prevalence of alcohol use and describe the characteristics of women who continue to consume alcohol during pregnancy. The analysis was based on the All Our Babies (AOB) study, a community-based longitudinal observational cohort study of pregnant women in Calgary. Data was collected across three time points: <24wks gestation, 34-36wks gestation, and 4 months postpartum. Alcohol consumption as derived from the frequency and quantity of alcohol consumed after knowledge of pregnancy was the main outcome variable. Socio-demographic, maternal and psychosocial factors that proved to be significant at the bivariate level ($P<0.10$) were considered for multivariable regression analysis. 81% of women consumed alcohol in the 12 months prior to pregnancy, and 44.6% of women continued to consume alcohol after knowledge about pregnancy, typically at low to moderate levels. In the multivariable regression model, characteristics of women least likely to consume alcohol included: non-Caucasian ethnicity (Odds Ratio (OR)=0.53; 95% Confidence Interval(CI): 0.37-0.76), being foreign born (OR=0.63; 95% CI: 0.44-0.90) and having a higher education level (OR=0.62; 95% CI: 0.41-0.92). Characteristics of women more likely to consume alcohol included: unmarried or not in a common-law relationship (OR=1.72; 95% CI: 0.94-3.17), unintended pregnancy (OR=1.48; 95% CI: 1.08-2.02), and high prenatal anxiety (OR=1.37; 95% CI: 0.98-1.83). Characteristics of women who consume alcohol during pregnancy have been identified, which allows for designing strategies to reduce exposure to alcohol during pregnancy.

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INTERACTION OF MATERNAL SMOKING DURING PREGNANCY AND FETAL GROWTH AND ITS EFFECTS ON CHILDHOOD GROWTH. *K. Suzuki, M. Sato and Z. Yamagata (University of Yamaguchi, Chuo, Japan)

Recently, it has been suggested that intrauterine growth retardation (IUGR) does not intervene in the association between maternal smoking during pregnancy and childhood obesity. Although maternal smoking during pregnancy is a major risk factor for IUGR, the difference in the mean birth weight of children born to smoking and nonsmoking mothers was suggested to be only 120 g. Some interaction might exist between maternal smoking during pregnancy and fetal growth and its effects on childhood growth, and this requires further examination. This study aimed to examine the effect of this interaction by using data from a prospective cohort study in Japan. The study participants were 2666 women and their children who were born between April 1, 1991, and March 31, 2006. Anthropometric data were compiled through medical check-ups conducted at 3 years of age in 2183 (81.9%) of these children. Multiple linear regression models were used to analyze the data. After adjusting for parity, maternal body mass index (BMI), and BMI of children at birth; the BMI at 3 years of age of appropriate for gestational age (AGA) babies from smoking mothers, especially in male children, was found to be significantly larger than the BMI of AGA babies from nonsmoking mothers. However, as compared to the BMI of AGA babies from nonsmoking mothers, the BMI of small for gestational age (SGA) babies from both smoking and nonsmoking mothers was not significantly larger. Maternal smoking during pregnancy had little apparent effect on childhood growth in female children. In conclusion, maternal smoking during pregnancy might increase the BMI of children at 3 years of age only when the children, especially males, were born as AGA.

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IMPACT OF PRENATAL WORK ON BREASTFEEDING INTENTION AND INITIATION. *L Attanasio, KB Kozhimannil, PM McGovern, DG Gjerdingen, PJ Johnson (University of Minnesota School of Public Health, Minneapolis, MN, 55455)

The extent to which employment impacts breastfeeding is important for women, clinicians, and employers. We estimated the relationship between prenatal work and breastfeeding intention and initiation. With data from the Listening to Mothers II survey, a nationally-representative sample of women who delivered a singleton baby in a US hospital in 2005 (n=1498), we used propensity score matching methods to reduce potential bias associated with selection into employment patterns. Exposure was prenatal work status (full-time, part-time, not working). We estimated probability of exposure (propensity score) and matched exposed to unexposed women on propensity scores. Primary outcomes were intention to breastfeed and initiation of breastfeeding, conditional upon intention. We also examined how hospital practices consistent with the Baby Friendly Hospital Initiative (BFHI) impacted breastfeeding initiation. We found no statistically significant differences in breastfeeding intention by prenatal work status. Working full time during pregnancy was associated with decreased odds of breastfeeding initiation, compared to not working (adjusted odds ratio (AOR)=0.54, $p=0.11$). While not statistically significant, this indicates a potentially troubling trend. Higher BFHI scale scores were associated with significantly higher odds of breastfeeding initiation (AOR>1.29, $P<0.001$ for each work status), but did not differentially impact women by work status. The difference in breastfeeding initiation for full time workers has important public health and policy implications. Our study confirms that hospital practices consistent with the BFHI have a robust positive association with breastfeeding initiation.

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A STUDY ON THE TIMING OF ANXIETY AND DEPRESSION DIAGNOSIS AND HYPERTENSIVE IN PREGNANCY. S Cretella*, J Liu, R McKeown, R Moran (University of South Carolina, Columbia, SC 29208)

Introduction: An estimated 500,000 pregnancies annually involve psychiatric illness in the US. Yet our knowledge about the association between the diagnosis of anxiety or depression and hypertension in pregnancy (HIP) is limited. This study examined this association while focusing on the timing of first anxiety or depression diagnosis on the onset of HIP. Methods: We linked data from 2004-6 South Carolina birth certificates with medical insurance claims during pregnancy and up to two years prior to the estimated date of conception (EDC). There were 45,653 women who delivered singleton live births, were free of chronic hypertension, and insured for at least one year prior to EDC by Medicaid (86%), a large private insurer (13%), or both (1%). Anxiety, depression, and HIP were ascertained using ICD-9 codes. Results: Nine percent of women were diagnosed with anxiety or depression prior to pregnancy and 3% were first diagnosed during pregnancy. Five percent of women developed HIP. The diagnoses of depression, anxiety, or comorbid anxiety and depression were associated with increased odds of HIP (adjusted odds ratios=1.12, 1.10, and 1.22, respectively), although none of them were significant. Women who were diagnosed with anxiety or depression during pregnancy had 41% higher odds of HIP (95% confidence interval: 1.24, 1.78), while diagnosis prior to the pregnancy was not significantly associated with HIP. Conclusion: Depression or anxiety shows a modest, non-significant increase in HIP. The timing of first psychiatric disorder diagnosis, and not only the presence of disorder, may be critical for development of HIP. Detecting and addressing mental health conditions during pregnancy may reduce the odds of HIP.

DISPARITIES IN POTENTIALLY AVOIDABLE HOSPITAL ADMISSIONS. *PJ Johnson, N Ghildayal, P Wheeler. (Medica Research Institute; Allina Hospitals & Clinics, Minneapolis, MN)

Reducing hospital readmissions is a priority for healthcare systems. Yet, any admission for a condition better managed in primary care is also a concern. Electronic health record data for adult hospitalizations in one large integrated health system during 2010 (n=82,793) linked with zip-code and county data were used to examine admission for ambulatory care sensitive conditions (ACSC) by individual and contextual factors. ACSC were classified by primary diagnosis using AHRQ's prevention quality indicators. We examined 12 cause-specific ACSC, aggregated acute (e.g., pneumonia) and chronic (e.g., diabetes) ACSC, and all-cause ACSC. We used chi-square to test differences by demographic (e.g., race/ethnicity), geographic (e.g., metro status), and neighborhood factors (e.g., poverty) and logistic regression to estimate odds of admission due to ACSC. GIS was used to visualize spatial patterns across the state. Overall, 8% of admissions were for ACSC. ACSC admissions were highest for American Indians (13%). Nearly 2/3 of ACSC admissions were chronic conditions. We found significant differences by race/ethnicity in admission for: diabetes complications (10% to 30%), COPD/asthma (7% to 28%), congestive heart failure (12% to 27%), and hypertension (2% to 12%). Multivariable models revealed disparities by race/ethnicity, age, language, insurance, and neighborhood factors. Geographic clustering was noted. Of particular concern is the magnitude of disparity in admissions for chronic ACSC among older adults, Blacks, American Indians, publicly insured or uninsured, non-English speakers, and those in disadvantaged neighborhoods. That disparities are more notable for chronic conditions suggests a gap in chronic disease management for some populations.

TRENDS IN OBSTETRIC CARE AND THE ROLE OF HEALTH INSURANCE, 2002-2009. *KB Kozhimannil, O Adegoke, TP Shippee, BA Virnig (University of Minnesota School of Public Health, Minneapolis, MN, 55455)

We characterized the relationship between health insurance and maternity care, focusing on whether recent trends differ by insurance status. We analyzed nationally-representative hospital discharge data on 6,717,486 US births occurring from 2002-2009. We measured the association between the primary payer for childbirth (self-pay, private insurance, Medicaid) and changes over time in rates of cesarean delivery and vaginal birth after cesarean (VBAC). Secondary outcomes were labor induction, episiotomy, and perineal laceration. We used generalized estimating equations to model annual changes in maternity care from 2002-2009, accounting for hierarchical data structure. Women without health insurance (self-pay) had different patterns of obstetric care than insured women; uninsured women were less likely to have a cesarean delivery (adjusted odds ratio (AOR) =0.70), an episiotomy (AOR=0.89), or to have labor induced (AOR=0.66), and more likely to have a VBAC (AOR=1.63; p<.001 for all AORs). Among insured women, delivery mode and obstetric procedures differed by payer. Women with Medicaid had lower odds of cesarean delivery (AOR=0.90; p<.001) and higher odds of VBAC (AOR=1.21; p<.001). Changes over time occurred more rapidly among insured women with private coverage, with cesarean delivery rates rising 5.6% annually in this group. Presence or absence and type of health insurance affected obstetric care, with private coverage, in particular, being associated with higher rates of interventions, including cesarean delivery. Changes over time in maternity care differed by whether or not a woman had health insurance and by the source of insurance (Medicaid vs. private).

CULTURAL CONTEXT, HEALTHCARE, AND CAM USE. *PJ Johnson, N Ghildayal. (Medica Research Institute, Minnetonka, MN)

Complementary and alternative medicine (CAM) is a growing component of healthcare and health promotion. Cultural beliefs influence health behaviors and may also influence CAM use. We aimed to identify cultural differences in healthcare and CAM use using 2007 NHIS data to examine past year CAM use for US adults (n = 23,313) by race, ethnicity, and country of origin. CAM use was examined 3 ways: 1) 22 CAM therapies, 2) 5 CAM types (Alternative medical systems, biologically-based, manipulative body-based, mind body, energy healing), and 3) practitioner-based or self-treatment. Reasons for using CAM and health conditions treated with CAM were also examined. We used summary statistics to describe patterns and logistic regression to examine odds of CAM use by cultural group. Overall, 64% of US adults used CAM in the past year. Chinese had the highest use (73%) and Hispanics the lowest (48%). Across cultural groups, the highest use of alternative medical systems was American Indians (10%), manipulative body therapies was non-Hispanic whites (18%), biologically-based therapies was Chinese (26%), and mind-body therapies was Indians (34%). Significant differences were found across cultural groups for 18 of 22 CAM therapies. CAM use was more prevalent in US compared to foreign-born adults across most cultural groups. Having delayed medical care due to cost significantly increased the odds of CAM use in the past year but this varied by cultural group. Differences in CAM use by race, ethnicity, and country of origin underscores the importance of examining healthcare and CAM use by cultural context. As ethnic diversity in the US increases, understanding the cultural context of CAM use may play a role in improving access to and provision of high quality, patient-centered care to diverse cultural groups.

DENTAL CARE AMONG YOUNG ADULTS WITH INTELLECTUAL DISABILITY: METROPOLITAN ATLANTA DEVELOPMENTAL DISABILITIES FOLLOW-UP STUDY. *V. Kancherla, K. Van Naarden Braun, M. Yeargin-Allsopp (Centers for Disease Control and Prevention, Atlanta, GA 30333)

Dental care among young adults with intellectual disability is poorly documented and thought to be largely an unmet. Healthy People 2020 targets improvements in dental care visits among people with intellectual disability. The objective of our study was to examine factors associated with attending at least one dental visit per year among young adults with and without intellectual disability. Data were obtained from the original Metropolitan Atlanta Developmental Disabilities Study (MADDS), and the Metropolitan Atlanta Developmental Disabilities Follow-up Study, 1997-2000, which followed the original MADDS cohort into young adulthood (ages 22-25 years). The follow-up study employed a stratified two-stage probability sampling technique to select young adults representative of the baseline cohort; estimates were statistically weighted accordingly. Using logistic regression analysis, socio-demographics, daily functioning, societal participation, dental services, and dental health were examined as predictors for dental visits. Results showed that only 45% of young adults with intellectual disability visited a dentist at least once per year. Severity and co-occurring developmental disabilities was associated with the frequency of dental visits. Male sex, lower than high school education, and having a toothache within past four weeks, predicted the odds of not visiting a dentist at least once a year; whereas receipt of vocational services, and having limitations in activities of daily living predicted more than one dental visit per year. Our findings have utility in improving the frequency of dental care visits among young adults with intellectual disability.

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HEALTH LITERACY AND URBANICITY IN THE 2008-2010 SURVEY OF THE HEALTH OF WISCONSIN (SHOW). *MC Walsh, K Malecki, AJ Bersch, PE Peppard, LW Galvao, MARTINEZ-DONATE, DA Kindig, FJ Nieto (University of Wisconsin - Madison 53726)

Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information required to make appropriate medical decisions. Little is known about the relationship between health literacy and urbanicity. Using data from the Survey of the Health of Wisconsin (SHOW), we focused on this association. SHOW began in 2008 and consists of a series of annual surveys gathering health-related data on a representative sample of Wisconsin residents age 21-74. 1,570 study participants have been enrolled (2008-2010) and were included in this analysis. Using an established cut point, health literacy was measured with the 36 item STOFHLA (Short Test of Functional Health Literacy in Adults). An urbanicity variable was created that stratified Wisconsin into three categories: Milwaukee, other urban, and rural, using Rural-Urban Commuting Area codes. Odds ratios (OR) and 95% confidence limits (CL) for the associations between health literacy and urbanicity were modeled using logistic regression. Compared to living in Milwaukee, crude results suggest that adequate functional health literacy is associated with living in other urban areas (OR 3.2; CL 1.2-8.3). However this association is attenuated when adjusting for age, gender, race and ethnicity, income and education (OR 1.9; CL 0.7-5.2). A similar pattern is seen when comparing Milwaukee residents with residents from rural areas (crude OR 1.6; CL 0.7-3.7, adjusted OR 0.9; CL 0.3-2.5). These findings suggest the distribution of sociodemographic determinants across Wisconsin contribute to observed differences in health literacy.

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UTILIZATION OF COLORECTAL CANCER SCREENING IN PERSONS WITH DIFFERENT DIETARY PATTERNS. THE ADVENTIST HEALTH STUDY-2. *Y. Ibrayev, K. Oda, K. Dang, S. Knutsen (Loma Linda University, Loma Linda, CA 92350)

Colonoscopy and fecal occult blood test are considered important screening methods for early detection of colorectal cancer. Using ordinal logistic regression, we studied self-reported cancer screening utilization within the last 0-4 and 5+ years among 53,277 subjects age 50+ years (34,782 females, 18,495 males), with different dietary and lifestyle characteristics. Vegetarians were less likely to report screening: vegans, Odds Ratio (OR)=0.53 (95% confidence interval 0.49-0.57); lactoovovegetarians (0.86, 0.82-0.90). Pescovegetarians (0.90, 0.84-0.96) and semivegetarians (0.96, 0.88-1.05) compared to nonvegetarians. Blacks were more likely than non-Blacks to be screened (1.22, 1.13-1.39) and males were less likely (0.91, 0.87-0.95). Education and household income were positively associated with recent screening, with ORs increasing from 0.61 to 1.22 and 0.91 to 1.15, respectively. Also for BMI, ORs increased from 0.85 (BMI=16-19.9) to 1.14 (BMI>30). Older subjects were more likely to be screened: OR=1.74, 2.11 and 1.66 for ages 60-69, 70-79, and 80+ respectively compared to those aged 50-59. Unmarried and divorced/widowed subjects were less likely (OR=0.75 and 0.85 respectively). Family history of colorectal and other cancers were associated with more frequent testing, OR=1.49 and 1.21, respectively. In this low risk population of Adventists with focus on healthy lifestyle, we found that individual screening behaviors varied significantly. Lower screening rates by income, education and BMI were expected, and Blacks were more likely to screen. Health professionals need to understand their patients' preventive profiles especially as adherence to such recommendations may be different than expected.

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UTILIZATION OF PROSTATE CANCER SCREENING IN PERSONS WITH DIFFERENT DIETARY PATTERNS. THE ADVENTIST HEALTH STUDY-2. *Y. Ibrayev, K. Oda, S. Knutsen (Loma Linda University, Loma Linda, CA 92350)

Prostate-specific antigen test and digital rectal examination, despite some limitations, are considered important screening methods for early detection of prostate cancer. Using logistic regression, we investigated self-reported prostate cancer screening utilization within the last 2 years among 18,495 men, age 50+ years, with different dietary patterns and lifestyle characteristics. Vegetarians were less likely to have been screened: vegans, Odds Ratio (OR)=0.54 (95% confidence interval: 0.46-0.63) and lactoovovegetarians, OR=0.82 (0.74-0.91). Pescovegetarians, OR=0.85 (0.72-1.00) and semivegetarians, OR=1.26 (1.01-1.59) compared to nonvegetarians. Blacks were more likely than non-blacks to be screened: OR=1.25 (1.13-1.39). Education and household income up to 75K were positively associated with recent screening with ORs increasing from 0.54 to 1.35 and 0.86 to 1.46, respectively [p (trend) for both <0.001]. Also for BMI, ORs increased from 0.67 (BMI=16-19) to 1.17 (BMI=25-29) to 1.35 (BMI>30) [p(trend) <0.001] compared to normal weight. Screening rates increased with age: OR=1.78, 2.16 and 1.65 for ages 60-69, 70-79, and 80+ respectively [p (trend) <0.001] compared to those aged 50-59. Unmarried and divorced/widowed men were less likely to use screening services (OR=0.48 and 0.67, respectively). Family history of prostate and other cancers were associated with more frequent testing, OR=1.43 and 1.20, respectively. In this low risk population of Adventists with focus on healthy lifestyle, we found that individual screening behaviors varied significantly. Lower screening rates by income, education and BMI were expected, and Blacks were more likely to screen.

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USE OF CAM AMONG US ADULTS WITH BACK PAIN. *N Ghildayal, PJ Johnson (University of Minnesota, Minneapolis, MN, 55455)

Complementary and alternative medicine (CAM) is increasingly being used to treat back pain in the US. However, little is known about patterns of CAM use among patients suffering from this costly and debilitating condition. We used 2007 NHIS data to examine CAM use among adults with back pain (N=5,850). CAM use in the past 12 months was examined in 3 ways: 1) any CAM therapy, 2) 5 CAM types (alternative medical systems, biologically-based, manipulative body-based, mind body, energy healing), and 3) practitioner-based or self-treatment. The use of CAM was compared by back pain status (back pain versus no back pain in past 3 months) using chi-square tests, and multivariate logistic regression was used to estimate the odds of CAM use among back pain sufferers adjusting for other factors. We also examined reasons for CAM use and disclosure of CAM use to health providers. Adults with back pain were more likely to use CAM than adults without back pain (75% to 62%). Use of biologically-based therapies was common in back pain patients and used more by those with back pain than those without (66% to 57%). Manipulative body therapies (24% vs. 12%) and mind-body therapies (25% vs. 17%) were also more prevalent among those with back pain. Differences were found by back pain status for disclosure of CAM use to provider and reasons for CAM use. Among adults with back pain, the most common reasons for CAM use in the past year were general wellness or because it was recommended by friends and family. Significant differences in CAM use were found by race/ethnicity, nativity status, language, sex, age, education, and census region among adults with back pain. Further research is needed to assess patterns of CAM use and the impact of CAM use on management of back pain.

116-S

DISPARITIES IN QUALITY AND PROVISION OF TRANSPLANT EDUCATION. *LM Kucirka; KS Balhara; DL Segev JHU(Johns Hopkins School of Public Health, Baltimore, MD)

The nephrologist is often the first provider to educate ESRD patients about kidney transplant, and disparities in the quality and provision of transplant education might contribute to disparities in access to transplant (ATT). The goals of this study were to (1) describe national transplant education attitudes and practices using a national survey of 906 nephrologists, (2) and to characterize disparities in the provision of transplant education and analyze associations between education and ATT, based on the United States Renal Data System (USRDS) national registry data from 2005-2007. Modified Poisson regression was used to examine factors associated with spending > 20 minutes on transplant education based on a national survey of nephrologists. Associations between being informed about transplant (as reported by nephrologists for each incident ESRD patient in the United States) and ATT were examined based on USRDS data from 2005-2007. Most survey respondents (81%) felt the ideal time to spend on transplant education was >20mins, but only 43% reported actually doing so. Spending >20mins was associated with covering more topics, having one-on-one and repeated conversations, involving families in discussions, and initiating discussions at CKD-stage 4. Nephrologists at for-profit centers were significantly less likely to spend >20mins (RR=0.89, 95%CI:0.80-0.99) or involve families (RR=0.57, 95%CI:0.38-0.87); they reported that fewer of their patients received transplant counseling (RR=0.58, 95%CI:0.37-0.96), initiated transplant discussions (RR=0.58, 95%CI:0.38-0.88), or were eligible for transplantation (RR=0.45, 95%CI:0.30-0.68). Of 236,079 incident ESRD patients in the United States, 30.1% were not informed about transplant at ESRD-onset, and the most common reason reported by nephrologists was that they were unassessed (42.1%). Uninformed patients had a 53% lower rate of ATT, a disparity that persisted in the subgroup of uninformed patients who were simply unassessed. Disparities in ATT may be partially explained by disparities in the quality and provision of transplant information; dialysis centers should ensure this critical intervention is offered to patients in an equitable and timely manner.

118-S

THE USE OF CRITERIA FOR OBSERVATIONAL STUDIES OF NEONATAL COHORTS: THE POTENTIAL INTRODUCTION OF BIAS. *M. Jie, J, Dorling (University of Nottingham, Nottinghamshire, UK, NG7 2RJ)

Objective: Despite much evidence to suggest that using birth weight as inclusion criteria for neonatal cohort studies introduces selection bias and false over-estimation of survival rates in outcome prediction, it is still not unanimously acknowledged by professionals in the field. This study aims to determine whether selection bias can be identified within a cohort using different gestational ages and birth weight cut-off's as inclusion criteria and if selection bias significantly affects the association of predictive variables with mortality. **Methods:** The BadgerNet database for the Trent Perinatal Network was used in this study. Statistical analysis using the independent samples t-test and Fisher's Exact test were used to decide if selection bias was introduced into six different cohort groups (total cohort, ≤1500g VLBW, ≤ 1000g ELBW, premature, very premature and survival prediction models to assess if selection bias affected the outcome predictions. **Results:** Statistical significance (p<0.05) was observed across all groups for gestational age and birth weight variables. No association was identified for admission temperature and birth time. Bias was detected in the VLBW and ELBW groups leading to an increased proportion of male infants excluded at each gestational age. Logistic regression showed increased survival in the VLBW and ELBW groups in comparison to the other four groups. **Conclusion:** For the cohort groups that have been subjected to birth weight cut-offs, selection bias was identified and caused an over-estimation of survival in prediction models. Gestational age appeared to be an important predictive variable regardless of weight, bias, gender or temperature. Future studies should endeavour to use gestational age in days as criteria for neonatal cohort studies as it minimises bias and increases the external validity of any prediction models determined.

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FACTORS AFFECTING COLLEGE STUDENT BLOOD DONATION IN GRENADA, WEST INDIES: AN INCIDENCE DENSITY CASE-CONTROL STUDY. S. N. Hewitt, *L. L. McV. Messam (St. Georges University, St. Georges, Grenada, West Indies).

Blood drives jointly organized by the Grenada Blood Bank and St. George's University's (SGU) American Medical Students Association on SGU's campus are poorly promoted. These are the only regular blood drives in Grenada and blood donor monthly prevalence is approximately 0.5%. An incidence density case-control study was undertaken to identify factors acting proximate to the day of a campus blood drive that affect student donation. Data were collected on the 3 blood drive days in February, March and April 2010 and only during blood collection periods (9:00 am – 3:00 pm). Cases (70) were students donating blood at any of the blood drives and controls (452) were students who did not. Cases were over represented among North American (19%) compared to Caribbean students (6%). Percentages of cases were also higher among medical (17%) and veterinary medical (16%) compared to arts and science (6.5%) students, and females (14.5%) compared to males (12%). Logistic regression was used for multivariable analysis with adjusted odds ratios approximating incidence rate ratios (IRR). Donation rates for students who had been reminded of the blood drive either by a sign on campus (IRR = 2.6; 95% CI: 1.3-5.1), in-class announcement (IRR = 2.3; 95% CI: 1.2-4.2), verbal reminder (IRR = 3.3; 95% CI: 1.8-5.9), facebook (IRR = 5.0; 95% CI: 2.4-10.2) or by e-mail (IRR = 5.3; 95% CI: 2.8-10.0) were higher than for those who hadn't been. Donation rates for students who had an assignment due either on the day of (IRR = 0.5; 95% CI: 0.3-0.9) or day after (IRR = 0.6; 95% CI: 0.3-1.0) a blood drive were lower than for those who didn't. Students should be targeted for blood drive promotion outside of periods of academic stress, and promotion immediately preceding the drives should include reminders via person to person contact, in-class announcements, e-mails and social media.

119-S

ORAL HEALTH DISPARITIES IN CHILDREN OF NEW IMMIGRANTS IN SOUTHERN TAIWAN. *YC Lin, YL Liu, PL Lin, CH Lee and HL Huang (Kaohsiung Medical University, Kaohsiung, Taiwan 80708)

A large number of the new immigrant spouses are growing in Taiwan. Previous studies showed health disparity in immigrant (IM) and native (NA). There are often major inequalities in access to health care according to social class, educational level or language barriers. The aim of our study was to assess the needs in oral health care of new immigrant children in order to develop a cultural appropriate intervention program. We therefore used the baseline data of the Lay Health Advisors Approach Intervention Program to explore disparities in oral health between IM and NA children and factors associated with their oral health. A cross-sectional community-based study was administered to collect data from mothers and their pre-school children from Kaohsiung area in Southern Taiwan in 2011. A total of 658 (NA=519, IM=139) aged 3-6 children and their mothers completed the questionnaire and oral examination. Multiple regression models analyzed the association between child's oral health and it related factors. The disparities in oral health between IM and NA children were observed. The children's caries experience index (dmft) was significantly higher in IM than NA group (88% vs. 79%). The IM mothers had lower level of knowledge, self-confidence and attitudes toward oral health (P<0.001). The significant factors associated with decayed tooth and dmft in IM children were mother's tooth-brushing frequency ($\beta=2.22$ and 2.80), mother asked children to tooth-brushing ($\beta=6.73$ and 6.61) and children drank sugary beverages ($\beta=1.58$ and 1.92). The findings suggested that cultural adequate oral health promotion intervention programs should be implemented for immigrant children and their mothers.

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A CASE-PARENT-TRIAD APPROACH IN ASSESSING RISK OF OSTEOSARCOMA ASSOCIATED WITH GENETIC VARIATION IN ESTROGEN METABOLISM GENES: A CHILDREN'S ONCOLOGY GROUP (COG) STUDY. *JRB Musselman, T Bergemann, M Krailo, D Malkin, JA Ross, S Savage, R Nagarajan, C Sklar, LG Spector (University of Minnesota, Minneapolis, MN, 55455)

Osteosarcoma (OS) is a rare malignant bone tumor with an overall incidence rate of 4.6 cases per million children aged 0-19 years in the United States. OS incidence peaks sharply in adolescence coinciding with the pubertal growth spurt. While the etiology of OS is largely unknown, its distinctive age-incidence pattern suggests that growth and development is crucial in the genesis of OS. Prior studies have suggested that variants in genes in the estrogen metabolism pathway are associated with OS. We assessed this hypothesis by examining 548 single nucleotide polymorphisms (SNPs) in 27 genes from this pathway in a case-parent-triad study of cases and their biological parents. The sample included 229 complete triads and 56 dyads diagnosed during 2008-2011 at Children's Oncology Group institutions. Buccal cell samples were collected via the Oragene kit (DNA Genotek, Ottawa, Ontario) and returned by mail; genotyping was conducted by Sequenom iPLEX Gold method. We used log-linear models to estimate relative risks (RR) and 95% confidence intervals (CI) associated with transmitting one or two copies of the variant compared to no copies. After Bonferroni correction, 1 SNP in the downstream region of the androgen receptor gene (rs1415270: RR = 0.50 and 8.37 for 1 and 2 vs. 0 copies, respectively; $p = 0.010$), was significantly associated with OS incidence. These results confirm previous findings that variation in the estrogen metabolism pathway influence OS risk and further support the pathway's biologically and epidemiologically plausible role in OS development.

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PREVALENCE OF UNDERWEIGHT, OVERWEIGHT AND OBESITY AMONG CHILDREN UNDER 5 YEARS OLD IN VIETNAM. Naoko Sakamoto*, Limin Yang, Pham Thi Thuy Hoa, Le Thi Hop (National Research Institute for Child Health & Dev, Tokyo, Japan)

The purposes of this study were to provide the most recent estimate of the prevalence of underweight, overweight and obesity among Vietnamese children under 5 years old, and compare the distribution of body mass index (BMI) in Vietnamese children with that in Western populations. Height and weight measurements were obtained from a nationwide cross-sectional survey conducted in 2010 in Vietnam. Data from 48886 children (25201 boys, 23685 girls) were used for the present analysis. The prevalence of underweight, overweight and obesity was evaluated using the cut-offs of the World Health Organization (WHO) child growth standards. Smooth centile curves for BMI were modeled using the LMS method. In 2010, 4.3% (95% CIs: 4.1%, 4.6%) of boys and 3.1% (95% CIs: 2.9%, 3.3%) of girls under 5 years old were obese according to the WHO cut-offs. The prevalence of stunting, underweight and wasting were 28.8% (95% CIs: 28.2%, 29.4%), 17.0% (95% CIs: 16.6%, 17.5%) and 7.3% (95% CIs: 7.0%, 7.7%) in boys, respectively, and 26.4% (95% CIs: 25.9%, 27.0%), 15.7% (95% CIs: 15.2%, 16.1%) and 6.2% (95% CIs: 5.9%, 6.5%) in girls, respectively. Compared with the results of a national nutrition survey conducted in 2005 in Vietnam, there was a decrease in the prevalence of malnutrition, but a slightly increase in the prevalence of obesity among children under 5 years old. The existence of both overweight and underweight Vietnamese children remains a major public health concern. The present finding indicate the need for policies in Vietnam aimed at promoting physical activity, healthy nutrition, and strengthening efforts to reduce malnutrition among children.

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ADJUNCT CORTICOSTEROIDS IN CHILDREN WITH COMMUNITY-ACQUIRED PNEUMONIA IN THE OUTPATIENT SETTING. *L.Ambroggio, S.S. Shah (Cincinnati Children's Hospital, Cincinnati, OH, 45229)

Objective: To determine the association between adjunct corticosteroid treatment and unscheduled follow-up visits in children with community-acquired pneumonia (CAP) in the outpatient setting. **Methods:** Children, 1-18 years old, with underlying asthma who were diagnosed with CAP at any of the 83 outpatient practices affiliated with Geisinger Health System were eligible. The primary exposure was the receipt of adjunct systemic corticosteroids. The primary outcome was an unscheduled follow-up visit (i.e. outpatient, emergency department, or admitted as an inpatient) within 14 days of diagnosis. A multi-variable logistic regression model adjusted for age, antibiotic therapy, and receipt of beta-agonist therapy (e.g. albuterol) was used to estimate the association between adjunct corticosteroids and unscheduled follow-up visits. Interactions between age or beta-agonist therapy and adjunct corticosteroid therapy were tested but were not statistically significant. **Results:** Of 680 children with CAP who had underlying asthma, 224 (33%) received adjunct corticosteroids and 565 (83%) received beta-agonist therapy. The mean age was 7.5 years old (SD: 4.6). Most patients received macrolide monotherapy (415, 61%). Patients who received adjunct corticosteroids were twice as likely to have an unscheduled follow-up visit compared with non-recipients (Adjusted Odds Ratio (AOR): 2.05, 95% confidence interval (CI): 1.46, 2.88). **Conclusion:** If unscheduled follow-up visits are considered a proxy for treatment failure then our findings suggest that among patients who are diagnosed with CAP and have underlying asthma, adjunct corticosteroids are not beneficial as these patients have much higher odds of an unscheduled follow-up visit.

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BREASTFEEDING IS AN EFFECT MODIFIER OF THE ASSOCIATION BETWEEN CAESARIAN SECTION DELIVERY AND ASTHMA IN CHILDHOOD. *Gareth Mercer (MD/PhD Program & School of Population and Public Health, Faculty of Medicine, University of British Columbia.)

Background: Although it is currently accepted that delivery by caesarian section is associated with a moderately increased odds of childhood asthma, the magnitudes of odds ratios reported in previous studies have been inconsistent. Effect modification by breastfeeding could account for some of this inconsistency. **Methods:** This study uses data from a population-based longitudinal cohort of 7577 Canadian children followed-up between 1994 and 2009 to investigate whether having been breast-fed could be an effect modifier of the association between delivery by caesarian section and asthma. Stratified logistic regression is used to estimate odds ratios for being diagnosed with asthma by age six, and after age six comparing caesarian section delivery to vaginal delivery among strata of breastfed and not breastfed children. **Results:** Among children who were breast-fed, caesarian section is associated with no increased odds of asthma by age six (OR: 0.98, 95% CI: 0.81-1.18), but significantly increased odds after age six (OR: 1.47, 95% CI: 1.05-2.06). Whereas, among children who were not breastfed, caesarian section is associated with significantly decreased odds of asthma by age six (OR: 0.64, 95% CI: 0.43-0.94) and no significant increased odds of asthma after age six (OR: 1.20, 95% CI: 0.64-2.25). **Conclusions:** Breastfeeding could modify the effect of caesarian section on odds of asthma through effects on the composition of infant intestinal microflora and development of normal immune system tolerance. Future studies of the association between caesarian section and childhood allergic disease should include assessments for effect modification by breastfeeding.

124-S

MATERNAL ANAEMIA: A PREDICTOR OF LOW HAEMOGLOBIN LEVEL IN INFANTS DURING THE FIRST 18 MONTHS OF LIFE. *Ghislain K. Koura, Smaïla Ouédraogo, Gilles Cottrell, Agnès Le Port, Achille Massougboji and André Garcia (IRD UMR216, Mère et enfant face aux infections tropicales, Paris, France).

Anaemia during pregnancy is an important public health problem in low-income and middle-income countries. Its association with the infant's haemoglobin evolution over time remains unclear. Our goals were to identify distinct trajectories of haemoglobin level using latent class analysis, to assess the association between maternal anaemia and other risk factors and these trajectories. A prospective study of infants from birth to 18 months of life was conducted in rural setting in Tori-Bossito, Benin. The main outcome measure was the haemoglobin levels repeatedly measured at 3, 6, 9, 12, 15 and 18 months. Some variables were collected from the mothers at delivery and from the infants at birth and during the follow-up. All the analyses were performed with Stata software, version 11.0 using the generalized linear latent and mixed model (GLLAMM) framework. The analysis covered 2708 haemoglobin measurements out of the expected 3252. We have shown that 33.7% of children experienced a lower haemoglobin trajectory and 66.3% a higher trajectory during the first 18 months of life. Newborn's anaemia, placental malaria and maternal age were associated with infant's haemoglobin evolution. We have also shown that maternal anaemia was a predictor for 'low trajectory' group membership. Maternal anaemia could have negative consequences not only at birth but also during childhood. There is a need to increase the efforts for preventing maternal anaemia together with placental malaria, to prevent adverse developmental outcomes.

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PREDICTION OF EXCESS WEIGHT IN YOUNG ADULTHOOD FROM INFANT GROWTH TRAITS AND PARENTAL CHARACTERISTICS. *AO Odegaard, W Johnson, B Towne, SA Czerwinski, EW Demerath (University of Minnesota, Minneapolis, MN 55454; Wright St. University, Dayton, OH, 45420)

Research links infant growth traits and greater parental body mass index (BMI, kg/m²) with increased risk of excess weight in adulthood. Yet, the predictive ability of these metrics has received little attention. We carried out a receiver operating characteristic (ROC) analysis to examine how these metrics predict overweight (BMI \geq 25) status in young adulthood (age 20-29). We analyzed data from 422 appropriate for gestational age white singleton infants in the Fels Longitudinal Study with serial weight and length measures between birth and 42 months of age, measured BMI as a young adult (101 were overweight), and maternal and paternal BMI closest to the child's birth. From these data we derived weight-for-age (WAZ) and weight-for-length Z-scores according to the World Health Organization 2006 infant growth standards. We created a tiered predictive model including 1) infant sex, gestational age, birth year, adult BMI age, 2) + Z-score or change in Z-score, 3) + maternal BMI/age, and 4) + paternal BMI/age. We present the simplest measure; birth WAZ, comparing infants at or above the 85th percentile (Z-score \geq 1.036) to infants below the 85th percentile. In model 1) the c-statistic was 0.60 (95% CI 0.54-0.66). In model 2) the c-statistic increased to 0.64 (0.58-0.70), $p = 0.07$. In model 3) adding maternal BMI and age significantly increased the predictive ability, $c = 0.71$ (0.66-0.77), $p < 0.02$. Adding paternal BMI and age also increased the predictive ability, $c = 0.74$ (0.69-0.79), $p = 0.07$. These findings were consistent across infant growth traits suggesting a simple clinical prediction model may have utility in predicting overweight young adults.

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UPDATING SURVIVAL CHARTS FOR VERY PRETERM BIRTHS: PRODUCTION AND VALIDATION OF A PROGNOSTIC MODEL. *BN Manktelow, SE Seaton, DJ Field, and ES Draper. (Department of Health Sciences, University of Leicester, UK)

Background: Accurate estimates of the probability of survival of very preterm infants admitted to neonatal care are vital for counselling parents, informing care and planning services. In 1999 easy-to-use charts of the probability of survival by gestation, birthweight and gender were published using UK data from The Neonatal Survey (TNS). These charts have been widely used in clinical care, for benchmarking survival and form the core of the Clinical Risk Index for Babies (CRIB) II score. Subsequent improved survival of preterm infants means the charts need updating. Methods: 2,993 white singleton infants born at 23+0 to 32+6 weeks gestation from 2008-2010 were identified from TNS. A logistic model was fitted with gestational age, birthweight, gender, and all two-way interactions. Non-linear functions were estimated by fractional polynomials. Bootstrap methods were used to assess the internal validity of the final model, by monitoring the c-statistic and Cox regression coefficients for 200 repetitions. Discrimination and calibration of the final model were assessed through the c-statistic, Cox regression coefficients, Hosmer-Lemeshow (HL) test and Brier score on the entire dataset and on subsets by gestation. Results: A prediction model was estimated: c-statistic=0.86; HL $p=0.20$. Updated charts were produced together with contour plots of equal survival. Survival ranged from 29.7% for boys born at 23 weeks gestation to 99.4% for girls born at 32 weeks. The model showed good calibration across gestational ages. Conclusion: These internationally validated survival charts have been updated to reflect increasing survival and will be of continued use to clinicians, parents and managers.

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BODY MASS INDEX, PARENTAL EDUCATION, AND RACE PREDICT BIRTHWEIGHT AND GESTATIONAL AGE AMONG ADOLESCENTS. EW Harville,* AS Madkour, Y Xie (Tulane University, New Orleans, LA 70112)

Objective: To examine the epidemiology of preterm birth and low birthweight in adolescents compared to older women. Study design and setting: The National Longitudinal of Adolescent Health (Add Health), a prospective, longitudinal cohort study, nationally representative of the United States. Outcomes of pregnancies were reported by participants at Wave IV; data were compared among female participants reporting a first singleton livebirth at <20 years ($n=1101$) or $20+$ years ($n=2,846$). Multivariable linear modeling was used to model continuous outcomes; predictors included demographic characteristics (age, race, ethnicity, language, adolescent living arrangement, parental educational level, respondent marital status at birth), as well as maternal health and behavioral characteristics (gravidity, body mass index (BMI), smoking, prenatal care use, and being on birth control when the respondent became pregnant). Results: Among Black adolescents, low parental education and older age at pregnancy were associated with higher birthweight, while low parental education and being on birth control when one got pregnant were associated with higher gestational age. In non-Black adolescents, lower BMI was associated with lower birthweight, while being unmarried was associated with lower gestational age. Conclusions: Predictors of birth outcomes may differ by age group and social context.

RACIAL/ETHNIC AND FAMILY INCOME DIFFERENCES IN DIAGNOSED ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) FOR US CHILDREN AGED 7-11, NATIONAL HEALTH INTERVIEW SURVEY 1999-2010. *PN Pastor, CA Reuben (CDC/NCHS, Hyattsville, MD 20782)

Although the increased prevalence of diagnosed ADHD has been widely reported, few studies have examined trends in diagnosed ADHD by race/ethnicity and family income. This study examines national trends in ADHD for US children in selected subgroups. The analysis includes 33,467 children aged 7-11 from the 1999-2010 National Health Interview Survey, a large nationally representative household survey. Information about diagnosed ADHD and the child's characteristics including race/ethnicity and family income was provided by a knowledgeable household adult. Data from 1999-2010 were combined to form 4 time periods each consisting of 3 consecutive years. Average annual rates of change were calculated for 6 subgroups of children defined by both race/ethnicity (Hispanic, non-Hispanic (NH) black, NH white) and family income (lower: < 200% of the poverty level, higher: 200%+). SAS/SUDAAN was used to adjust for the complex sampling design. Among all children the prevalence of ADHD increased from 7.4% (1999-2001) to 9.1% (2008-2010). Among children with higher family income, the prevalence of ADHD did not change significantly and fluctuated around 7.0%, regardless of the child's race/ethnicity. However, among children with lower family income, the prevalence of ADHD among Hispanic children increased from 3.1% to 6.0% (annual change = 5.7%) and among NH black children from 8.3% to 13.3% (annual change = 4.0%). Among lower income NH white children, the prevalence of ADHD did not increase significantly (from 11.0% to 14.0%). Additional analyses will explore the impact of recent changes in special education programs and public insurance on the trends in diagnosed ADHD.

BCG VACCINATION AND CHILDHOOD ASTHMA: PRELIMINARY RESULTS FROM A BIRTH COHORT. *M El-Zein, M-E Parent, R Menzies, A Benedetti, F Conus, M-C Rousseau (INRS-Institut Armand Frappier, Laval, QC, Canada, H7V 1B7)

It remains unclear whether Bacillus Calmette-Guérin (BCG) vaccination is related to the development of childhood asthma. Between 1949 and 1974, a BCG vaccination program was conducted in Quebec targeting neonates and school-age children. To investigate the effect of BCG vaccination on asthma, we assembled a retrospective cohort of individuals born in Quebec in 1974 through the linkage of several demographic and administrative medical databases. BCG vaccination status, asthma-related events (physician services billing claims, hospitalizations, emergency department visits), and potential confounders were obtained for each subject until 1994. Logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) adjusting for gender, birth weight for gestational age, number of older siblings, parents' age, family income, and urban/rural residency. Among 90,060 individuals born in Quebec in 1974, at or after 32 weeks of gestation, probabilistic linkage resulted in a cohort of 81,496 subjects. Vaccination or asthma status could not be determined for 4,547 subjects. Among the remaining 76,949 subjects, 51% were males. Subjects vaccinated with BCG within their first year constituted 43% of the cohort, whereas 3.5% were vaccinated later. Those who had 2 or more asthma-related medical services or at least 1 hospitalization were considered asthmatics, representing 7.7% of the cohort. A slightly lower asthma risk was observed among vaccinated as compared to non-vaccinated subjects; the adjusted OR was 0.94 (95% CI: 0.89, 0.99). These results are in support of the immunological hypothesis that BCG vaccination in early life may influence immune maturation and prevent asthma.

MOTHERS' MEDITERRANEAN DIETARY PATTERN AND ASTHMA AMONG CHILDREN IN NEW YORK CITY. Paula Bordelois*, Inge F. Goldstein, Robert B. Mellins, Elizabeth A. Kelvin, Richard J. Deckelbaum, Maxine Ashby-Thompson, Judith S. Jacobson. (Columbia University, New York, NY 10032)

Maternal diet during pregnancy has been associated with asthma in the offspring. In a sample of preschool children, we examined the association of physician-diagnosed asthma with mothers' current adherence to the Mediterranean diet (MD). Mothers of 417 children (mean age 4 years) attending Head Start centers in New York City provided demographic data, family respiratory health history, and information on their own dietary intake. Mothers' dietary intake patterns were rated in relation to the MD on a validated 9-point scale. We used multivariable logistic regression to analyze the association of diagnosed asthma among the children with their mother's diet. Mothers of children with asthma were less likely than other mothers to have a high (odds ratio (OR): 0.39, 95% confidence interval (CI): 0.21-0.73) or medium (OR: 0.55, 95% CI: 0.33-0.934) vs. low MD score. Although overall score was associated with asthma, none of the 9 food groups included in the scale remained associated with asthma after adjustment. In the same models, gender, national origin, feeding in infancy (bottle vs. breast), waist circumference and maternal asthma were also associated with asthma. This study supports earlier findings that maternal adherence to the MD during pregnancy is related to lower risk of asthma in offspring and suggests that this association is present even in populations in which overall adherence to the MD is moderate to low.

DESCRIPTION OF BACILLUS CALMETTE-GUÉRIN (BCG) VACCINATION RATES IN THE PROVINCE OF QUEBEC, CANADA, 1926-1974. *M-C Rousseau, F Conus, K Kâ, M El-Zein (INRS-Institut Armand-Frappier, Laval, QC, Canada, H7V 1B7)

In Quebec, the BCG (Bacillus Calmette-Guérin) vaccine was offered to newborns and school-age children from 1949 to 1974 in an organized tuberculosis prevention program. It has been suggested that this vaccine could also prevent asthma through an inhibition of immune mechanisms associated with atopic disorders. Epidemiological studies focusing on BCG vaccination and asthma have generated equivocal results, but most agreed that a pertinent window of exposure exists in the first year of life. We aimed to describe BCG vaccination rates by age groups in the Canadian province of Quebec from 1926-1974. BCG vaccination rates among children aged 0-1 year were estimated using the number of vaccine recipients extracted from the computerized BCG Vaccination Registry and the number of live births obtained from the provincial Ministry of Health and Social Services. The age distribution of vaccine recipients was generated using individual records from the BCG Vaccination Registry for each year from 1926 to 1974. The proportion of 0-1 year old children vaccinated with BCG increased steadily from less than 1% in the 1920s to 5% in 1940, 24% in 1950, and 48% in 1960. It then decreased to 35-40% later in the 1960s and until 1974. Over all time periods, newborns represented the greatest proportion of all BCG vaccinees, 40% on average. Children aged 5-9 and 10-14 years were the second and third most preponderant groups, respectively representing 33% and 18% of BCG vaccine recipients. The relatively high proportion of BCG vaccination in the first year of life suggests that this population is very suitable to retrospectively study the effect of early life BCG vaccination on the development of asthma.

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DIFFERENT METRICS PRODUCE DIFFERENT ESTIMATES IN PREVALENCE OF CHILDHOOD OBESITY. *A.K. Brzozowski, C.D. Drews-Botsch, J.A. Gazmararian (Emory University, Atlanta, GA, 30322)

Body mass index (BMI) is often used to measure childhood obesity. However, BMI may not be the best metric in young children because of their different body composition compared with adults. We used data from the Follow-Up Development and Growth Experiences Study (1997-99) to compare the prevalence of obesity in preschool-aged children using three different metrics: BMI, triceps- and subcapular-skinfold-thickness (TST, SST). For each metric, obesity was defined as being in the top 15% of 4.5 year old children using CDC norms. Anthropometry was obtained by trained staff on 513 children aged 4.5 years born at one of two Atlanta, GA hospitals. Race, sex, and small-vs. appropriate-for-gestational-age (SGA, AGA) status were from previously collected data. Overall, the observed prevalence of obesity in AGA children was highest using BMI (BMI: 29.0%; TST: 12.9%; SST: 13.2%). Obesity was less common in children born SGA than among those who had born AGA, but the relative prevalence differed by definition (0.36 for BMI, 0.50 for TST, 0.64 for SST). Prevalence of obesity was similar between boys and girls when using BMI (15.3% vs. 18.5%), but much higher among boys when using skinfold measures (TST: 16.5% vs. 1.2%; SST: 19.2% vs. 1.2%). The prevalence of high BMI was similar in whites and blacks (16.6% vs. 17.2%), but whites were more likely to be classified as obese when using TST and SST (11.7% vs. 6.2%, 13.2% vs. 7.4%). We conclude that childhood obesity metrics influence the prevalence, and group differences in the prevalence, of obesity in preschool-aged children. Researchers should consider which metric most accurately reflects the true obesity status relevant to their research question.

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INTENSITY OF INTERNET USE IS ASSOCIATED WITH ADOLESCENT BLOOD PRESSURE. *AE. Cassidy-Bushrow, DA. Johnson and CL Joseph (Henry Ford Hospital, Detroit, MI 48202)

Growing evidence suggests intense internet use negatively impacts adolescent health, however, the relationship between internet use and blood pressure (BP) among US adolescents is unknown. Adolescents age 14-17 years completed a research visit between November, 2009 and June, 2011. Height, weight, and BP were measured by trained staff and internet use by questionnaire. Heavy internet use was defined as ≥ 2 hours/day, moderate use as < 2 hours/day at least 5 days/week and light use as < 2 hours/day ≤ 4 days/week. Non-use within the last month was grouped with light use (n=6). Overweight was defined as body mass index ≥ 85 th percentile for sex and age and elevated BP as a systolic or diastolic BP ≥ 90 th percentile for sex, age and height. Logistic regression was used to estimate the association of internet use intensity with elevated BP. The sample consisted of 331 adolescents (mean age 16.4 ± 1.0 years; 150 (45.3%) male; 184 (55.6%) African-American). Most were heavy (n=132) or moderate (n=137) internet users; 47 (14.2%) had elevated BP. Compared to light internet use, heavy internet users had 2.8 times greater odds of elevated BP (P=0.046) and moderate users had 1.5 times greater odds of elevated BP (P=0.445). Results were similar after adjusting for age, sex, race, and overweight. In sex-specific models, heavy internet use was associated with 4.9 times increased odds of elevated BP compared to light use adjusted for age, race and overweight in boys (P=0.052); no association was found in girls. Our results suggest that heavy internet use may place adolescents at-risk for elevated BP and this may be particularly important for boys. Additional research examining other confounders (e.g. mental health, physical inactivity) is needed.

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BODY MASS INDEX AT BIRTH AND GROWTH DURING INFANCY IN RELATION TO TOTAL BONE MINERAL DENSITY AMONG CAUCASIAN CHILDREN. *K Ka, M-C Rousseau, A Van Hulst, L Gomez-Lopez, TA Barnett, M Lambert, J O'Loughlin, A Tremblay, B Nicolau (McGill University, Montreal, Quebec, Canada)

Evidence indicates a positive association between birthweight and adult bone mass. Few studies have looked at links between postnatal growth and bone mass in children. Using data from the Quebec Adipose and Lifestyle Investigation in Youth cohort, an ongoing longitudinal study investigating the natural history of obesity among Caucasian Quebec children, we investigated whether body mass index (BMI) at birth and growth between 0-2 years were associated with Total Bone Mineral Density (TBMD) at 8-10 years. This analysis included 418 children aged 8-10 years at the baseline visit. Measures of weight and length from 0-2 years were collected retrospectively from Health Booklets and transformed to sex-specific BMI-for-age z-scores using WHO growth standards. Individual slopes were estimated between 0-2 years using simple linear regressions and used as indicators of infancy growth rate. TBMD (g/cm²) at 8-10 years was measured by dual-energy X-ray absorptiometry. Linear regression analyses adjusting for potential confounders (age, sex, height, Tanner stage, body weight, daily calcium and vitamin D intake and daily physical activity) were conducted. A 1-unit increase in BMI-at-birth z-score was associated with 0.006 g/cm² increase in TBMD at 8-10 years (95% Confidence interval: 0.001-0.010), independently of current body weight. An association between infancy growth rate and the outcome was also found, but was not significant when accounting for body weight. In our sample, BMI at birth but not infancy growth rate predicted TBMD at 8-10 years. Interventions targeting optimal intra uterine growth may positively affect bone density in children.

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COMPARISON OF BILIRUBIN-INDUCED NEUROLOGIC DYSFUNCTION (BIND) SCORES IN JAUNDICED NIGERIAN INFANTS BY RESIDENT & CONSULTANT PEDIATRICIANS. *F.Groves, T.Slusher, P.Radmacher, G.Ofowwe, E. Amuabunosi, J.Owa (University of Louisville, KY 40202)

Severe jaundice may be the largest underreported cause of neonatal morbidity and mortality. The BIND score assesses severity of neurologic dysfunction in jaundiced newborns. The original BIND has been modified (m-BIND) to better discriminate acute bilirubin encephalopathy (ABE) from tetanus in populations where both occur commonly. The study population included neonates (< 18 days old) admitted to three southern Nigerian hospitals during 2008-2010 for severe jaundice. Infants were examined at a mean age of 156 hours. Resident and consultant pediatricians examined each of the jaundiced infants and scored four domains (mental status, muscle tone, cry pattern, and eye movements) from 0-3, with higher scores indicating more severe signs. Consultants also diagnosed ABE clinically, regardless of m-BIND score. Fifty-three (15.9%) of 333 jaundiced neonates were deemed to have ABE by the consulting pediatrician; the residents and the consultants both assigned m-BIND scores > 1 to 50 of these, for a sensitivity of 94.3%. The residents and consultants assigned m-BIND scores < 2 to 267 and 268 of the remaining 280 infants, respectively; the corresponding specificities were 95.4% and 95.7%. The negative predictive value of an m-BIND score less than two was 98.9% for both residents and consultants. The positive predictive values for an m-BIND score > 1 were 79.4% and 80.6% for residents and consultants, respectively. Since both resident and consultant pediatricians effectively identified Nigerian infants with signs and symptoms of ABE by using the m-BIND instrument, this algorithm may prove useful in the clinical diagnosis of ABE among jaundiced neonates from high-risk populations.

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NEONATAL MORTALITY RATE IN THE LAST 25 YEARS DUE TO CONGENITAL HEART DISEASE (CHD). *J. Teji, S. Patel (University of Chicago, Chicago, IL 60637, Mercy Hospital and Medical Center, Chicago, IL 60616)

Background: The role of pulse oximetry as a screening tool for CHD, has been studied intensively over the past decade, leading to endorsement by major scientific communities. The neonatal mortality rate associated with CHD is a strong indicator of the usefulness of this tool. Purpose: To determine the neonatal mortality rate (NMR) associated with CHD in the babies born in the USA and its relation to the gestational age of the baby. Pulse oximetry may be a more practical tool if used only on babies less than 37 weeks GA. Methods: NCHS vital statistics perinatal files from the years 1983 to 2007; and death certificates for all infants were used as data. Variables analyzed for babies with CHD were gestational age, sex, age at death, and place of death. The effect of maternal history of diabetes, hypertension and exposure to nicotine was also analyzed. Analysis was done with STATA 10.0 and Excel 2007. Results: Deaths due to CHD from a total of about 100 million births were 28,426; leading to an average of 0.29 deaths per 1000 live births. Overall, the NMR has decreased over the last 25 years mostly for 1 thru 27 days of life, with the steepest decline in the age group of 1-6 days of life. However, CHD continues to be the number one cause of death from 1 thru 27 days of life. Over 80% deaths occurred in the hospital while less than 7% occurred at home. The death rate due to CHD was higher in infants born at less than 37 weeks GA. Conclusions: 1.NMR due to CHD has been declining for the last 25 years, mainly in babies greater than 24 hours of age. 2.CHD causes higher mortality in babies less than 37 weeks GA. 3.Pulse oximetry screening for all babies less than 37 weeks GA would be a more efficient way of decreasing the NMR due to CHD. 4.Due to the frequency and the accuracy of the antenatal detection of CHD every ear the yield of missing a critical CHD will be very low.

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STATE-WIDE BIRTH COHORT STUDY OF MEASURED AND MODELED AIR POLLUTION AND FETAL GROWTH. *LC Vini-koor-Imler, JA Davis, TJ Luben [U.S. Environmental Protection Agency (EPA), Research Triangle Park, NC 27711]

Particulate matter (PM) and ozone (O3) have been observed to affect the risk of many health effects. The objective of this study was to determine whether maternal exposure to PM2.5 and O3 during pregnancy is associated with the risk of low birth weight (LBW) and small for gestational age (SGA) infants. LBW and SGA were determined using all birth certificates from North Carolina (NC) from 2002-2005. Ambient air concentrations of PM2.5 and O3 were estimated using a Bayesian hierarchical model of air pollution generated by "fusing" modeled air pollution predictions from EPA's Community Multi-Scale Air Quality (CMAQ) model with air monitor data from the EPA's Air Quality System. Binomial regression was performed and adjusted for multiple potential confounders. In single-pollutant models, O3 concentration was positively associated with both SGA and LBW births [risk ratios (RR) for an increase equal to the interquartile range in O3 during the third trimester: 1.09 (95% confidence interval (CI) 1.06, 1.13) for SGA and 1.28 (95% CI 1.19, 1.37) for LBW]; however, inverse or null associations were observed for PM2.5 [RRs for an increase equal to the interquartile range in PM2.5 during the third trimester: 0.98 (95% CI 0.97, 0.99) for SGA and 0.97 (95% CI 0.94, 1.01) for LBW]. Findings were similar in co-pollutant models. In summary, our study examined SGA and LBW for all births in NC using air pollution data that covers both urban and rural areas of the state and observed that maternal exposure to air pollution during pregnancy, specifically O3, appears to affect the risk of fetal growth. Disclaimer: The views expressed are those of the authors and do not necessarily reflect the views or policies of the US EPA.

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MULTIPLE BIRTHS OCCUR MORE COMMONLY IN THE NORTH-ERN USA. *J. Teji, KS Lee, S. Co, R. Teji, (University of Chicago, Chicago, IL 60637; Loyola University, Chicago, IL , 60658; Mercy Hospital and Medical Center, Chicago, IL 60616)

Aims: Incidence of multiple births is increasing in the USA. There are reports from the animal studies that multiple births may occur more commonly in the colder climate because of survivability in of multiple ovulations in the colder ambient temperature. The purpose of this study is to determine the distribution of multiple births in the USA with relation to latitude. Methods: Data from the CDC, Vital statistics perinatal files were used from the years 1995-2002. The following variables were used for the analysis. Multiple birth, mbth; maternal age, mage; maternal education, med; tobacco use during pregnancy, tob; alcohol usage during pregnancy, alc; prenatal care, pnc; medical risk factors during pregnancy, mrsk; sex, race;. Depicting the geographical areas, we used latitude of the middle of the USA to divide the USA into north and south, variable created was latnorth. Logistical regression was performed on mbth for the variables a listed above including latnorth. Results: There were over 24 million births with usable data for the variable utilized. Logistical regression on mbth revealed that OR for latnorth was 1.24 , cf 95% (1.236002-1.248697), Only other variable of significance was mrsk, and very slightly for the male gender. Non-hispanic white, NHW, had OR 1.11, cf 95% (1.08-1.15) than non-hispanic black, NHB, OR 1.06 cf 95% (1.02-1.09). There was a higher incidence of mbth in the NHW mother and more college educated and older women in the north, but also in the less than college educated women in the north. Conclusion: 1. There was a higher incidence of multiple births in the north USA. 2. Less than college educated mothers also had a higher probability of giving births in the north USA. 3. Exposure to colder weather in the north could be explored as a cause of multiple ovulations have higher survival as seen in the animals demonstrating a higher probability of mbth such as dizygotic twins, particularly in the less than college educated and not just in vitro fertilization in the affluent population.

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QUANTILE REGRESSION MODELS OF FACTORS ASSOCIATED WITH MENSTRUAL CYCLE LENGTH DURING THE MENOPAUSAL TRANSITION IN THE STUDY OF WOMEN'S HEALTH ACROSS THE NATION (SWAN). P Paramsothy*, SD Harlow, MR Elliott, M Yosef, LD Lisabeth, GA Greendale, EB Gold, SL Crawford, JF Randolph (*University of Michigan, Ann Arbor, MI 48103)

The association of body mass index (BMI) and race/ethnicity with menstrual cycle length during the menopausal transition was assessed. These analyses used daily self-recorded menstrual diary data from 1996-2006 and includes participants from 3 SWAN sites and four racial/ethnic groups: African-American, Caucasian, Chinese, and Japanese. Height and weight were measured at each 11 annual visits. Women who had a defined FMP (n=431) were included. All cycles prior to FMP were included. Pregnancy and time intervals of hormone use were excluded. Quantile regression was used to model differences in menstrual cycle length at the 25th, 50th, 75th, and 90th percentiles. Bootstrap sampling was used to construct 95% confidence intervals (CI). The multivariate models included BMI, race/ethnicity, current smoking, physical activity, education, and time until FMP which was included with a natural cubic spline with knots at 1,2,3,4, and 5 years prior to the FMP. At the 50th percentile as compared to Caucasians, menstrual cycle lengths were 1.58 (95%CI: 0.18, 2.97) days longer in African-American women, 1.18 (95% CI: 0.49, 1.86) days longer in Chinese women and 1.02 (95%CI: 0.46, 1.58) days longer in Japanese women. As compared to normal weight women, menstrual cycle lengths were 0.95 (95%CI: 0.40, 1.50) days and 1.13 (95%CI: 0.42, 1.85) days longer in overweight and obese women respectively. Both race/ethnicity and BMI were associated with longer menstrual cycle lengths during the menopausal transition. SWAN Funding: (NR004061; AG012505, AG012535, AG012531, AG012539, AG012546, AG012553, AG012554, AG012495)

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PREGRAVID ORAL CONTRACEPTIVE USE IN RELATION TO FETAL GROWTH. *E.E. Hatch, K.A. Hahn, L.A. Wise, A.H. Riis, E.M. Mikkelsen, K.J. Rothman, H.T. Sorensen (Boston University, Boston, MA 02118)

Several studies have examined birth weight in relation to use of oral contraceptives (OC) before conception, but findings have been inconsistent. We evaluated the association of pregravid OC use with birth weight in a prospective cohort study of Danish pregnancy planners recruited and followed via the internet ('Snart Gravid'). Among the women who conceived during the study, we linked questionnaire data with the Danish National Birth Registry to obtain information on birth weight. We included 1812 mother/infant pairs, after excluding women with diabetes, thyroid disease, multiple births, or infants with malformations. We estimated differences in mean birth weight across categories of recency of OC use using multivariable linear regression to adjust for maternal age, smoking, parity, and pre-pregnancy body mass index. The adjusted differences in mean birth weight (grams) (95% confidence intervals (CI)) across categories of recency were: 78 (-24, 181), 38 (-31, 106), -3 (-77, 70), and 33 (-50, 117) for OC use within 0-1, 2-6, 7-12, and 13-24 months of conception, respectively, compared with OC use >24 months before conception. We also evaluated the risk of macrosomia (>4000 grams) using log binomial regression. Compared with OC use more than 24 months before conception, risk ratios (95% CI) for macrosomia were 1.34 (0.92, 1.95), 1.06 (0.80, 1.40), 1.03 (0.76, 1.40), and 1.22 (0.87, 1.70) for OC use 0-1, 2-6, 7-12, and 13-24 months before conception, respectively. Low birth weight was too rare to analyze with precision. Further analyses will focus on estrogen/progestin content and duration of OC use in combination with recency. There was little evidence of a major effect of pregravid OC use on infant birth weight.

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NIGHT AND ROTATING SHIFT WORK IN RELATION TO HORMONES ACROSS THE MENSTRUAL CYCLE. *P. Mendola, S.L. Mumford, A.Z. Pollack, A. Ye, L. Vinikoor-Imler, L.C. Messer, J. Wactawski-Wende, and E.F. Schisterman (NICHD, Rockville, MD, 20852)

Night and rotating shift work have been associated with disrupted sleep and other physiologic processes that rely on circadian rhythms. The impact of night work (more than 50 percent of hours evening/night) and rotating shifts (schedule changes between days, evenings, nights) on hormones was examined across the menstrual cycle among currently employed women enrolled in the BioCycle study. Women were followed for up to two menstrual cycles with up to eight visits per cycle. Job data was collected at baseline and hormones were measured at each study visit timed to menstrual cycle phase. Cycle length was assessed using mixed models to account for multiple cycles and generalized estimating equations estimated anovulation risk. Harmonic models assessed the mean, amplitude and phase shift of log-transformed estradiol, follicle stimulating hormone (FSH), luteinizing hormone (LH) and progesterone (Pg) adjusted for age, BMI, race, marital status and education. FSH had a significantly earlier phase shift in both night (n=71; beta=-0.04, p<0.01) and rotating (n=46; beta=-0.06, p<0.01) workers compared to women with no night/rotating work (n=113; reference group). Mean LH was higher for rotating work (beta=0.13, p<0.05) and phase shift was marginally earlier in night workers (beta=-0.03, p=0.07). Mean Pg was significantly higher in rotating workers (beta=0.11, p<0.01) and marginally so in night workers (beta=0.06, p=0.09). No estradiol effect was observed. Cycles were marginally shorter in night/rotating workers with no differences in anovulation. Hormone changes unlikely to impact fertility were associated with night/shift work in healthy premenopausal working women.

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PRENATAL EXPOSURE TO CNS-ACTING DRUGS AND CHILDHOOD NEURODEVELOPMENTAL OUTCOMES. *K.A. Hahn, B.R. Collett, M.L. Speltz, M.M. Werler (Boston University School of Public Health, Boston, MA, 02118)

Medications that act upon the CNS of an expectant mother may cross the placenta and affect the developing brain of the fetus. We examined the relationship between exposure to 4 classes of CNS-acting drugs during the first 5 months of pregnancy and neurodevelopmental outcomes of the children. Participants were control subjects from a study of hemifacial microsomia that were recruited from pediatricians surrounding US and Canadian craniofacial centers. Mothers were interviewed about use of CNS-acting medications, which were grouped according to class: antihistamines (AH), autonomic drugs (AU), CNS agents, and respiratory agents. When children were between 5 and 12 years of age, teachers administered two screening measures: the Peabody Picture Vocabulary Test (PPVT) and the Beery-Buktenica Developmental Test of Visual Motor Integration (VMI). PPVT and VMI scores were compared between exposed and unexposed children separately for each of the 4 drug classes, using linear regression for mean scores and logistic regression for scores >1 sd below the normative mean. Of 469 children, 19.7, 30.6, 63.7, and 18.8 percent were exposed to AH, AU, CNS, and respiratory agents, respectively. After adjustment for maternal education, region, race, marital status, language, age and child's sex, no substantial differences in PPVT or VMI scores were observed for each of the drug classes. Findings remained null for exposures >14 days. The findings of this study suggest that exposure to four classes of CNS-acting drugs during the first 5 months of pregnancy are not associated with neurodevelopmental outcomes as measured by the PPVT and VMI.

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INTERNATIONAL DIFFERENCES IN AGE AT ONSET OF ADRENARCHE: A MIGRANT STUDY OF BANGLADESHI GIRLS TO THE UK. *L. Houghton, H. Katki, M. Booth, R. Troisi, R. Hoover, O. Chowdhury, R. Ziegler, G. Bentley (Durham University, Durham, UK, DH1 3LE and NCI, Bethesda, MD, 20852)

Adrenarche, the pre-pubertal rise in androgens, is speculated to alter the timing of puberty and possibly affect breast cancer risk, but little is known about the timing of adrenarche and how it varies internationally. To study international variation in adrenarche onset, we measured pubertal development via physical characteristics and the accompanying levels of reproductive steroid hormones in a migrant study of girls aged 5-16 years from four populations in increasing order of Westernization: Bangladeshi, British-Bangladeshi born in Bangladesh, British-Bangladeshi born in the UK, and white British girls. Participants (n=448) completed the Pubertal Development Scale questionnaire expanded to include questions regarding secondary sex characteristics associated with adrenarche. Girls also provided spot urine and saliva specimens to be analyzed for androgen and estrogen concentrations. Population differences in secondary sex characteristics and hormone levels were tested using age-adjusted logistic regression models. Age-adjusted prevalence of secondary sex characteristics increased with increasing Westernization across the four populations: leg hair (Odd Ratio(OR)=1.27; p-trend=0.005), pimples (OR=1.59; p-trend<0.001), pubic hair (OR=1.35; p-trend=0.005), and breast development (OR=1.45; p-trend<0.001). We are currently analyzing salivary dehydroepiandrosterone sulfate (DHEAS) and urinary estrogen data to determine if international differences in levels of these hormones can explain the observed trend of earlier onset of adrenarche-related secondary sex characteristics with increasing Westernization.

IS CAUSAL INFERENCE IN STUDIES OF VERY PRETERM BABIES POSSIBLE? *Olga Basso. (McGill University, Montreal, QC, Canada)

In studies restricted to very preterm babies, such as those carried out in perinatal networks, a given pathology (e.g. preeclampsia) is sometimes assessed in relation to an outcome (e.g. neonatal death). As most (if not all) babies in the reference group harbor other pathologies that caused early birth and affected outcome, causal interpretation is not possible unless all confounders are accounted for. The above design was reproduced in simulations: baseline risk due to immaturity is expressed as a quadratic function, and 4 factors are defined that alter timing of birth and mortality risk independently of one another. The effect of each factor was estimated through logistic regressions, with the other 3 behaving as unmeasured confounders. Data were analyzed both restricting to babies born before 31 weeks and including all babies, with and without (further) adjustment for gestational age. As expected, compared with the true causal odds ratio, all 4 analyses yielded biased estimates, sometimes with reversal of risk. Although estimates within $\pm 10\%$ of the truth occurred sporadically, they were more often seen in analyses restricted to babies born before 31 weeks, especially if adjusted for gestational age. If enough babies born early with no underlying pathology (e.g., delivered because the mother had an accident) could be identified, they may serve as a "healthy" reference. Even so, for estimating the true causal effect of a given factor, babies with any other condition beyond the one under study should be excluded from the analysis, as their presence can result in biased estimates. As this may not be feasible with our current level of knowledge, causal inference in studies of very preterm babies remains elusive.

CONTRACEPTIVE USE PATTERNS IN THE 2008-2010 SURVEY OF THE HEALTH OF WISCONSIN. *C McWilliams, L Galvao, A Bersch, M Walsh (University of Wisconsin, Madison, WI 53705)

While it is well established that contraceptive use patterns vary according to age, race, income, and education, most current information on the use of contraception is collected at the national level. The Survey of the Health of Wisconsin (SHOW) provides an unprecedented opportunity to study state-level contraceptive use, as reported by use of Audio Computer Assisted Self Interview (ACASI). SHOW consists of a series of annual surveys gathering health data on a representative sample of Wisconsin residents age 21-74. 1,570 individuals were enrolled through 2010. We analyzed SHOW contraceptive use data to describe whether contraception type was associated with demographic characteristics. Demographic variables included education, age, income, and gender. Odds ratios (OR) and 95% confidence intervals (CI) were modeled using logistic regression. All models included age, gender, income, and education. Hormonal contraceptives (oral pill, ring, patch) were significantly less likely to be used by those at one (OR 0.2, CI 0.1-0.5) and two (OR 0.2, CI 0.1-0.3) unit increases in age. Vasectomy was associated with one unit increase in age (OR 11, CI 4.1-29.5) and two units increase in income (OR 2.9, CI 1.4-5.8). Condom use decreased significantly as age and income increased. Interestingly, IUD use was not significantly different among any of the demographic groups, except gender. Compared to females, males were significantly less likely to report IUD as their contraceptive method (OR 0.5, CI 0.3-1.0). These results support that contraceptive method varies according to demographic characteristics. Better understanding of these patterns at the state level will be valuable for health care providers, policymakers, and the public health workforce.

IS INCREASED PERINATAL MORTALITY FOR THE SECOND TWIN RELATED TO ASSISTED REPRODUCTIVE TECHNIQUES? A POPULATION BASED COHORT STUDY FROM NORWAY, 1988-2008. *Klungsoyr K, Skjærven R, Tandberg A, Rasmussen S, Irgens LM. (University of Bergen, 5018 Bergen, Norway)

Background: Studies have reported higher delivery related mortality for second than first twins. Prevalence of twin pregnancies has increased over time, partly due to more use of assisted reproduction techniques (ART). Methods: We analysed delivery related perinatal mortality (intrapartum stillbirth or neonatal death) by birth order of twins using data from the Medical Birth Registry of Norway; 18 561 twin deliveries during 1988-2008. We specifically studied whether the use of ART, birth weight discordance (100 X (birth weight first – birth weight second / birth weight first)) and delivery mode influenced the relations. Results: A total of 211 first and 241 second twins died perinatally (odds ratio (OR) 1.3 (95% confidence interval 0.9-1.6)). For twins delivered after 31 weeks, the second twin had twice the mortality risk of the first (OR 2.0 (1.1-3.5)). When stratifying on ART or non-ART pregnancies, the increased mortality for second relative first twins was confined to ART pregnancies: ART: OR 5.0 (1.5-7.0); non-ART: OR 1.1 (0.8-1.4); P-value for interaction = 0.01. If birth weight discordance was > 20%, the smallest twin had the highest mortality, independent of birth order. If birth weight discordance was < 20%, the second twin had higher mortality than the first when delivered vaginally (OR 2.0 (1.2-3.2), but not when by caesarean section: OR= 0.8 (0.5-1.3) (P-value for interaction = 0.01). Conclusion: Second twins had higher delivery related perinatal mortality than first twins when delivered after 31 weeks, and in vaginally delivered pregnancies with little birth weight discordance. Risk was linked to the use of ART.

LENGTH OF HUMAN GESTATION AND ITS NATURAL VARIATION. *Jukic AM, Baird DD, Weinberg CR, McConaughy DR, Wilcox AJ (NIEHS, Durham, NC 27709)

We used data from the North Carolina Early Pregnancy Study (1982-1985) to describe length of gestation from ovulation to spontaneous birth in 125 naturally conceived singleton live births. While attempting to conceive, women collected daily urine specimens which were analyzed for estrogen and progesterone metabolites and human chorionic gonadotrophin (hCG). We assigned day of ovulation using the rapid drop in estrogen/progesterone ratio. In 2010, the women were recontacted (N=100) to determine if their delivery included labor induction or C-section without labor (thus truncating the pregnancy). Twenty-five reported such interventions; missing censoring information was imputed (N=25). Data were analyzed with Kaplan-Meier curves and proportional hazards models. The range of ovulation-defined gestational age was 208 to 284 days. After excluding preterm births (≤ 245 days), the mean and median pregnancy lengths (from ovulation) were both 267 days and the standard deviation was 8.5 days. Mean and median LMP gestational ages for the same pregnancies were 285 days (SD 11.9 days). Women aged 29 or older had longer ovulation-based gestations than younger women (hazard ratio (HR), 95% confidence interval (CI): 0.6 (0.4, 0.9), $p=0.02$; 4-day difference in medians). Pregnancies with a late corpus luteum rescue were shorter than with early rescue ($p=0.006$; 13-day difference in medians). Pregnancies with longer time from ovulation to implantation then had longer time from implantation to birth (Per day increase, HR (CI): 0.8 (0.6, 1.0), linear trend $p=0.02$). Length of gestation was not significantly associated with parity, follicular-phase length in the conception cycle, or hCG levels early in pregnancy ($p>0.1$). Early pregnancy events appear to influence the duration of pregnancy.

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BMI TRAJECTORIES IN MINNESOTA: AN ANALYSIS OF A 35-YEAR BIRTH COHORT. *KE. Andrade, JM. Oakes, SK. Katusic, CL. Leibson. (University of MN, Minneapolis, MN, 55454)

Childhood and early adolescence are considered pivotal in the development of obesity. Our objective was to estimate life-course trajectories of body mass index (BMI) by socioeconomic status (SES). We used unique, high quality clinical data from a population-based retrospective birth cohort study of 5,718 individuals born to mothers who were residents of Olmsted County, MN between 1/1/1976 and 12/31/1982. All occurrences of height/weight were abstracted from the patient's provider-linked medical record; BMI was calculated. SES was measured by highest level of parental education at birth, as reported on the patient's birth certificate, and categorized into 3 groups. We plotted observed BMI trajectories and used the Q-sort method to identify BMI trajectory classes. Tabular analyses examined the relationship between BMI trajectory and SES at birth. The mean number of measures per person was 28 (range: 1-114). Preliminary analyses suggest that no distinct differences in trajectories exist before age 5. Trajectories begin to diverge at age 5 and by age 7, 3 trajectories are clearly observable. By end of follow-up, these trajectories map to the national distribution of BMI categories: normal weight (46%), overweight (26%) and obese (28%). Thus, obesity status at age 35 can be predicted by trajectory class at age 7 with some precision. Those classified as normal weight were more likely to have parents with at least a college degree; those classified as obese were more likely to have parents with less than high school or a high school degree/some college. We find that BMI trajectory predicts adult obesity after age 7, but not before. In addition, those with lower SES are more likely to belong to a trajectory characterized by high rates of obesity.

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MENDELIAN RANDOMIZATION STUDY OF THE ASSOCIATION OF AGE AT MENARCHE AND TYPE 2 DIABETES. *J Dreyfus, J Pankow, M Barbalic, R Huxley, P Lutsey, L Fernández-Rhodes, E Selvin, N Franceschini, E Demerath (University of MN, Minneapolis, MN, 55454)

Evidence suggests that early age at menarche increases the risk of type 2 diabetes (T2D), but findings may be confounded by early life events. We used a Mendelian randomization approach to test the causal association of early age at menarche with T2D using a genetic risk score (GRS) as an instrumental variable to represent menarche. We hypothesized that higher GRS would be associated with risk of T2D. We included 4,921 women of European ancestry aged 45-65 who participated in the Atherosclerosis Risk in Communities (ARIC) Study during 1987-1989. Women missing genetic or baseline diabetes information were excluded. We calculated the GRS as the sum of the risk alleles for 42 early menarche-associated SNPs that were identified in a genome-wide association study by the CHARGE-ReproGen consortium. T2D was defined based on self-reported diagnosis, fasting glucose ≥ 126 mg/dl, non-fasting glucose ≥ 200 mg/dl, or use of diabetes medication. Logistic regression evaluated the association of early menarche GRS (continuous) and prevalent T2D (yes/no). We identified 373 prevalent T2D cases. Mean age at menarche was 12.9 years (SD=1.6) and mean GRS was 41.3 (SD=3.9). Each 1 SD higher GRS was associated with a 10.9-week younger age at menarche ($p < 0.001$). Each 1-year younger age at menarche was associated with 13% higher odds of T2D (odds ratio [OR]=1.13, 95% CI 1.05-1.21). Odds of T2D were 10% higher (OR=1.10, 95% CI 0.99-1.22) for each 1 SD higher GRS, greater than the expected OR of 1.03 based on the GRS/menarche and menarche/diabetes associations. Our results using a GRS as an instrumental variable suggest a weak association of early menarche with T2D in middle age adults.

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LIFECOURSE SOCIOECONOMIC POSITION, RACE AND PREVALENCE OF DIABETES AMONG US WOMEN AND MEN. *T.Insaf, B.Shaw, R.Yucel, L.Chasan-Taber, D.Strogatz (School of Public Health, University at Albany, SUNY, Rensselaer, NY 12144)

Few studies have examined the degree to which a lifecourse perspective on socioeconomic position (SEP) accounts for Black-White differences in the development of diabetes. This question was addressed in data from the Americans' Changing Lives study of 3,497 adults aged 25 years and older. Sex-specific generalized estimating equations were used to compute prevalence ratios (PR) for associations of race and SEP with self-reported diagnoses of diabetes recorded at four waves of data collection during the 16 year study period (1986-2002). For men, childhood and adult SEP were unrelated to prevalence of diabetes and adjustment for lifecourse SEP had little effect on the excess prevalence of diabetes in Blacks (PR=1.56, 95% CI: 1.11, 2.21). In contrast, low father and low respondent education were each associated with increased diabetes in women (PR=1.69, 95% CI: 1.08, 2.63 and 1.78, 95% CI: 1.26, 2.51, respectively) and the combination of low SEP as a child and adult was associated with nearly a threefold increase (PR=2.89, 95% CI: 2.10, 3.99) in the prevalence of diabetes. The adjustment for lifecourse SEP reduced the PR for the association between race and diabetes in women from 1.96 (95% CI: 1.52, 2.54) to 1.40 (95% CI: 1.04, 1.87). The results suggest that the pathway and cumulative hypotheses for lifecourse SEP effects on diabetes may be especially salient for women.

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CHILDREN'S SELF-REGULATORY CAPACITY AND LATER WEIGHT STATUS. *M deBlois, M Glymour, M McCormick, L Kubzansky (Harvard University, Boston, MA, 02115)

This study examines the relationship between domains of self-regulation (emotion, attention, behavior, and social, as well as a global composite) and future weight status. We used data from 3407 children ages 3-12 at baseline in the Panel Study of Income Dynamics Child Development Supplement. From parent-reported behaviors, we derived novel multidimensional measures where higher scores indicate dysregulation. Height and weight were reported by parents in Wave 1 (1997) and measured by researchers in Waves 2 (2002) and 3 (2007). Age- and sex-referenced body mass index (BMI) was based on Centers for Disease Control and Prevention standards. To limit the potential for reverse causation we included only those with a baseline BMI (available for 2580 children) in the normal range ($n=1466$). We conducted complete analyses on children for whom parent BMI was available (final $n=906$). Odds ratios (OR) and 95% confidence intervals (95% CI) were calculated for ever-overweight status (i.e., overweight or obese at Wave 2 or 3) using logistic regression to assess increased odds of overweight associated with a 1-standard-deviation difference in each regulatory domain. We adjusted for sex, race/ethnicity, age, parent BMI, and parent income. Emotion (OR: 1.46, 95% CI: 1.09-1.96), social (OR: 1.33, 95% CI: 1.01-1.76), and global (OR: 1.40, 95% CI: 1.01-1.94) dysregulation predicted risk of weight gain. Attention and behavior regulation did not significantly predict subsequent weight gain, suggesting that for weight status, emotional and social self-regulation may be more important than attention and behavior. Results underscore the importance of early childhood development in the origins of adult disease and may provide insight into health promotion across the lifespan.

RACIAL DISCRIMINATION AND TELOMERIC AGING AMONG AFRICAN AMERICAN MIDLIFE MEN. *DH Chae (Emory University, Atlanta, GA 30322), AM Nuru-Jeter (University of California, Berkeley, 94720), NE Adler, J Lin, EH Blackburn, & ES Epel (University of California, San Francisco, 94118)

Leukocyte telomere length (LTL) has been posited to be a marker of general systemic aging and has been associated with several disease outcomes. This study examined whether the combination of experiencing racial discrimination and holding an unconscious in-group racial bias are associated with LTL among midlife African American men in the San Francisco Bay Area (N = 95). LTL was assayed from dried blood spots. Racial discrimination was assessed via self-report and unconscious racial bias was measured using the Black-White Implicit Association Test. There was a significant interaction between racial discrimination and implicit racial bias in predicting LTL at the $p = 0.04$ level ($b = -0.09$, standard error [SE] = 0.04). Among participants with an implicit anti-Black bias, greater self-reports of racial discrimination were associated with shorter LTL. In contrast, among those with an implicit pro-Black bias, there was a positive relationship between self-reports of racial discrimination and LTL. Results suggest that experiencing racial discrimination in tandem with internalizing in-group racial bias is associated with shorter LTL among African American midlife men. Among those with an implicit anti-Black bias, an average difference in LTL of 95 base pairs was found between those reporting low vs. high levels of discrimination, equivalent to approximately 1.5 chronological years of age. Efforts to promote a positive racial identity may be protective against the effect of racial discrimination on telomeric aging among African American mid-life men.

LATINO HEALTH PARADOX OR HEALTHY IMMIGRANT PHENOMENON? ADULT MORBIDITY IN THE INTEGRATED HEALTH INTERVIEW SERIES, 2000-2009. *Ross Macmillan (Universita Bocconi, Milano, ITALY), J. Michael Oakes (UMN) Naomi Duke (UMN), Wen Fan (UMN), Liying Luo (UMN) Holly Nyseth (UMN) Alain Vandormael (UMN)

Health is central to research on both immigration and assimilation, and differences in health among immigrants are a focal part of health disparities research. In these fields, immigrant health has been deemed “paradoxical” because a) immigrants tend to have better health than is predicted by their socioeconomic position and b) acculturation into American society is associated with declines in immigrant health status despite increases in socioeconomic position and related utilization of health care. Importantly, much of our understanding of immigrant health and its paradoxical nature come from studies of Hispanics. Using data from the 2000-2009 Integrated Health Interview Series, we extend inquiry to 10 distinct immigrant groups based on global region of birth. First, we assess health both across different immigrant groups and in relation to the prominent US born racial and ethnic groups. Second, we examine education gradients and assimilation trajectories across immigrant groups. Finally, we assess the ability of widely recognized explanatory factors to account for health differences across immigrant groups, educational gradients, and assimilation effects. Across four health outcomes, health advantages among immigrants are robust regardless of group, educational gradients and acculturation trajectories are generally consistent, and the explanatory factors do little to account for the immigrant health advantages. These findings highlight the significance of healthy immigrant selection and we discuss implications for existing theory and research on assimilation processes and health disparities research.

ASSOCIATION BETWEEN SOCIOECONOMIC STATUS, HEALTH BEHAVIORS AND ALL-CAUSE MORTALITY IN THE UNITED STATES. *A. Nandi, M. M. Glymour, S. V. Subramanian (McGill University, Montreal, Quebec, H3A 1A3 CANADA)

The contribution of health behaviors to explaining socioeconomic disparities in mortality in the United States (US) remains unclear. We assessed the extent to which smoking, alcohol consumption, and physical inactivity mediated the association between socioeconomic status (SES) and all-cause mortality in a representative sample of US adults enrolled in the Health and Retirement Study, a longitudinal, biennial survey of a national sample of US adults born between 1931-1941. Analyses were based on a sample of 8,038 participants enrolled in 1992 and followed for mortality from 1998 through 2008. We used exploratory and confirmatory factor analysis to derive a measure of SES based on respondents' education, occupation, labor force status, household income, and household wealth. Potential mediators (smoking, alcohol consumption, physical inactivity) were assessed biennially. The outcome was all-cause mortality from 1998 through 2008. We used inverse probability weighted mediation models to account for time-varying covariates. There were 914 (11.37%) deaths during the 10-year mortality follow-up. Accounting for age, sex, and baseline confounders, being in the most disadvantaged compared to least disadvantaged quartile of SES was associated with an increased risk of mortality [risk ratio (RR) 2.73, 95% confidence interval (CI) 2.25, 3.31]. Together, smoking, alcohol consumption, and physical inactivity attenuated the SES-mortality association by 38% (95%CI 28%, 46%), although it remained statistically significant (RR 1.87, 95%CI 1.54, 2.28). Estimates from models accounting for potential confounding by time-varying health status were similar. The distribution of health-damaging behaviors may explain a substantial proportion of excess mortality associated with low SES in the US suggesting the importance of health behavior interventions for reducing socioeconomic inequalities in mortality.

SIMULATING COUNTERFACTUALS: NEIGHBORHOOD INTERVENTIONS TO REDUCE DISPARITIES IN VIOLENCE AND PSYCHOPATHOLOGY. M Cerdá*, M Tracy, S Galea (Columbia University, New York, NY, 10032)

Blacks experience higher rates of violent victimization and attendant psychopathology than Whites. Disparities may be due to the segregation of Blacks into violent, disadvantaged neighborhoods with high physical disorder, limited policing of misdemeanors and low collective efficacy. Segregation of Blacks and Whites into non-comparable neighborhoods limits our ability to approximate counterfactual scenarios with observational studies. We used agent-based models to simulate experiences of victimization and post-traumatic stress disorder (PTSD) in agents embedded in neighborhoods, and to examine whether interventions on neighborhood physical disorder, misdemeanor policing and collective efficacy reduced racial disparities in these outcomes. We examined two types of interventions: 1) targeted to violent neighborhoods, and 2) across all neighborhoods. Characteristics of agents and neighborhoods were calibrated using NYC survey and administrative data. Increasing collective efficacy in violent neighborhoods reduced racial disparities in victimization (odds ratio [OR] for Blacks vs. Whites was 1.53 vs. 1.92 under no intervention), as did increasing misdemeanor policing (OR=1.70 vs. 1.92) and decreasing physical disorder (OR=1.71 vs. 1.92). Decreasing physical disorder, increasing collective efficacy and increasing misdemeanor policing in violent neighborhoods resulted in comparable reductions of racial disparities in PTSD (OR=1.18-1.19 vs. 1.30 under no intervention). Universal interventions across neighborhoods did not decrease racial disparities in victimization or PTSD. Neighborhood level interventions that target structural factors may be necessary to reduce racial disparities in violence and PTSD.

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SOCIAL EXCLUSION AND POST-TRAUMATIC STRESS DISORDER IN POST-CONFLICT LIBERIA. Kassem *AM, El-Sayed AM, Kruk ME, Galea S (Columbia University, New York, NY 10032)

Several studies have documented the high prevalence of PTSD in post-conflict sub-Saharan African countries. However, few studies have considered how social context in the aftermath of conflict influences the risk of psychopathology. Here, we were interested in the relation between perceived social exclusion (PSE) by government on the basis of tribal affiliation and traumatic exposure and post-traumatic stress disorder (PTSD) in a rural county in north central Liberia two decades following civil war. We collected data from a population-representative 3-stage rural cluster sample of 1434 adults. Covariates of interest included PSE, tribal affiliation, gender, age, literacy, education, marital status, household assets, and religion. After assessing bivariate relationships between exposures and outcomes, we fit multivariable logistic regression models of trauma exposure and PTSD symptomatology by PSE, adjusted for potential confounders. We then considered mediation of the relationship between PSE and PTSD symptomatology by trauma score. We found that PSE was associated with both high trauma score (OR=1.70, 95% CI 1.19-2.41) and high PTSD score (2.06, 1.60-2.66). Even after adjusting for trauma score, PSE was associated with high PTSD symptomatology (1.63, 1.17-2.10). Our findings suggest that PSE may operate to increase risk for PTSD by both increasing exposure to trauma, as well as increasing the likelihood of PTSD following traumatic exposure. Social context is likely to influence the psychopathologic consequences of conflict, and should be considered in future studies in this area.

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POLYMORPHISMS IN GENES ASSOCIATED WITH NATURAL KILLER CELLS ARE ASSOCIATED WITH PRETERM BIRTH. *QE Harmon, SM Engel, MC Wu, A Stuebe, CL Avery, T Moran, J Luo, AF Olshan (UNC Gillings School of Global Public Health, Chapel Hill, NC)

Inflammatory processes have been repeatedly implicated in preterm birth. Previous genetic epidemiologic studies have had conflicting results, and we sought to expand coverage of inflammatory genes. Using data from the Pregnancy, Infection and Nutrition cohort, we examined the association between maternal genetic variations in thirty genes (including 503 SNPs) in the inflammatory pathway and preterm birth among Caucasian and African American women. We used SNP-set kernel association testing (SKAT) to estimate the overall association of variations within the gene with preterm birth, separately by race. Among genes meeting false-discovery rate (FDR) criteria of 20%, we estimated single SNP associations using inverse probability weighting to generate risk ratios with robust variances used to calculate 95% confidence intervals (CI). Six genes met an FDR of 20% for preterm and spontaneous preterm birth among Caucasians: *IL12A*, *CSF2*, *IFNGR2*, *KIR3DL2*, *IL4* and *IL13*. Four of these genes are associated with natural killer (NK) cell function: *IL12A* is a potent NK cell activator, *CSF2* is produced by NK cells, *IFNGR2* and *KIR3DL2* are receptors for NK cell functions. In addition, SNPs tagging a locus control region for *IL13* and *IL4* were associated with an increased risk of spontaneous preterm birth (RR 1.9, 95% CI 1.4, 2.5) among Caucasians. Although associations were mainly found for Caucasians, associations among African Americans were often similar in magnitude and direction, although estimated with less precision. Cytokines related to natural killer cells pose a novel target for further elucidation of the link between inflammation and preterm birth.

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THE ASSOCIATION BETWEEN 25-HYDROXYVITAMIN D AND C-REACTIVE PROTEIN CONCENTRATIONS IN PREGNANT MOTHERS. *LM Bodnar, MA Klebanoff, AD Gernand, HN Simhan, JM Catov. (University of Pittsburgh, Pittsburgh PA 15261)

Little is known about the mechanisms underlying the effect of vitamin D deficiency on poor pregnancy outcomes. We tested the hypothesis that poor vitamin D status was associated with inflammation as measured by serum C-reactive protein (CRP). We used a random sample of 2663 singleton pregnancies in the Collaborative Perinatal Project (1959-65), a large U.S. multicenter cohort study. One banked serum sample drawn at ≤ 26 weeks gestation was assayed for 25-hydroxyvitamin D [25(OH)D] using LC/MS-MS and CRP using a high-sensitivity ELISA. Elevated serum CRP was defined as >8 ug/ml. Nonlinear relations were tested with natural splines. The median (IQR) 25(OH)D was 45.3 (30.5-64.5) nmol/L, and 58% and 87% of women had serum 25(OH)D <50 and <75 nmol/L, respectively. 23% of mothers had elevated CRP (n=621). In a multivariable logistic regression model adjusting for race/ethnicity, pregravid BMI, parity, gestational age, smoking, socioeconomic status, marital status, age, season, parity, and study center, there was a strong, positive association between 25(OH)D and odds of high CRP (linear, $p<0.0001$; nonlinear $p<0.0001$). For serum 25(OH)D <37.5 , 37.5- <50 , 50-75 nmol/L, elevated CRP adjusted odd ratios (95% confidence intervals) were 0.75 (0.59, 0.96); 0.97 (0.74, 1.3); 1.0; and 1.5 (1.1, 2.1), respectively. This relation was not modified by gestational age, BMI, race, season, or latitude. Contrary to our hypothesis, these data suggest that high 25(OH)D may be associated with inflammation among pregnant women. Longitudinal measures of vitamin D, CRP and more specific inflammatory markers are needed to clarify these mechanisms in pregnancy.

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ARE MARKERS OF OVERALL FUNCTIONING OF MATERNAL IMMUNE SYSTEM OR MATERNAL INFECTION DURING PREGNANCY PER SE ASSOCIATED WITH AN INCREASED RISK OF CP IN THE OFFSPRING? *Chun S. WU¹, Lars H Pedersen^{1,3}, Jessica E. Miller², Jørn OLSEN^{1,2} (¹ Department of Epidemiology, Aarhus University, Denmark; ² UCLA, USA, ³ Aarhus University Hospital)

Cerebral palsy (CP) is the common cause of physical disability in early childhood with only a few known causes. The risk factors are expected to be antenatal, peri- or neonatal, or early post-neonatal. Maternal infections during pregnancy such as chorioamnionitis, maternal urinary tract infection, neurotropic virus infection, and cytomegalovirus infection and even fever, have been associated with a higher risk for CP and several other neurological and psychiatric disorders. The mechanisms are uncertain but could be related to the infection during pregnancy per se. Given the unspecific nature of some of these associations, it could also be related to the overall functioning of maternal immune system. If so, one would expect not only infections occurring during pregnancy to be associated with CP but also infections prior to the time of pregnancy. We therefore conducted a cohort study of all first-born singletons (N=616,167) between 1982 and 2004 in Denmark. Information on CP was obtained from the Danish CP Register and we identified the mothers who had CP children by using the Danish Civil Register. Through the Danish Hospital Register, we extracted hospitalizations due to any infections five years prior to pregnancy and any infections during pregnancy. We used logistic regression to estimate odds ratio (OR) with 95% confidence interval (95%CI) of CP for children whose mothers had infections five years prior to pregnancy but had no infections during pregnancy compared to children whose mothers had no infections five years prior to pregnancy or during pregnancy. Risk of CP was slightly higher after we adjusted for several potential confounders (OR=1.17, 95%CI: 1.02 - 1.33). The results suggest that maternal overall immune functions may also play a role for the association between maternal infections and risk of CP in children.

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GENE-ENVIRONMENT INTERACTIONS AS EXPLANATION FOR GENETIC NON-REPLICATION IN THE ETIOLOGY OF HYPOSPADIAS. L van der Zanden, T Galesloot, W Feitz, B Franke, N Knoers, *N Roeleveld, I van Rooij (Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands)

Hypospadias is a common congenital malformation of the male external genitalia, which has been associated with single nucleotide polymorphisms (SNPs) in SRD5A2, ESR1, ESR2, and ATF3. However, we were unable to replicate these associations in a Dutch study and examined whether this could be due to dissimilar environmental exposures. We explored whether the associations differed when mothers were or were not exposed to exogenous estrogens, suffering from placental insufficiency, or having high estradiol levels. For ATF3, we also included occurrence of an infection and/or inflammation and smoking during pregnancy. We genotyped 712 hypospadias cases and their parents, obtained environmental data from postal questionnaires, and tested the presence of gene-environment interactions using the log-linear approach. Gene-environment interactions were identified between rs523349 in SRD5A2 and maternal estrogen exposure and between rs11119982 in ATF3 and the occurrence of an infection and/or inflammation. The SNP in SRD5A2 only increased the risk of hypospadias when the mother was exposed to exogenous estrogens. This could explain why we were unable to confirm the associations found for Chinese and Swedish mothers, as these women may be higher exposed to phytoestrogens than Dutch mothers through consumption of soy products, rye bread, and berries. The previously reported decreased risk for rs11119982 in ATF3 could not be confirmed, as we found an increased risk of hypospadias when the mother had an infection and/or inflammation and no effect when the mother did not. In conclusion, environmental factors may explain genetic non-replication between studies.

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ESTIMATING THE ASSOCIATION BETWEEN ASBESTOS AND LUNG CANCER MORTALITY USING STRUCTURAL NESTED MODELS. *AI Naimi, SR Cole, DB Richardson (UNC, Chapel Hill, NC 27599)

The healthy worker survivor bias is well recognized in occupational epidemiology. Standard methods, including regression adjustment for employment status and lagging the exposure variable, will often fail to resolve this bias. G-estimation of a structural nested model can provide a valid point estimate for an exposure-outcome association in the presence of the healthy worker survivor bias. Here, we use data collected from 2,975 asbestos textile factory workers obtained between 1 Jan 1940 and 31 Dec 1965, followed through 31 Dec 2001 for vital status and cause of death to estimate the association between occupational asbestos exposure and lung cancer mortality. At entry, median age was 24 years, with 42% female and 19% non-Caucasian. Asbestos exposure levels were estimated using job-specific ambient asbestos concentration measurements and job history information. During 115,643 person-years of follow up, 193 lung cancer deaths occurred. We fit three models to estimate the association between asbestos exposure and lung cancer mortality: employment status adjusted and unadjusted proportional hazards (PH) models, and a structural nested accelerated failure time model. All models were adjusted for race, gender, age, and birth year. For a 100 fiber-year/mL increase in cumulative asbestos exposure, the work status adjusted and unadjusted PH model yielded a hazard ratio (95% CI) of 1.5 (1.3, 1.8) and 1.6 (1.3, 1.9), respectively. For the same unit increase, the structural model yielded a hazard ratio of 1.8 (1.7, 1.9). Provided counterfactual consistency, no unmeasured confounding, no selection bias, and a correctly specified structural model, standard methods underestimated the effect of asbestos exposure on lung cancer mortality by about 18%.

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ORAL CONTRACEPTIVE USE AND MORTALITY: 32 YEARS OF FOLLOW-UP IN THE NURSES' HEALTH STUDY. *Brittany M. Charlton, Janet W. Rich-Edwards, Graham A. Colditz, Stacey A. Missmer, Susan E. Hankinson, Bernard A. Rosner, Karin B. Michels (Harvard School of Public Health, Boston, MA 02115)

To examine whether ever using oral contraceptives (OCs) is associated with the risk for premature mortality during 32 years of follow-up, we used a total of 121,701 participants in the Nurses' Health Study. These women were prospectively followed for 32 years, during which OC use was assessed biennially. The incidence and cause of death were assessed throughout follow-up. Cox proportional hazards models, stratified jointly by age in months and calendar year of follow-up at the beginning of each two-year questionnaire cycle, were used to calculate the relative risks of all-cause and cause-specific mortality associated with OC use. In our population of 115,437 women with information on OC use, there were 66,281 never-users (57.4%) and 49,156 ever-users (42.6%). After 32 years of follow-up and 3.2 million woman-years, we observed 26,115 deaths. We found a small increase in total mortality among women who had ever used OCs compared with women who had never used OCs. After adjusting for age, BMI, weight change since age 18, race, and smoking status, the hazard ratio [HR (95% CI)] for women who had ever used OCs was 1.03 (1.00, 1.06). Other significant cause-specific HRs include the increased rate for all cancer deaths [1.07 (1.02, 1.12)] as well as violent/accidental deaths [1.17 (1.00, 1.37)]. OC use appears to be relatively safe but may have a slight increase in overall mortality. Women who took first-generation OCs can be reassured that this did not greatly impact their risk of premature mortality.

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VEGETARIAN DIET PATTERNS AND MORTALITY: EARLY FINDINGS FROM ADVENTIST HEALTH STUDY 2. *M. Orlich, P. Singh, J. Sabate, J. Fan, and G. Fraser (Loma Linda University, Loma Linda, California, 92408.)

Background: The relationship of vegetarian diet patterns to mortality remains uncertain, previous studies having yielded conflicting results. Methods: Adventist Health Study-2 (AHS-2) is a cohort of 96,194 Seventh-day Adventists (SDAs) recruited between 2002 and 2007. Diets were classified into five patterns: vegan, lacto-ovo vegetarian, pesco vegetarian, semi vegetarian and non vegetarian. Proportional hazards regression was used to analyze the relationship of these diets to mortality through 2009, with attained age as the time variable and controlling for sex, race, income, marital status, smoking, alcohol, exercise, sleep, years SDA, and in women, menopause and hormone replacement. Results: Compared to non vegetarians, pesco vegetarians had lower risk of all-cause mortality--hazard ratio (HR) 0.87 with 95% confidence interval (CI) (0.78-0.96)--but not CVD mortality or cancer mortality. Lacto-ovo vegetarians did not have an overall reduction in mortality; however, analysis revealed a significant interaction between diet and attained age for lacto-ovo vegetarians, but not for the other diet patterns. Lacto-ovo vegetarians' had a reduced mortality risk up to approximately age 70. At the mean attained age of 64.3 years, the HR (95% CI) for lacto-ovo vegetarians was 0.85 (0.75-0.96) for all-cause mortality and 0.73 (0.57-0.93) for CVD mortality. No significant association with mortality was demonstrated for vegans or semi vegetarians. Conclusion: Preliminary results suggest an association between the pesco vegetarian diet and reduced mortality and between the lacto-ovo vegetarian diet and reduced mortality at younger ages (i.e. less than 70 years).

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BILATERAL OOPHORECTOMY AND RISK OF ALL-CAUSE, CARDIOVASCULAR DISEASE AND CANCER MORTALITY. *D Appiah, SJ Winters and CA Hornung (University of Louisville, Louisville KY 40292)

Bilateral oophorectomy (BSO) which is commonly performed concomitantly with hysterectomy reduces endogenous estrogen levels in premenopausal women which may influence disease status and risk. While several studies have suggested that BSO increases the risk cardiovascular diseases (CVD), the evidence for a relationship of BSO with fatal CVD outcomes is equivocal. We used Cox proportional hazard models to investigate the association between BSO and all-cause and cause-specific mortality according to hormone therapy (HT) use and age at BSO among 2418 postmenopausal women without previous diagnosis of CVD who were enrolled in the NHANES I Epidemiologic Follow-up Study. Approximately 40% of participants reported a history of hysterectomy, with 64% of these undergoing BSO. A total of 473 deaths occurred over a mean follow-up time of 8.4 years. The analysis controlled for cohort effect and adjusted for race, education, age at natural or surgical menopause, HT, hysterectomy, body mass index, physical activity, smoking history, total cholesterol level and history of diabetes, hypertension and cancer. Compared to natural menopause, BSO was not associated with a reduction or increase in all-cause mortality (Relative Risk=0.78, 95% Confidence Interval: 0.56-1.09), CVD mortality (RR=0.79, 95% CI: 0.48-1.32), or cancer mortality (RR=0.94, 95% CI: 0.50-1.77). However, among participants with BSO and a history of HT, all-cause mortality and CVD mortality were statistically significantly reduced by 61% and 76% respectively. Cancer mortality was 14% lower, but the difference was not statistically significant. This analysis does not support the hypothesis that BSO confers increased risk of all-cause, CVD or cancer mortality over natural menopause.

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EVALUATING INFLUENZA VACCINE EFFECTIVENESS AMONG HEMODIALYSIS PATIENTS USING A NATURAL EXPERIMENT. *L McGrath, A Kshirsagar, SR Cole, L Wang, DJ Weber, T Stürmer, MA Brookhart (University of North Carolina, Chapel Hill, NC 27599)

Influenza vaccine has long been recommended for end-stage renal disease (ESRD) patients, however little is known about its effectiveness. Observational studies of vaccine effectiveness (VE) can be biased because vaccinated patients may be healthier than unvaccinated patients. Using United States Renal Data System data, we estimated VE for influenza-like illness (ILI), influenza/pneumonia hospitalization, and mortality in adult, hemodialysis patients using a natural experiment created by year-to-year variation in the match of the influenza vaccine to the circulating virus. We compared vaccinated patients in matched (1998, 1999, 2001) years to an unmatched (1997) year using Cox proportional hazards models. Ratios of hazard ratios compared vaccinated patients between two years and unvaccinated patients between two years. Vaccination rates were <50% each year. Conventional analysis comparing vaccinated to unvaccinated patients produced average VE estimates of 13%, 16%, and 30% for ILI, influenza/pneumonia hospitalization and mortality respectively. When restricted to the pre-influenza period, results were even stronger, indicating bias. The pooled ratio of HRs comparing matched seasons to a placebo season resulted in a VE of 0% (95% CI: -3,2%) for ILI, 2% (95% CI: -2,5%) for hospitalization, and 0% (95% CI: -3,3%) for death. Compared to a mismatched year, we found little evidence of increased VE in subsequent, well-matched years. This suggests that the current influenza vaccine strategy may have a smaller effect on morbidity and mortality in the ESRD population than previously thought. Alternate strategies (high dose, intradermal, and adjuvanted vaccines) should be investigated.

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ALGORITHMS TO IDENTIFY SECOND BREAST CANCER EVENTS USING ADMINISTRATIVE DATA. *J. Chubak, O. Yu, G. Pocobelli, L. Lamerato, J. Webster, M.N. Prout, M. Ulcickas Yood, W.E. Barlow, D.S.M. Buist (Group Health Research Institute, Seattle, WA 98101)

Studies of breast cancer outcomes rely on the identification of second breast cancer events (recurrences and second breast primaries). Cancer registries often do not capture recurrences, and chart abstraction can be infeasible or expensive. An alternative is using administrative healthcare data to identify second breast cancer events; however, these algorithms must be validated against a gold standard. We developed algorithms using data from 3 152 female members of an integrated healthcare system who were diagnosed with stage I or II breast cancer in 1993-2006. Medical record review served as the gold standard for second breast cancer events. Administrative data used in algorithm development included procedures, diagnoses, prescription fills, and cancer registry records. We randomly divided the cohort into training and testing samples and used a classification and regression tree analysis (CART) to build algorithms for classifying women as having or not having a second breast cancer event. We created several algorithms for researchers to select among based on the relative importance of sensitivity, specificity, and positive predictive value (PPV) in future studies. Our algorithm with high specificity and PPV had 89% sensitivity (95% confidence interval: 84%-92%), 99% specificity (98%-99%), and 90% PPV (86%-94%); our high-sensitivity algorithm had 96% sensitivity (93%-98%), 95% specificity (94%-96%), and 74% PPV (68%-78%). Algorithms based on administrative data can identify second breast cancer events with high sensitivity, specificity, and PPV for use in epidemiologic studies of breast cancer outcomes.

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THE EFFECTIVENESS OF IMMUNOPROPHYLAXIS PROGRAM FOR NEONATAL TRANSMISSION OF HEPATITIS B WITHIN A LARGE HMO. *A. Kubo, A. Marks, D. Lakritz, C. Beaumont, K. Gabellini, D. Corley, L. Shlager (Kaiser Permanente Division of Research, Oakland, CA 94612)

Hepatitis B virus (HBV) infection remains globally endemic, associated with an estimated 350 million chronically infected patients world-wide. To prevent perinatal HBV transmission, infants of HBV positive women are recommended to receive HBIG and the first dose of hepatitis B (HepB) vaccine within 12hrs of birth and 2 additional doses of HepB vaccine at one to two months and six months of age. However, the true effectiveness of concurrent immunoprophylaxis program in a "real world" large community-based setting is not well known. We evaluated the effectiveness of such a program within the Kaiser Permanente Northern California (KPNC) population, an integrated health services delivery organization. KPNC's Perinatal Hepatitis B Tracking Program tracks prenatal women who test positive to HepB surface antigen (HBsAg+) and their infants for completion of all immunizations recommended to prevent vertical transmission. A total of 3294 mother-infant pairs were tracked between 2001-2010. Among all infants born to HBsAg+ women, 97.5% received HBIG and HepB vaccine within 12 hours of birth. Among 3023 children who maintained KP coverage, 97% received at least three HepB vaccines by age 7 months. Overall failure rate (proportion of infants who tested positive to HBsAg+ among those tested) was 0.65%; the failure rate for those with HBeAg+ mothers was 3.2%. Our findings suggest that universal screening and tracking of HBsAg+ women and their infants is feasible in an organized medical delivery system, and that immunization is highly effective in preventing vertical transmission of HBV.

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FACTORS AND REASONS FOR NOT INITIATING THE HPV VACCINE AMONG UNVACCINATED TEENS. *L Drinkard, VK Cheruvu (Kent State University, Kent, Ohio)

According to the CDC, there are over a hundred known types of human papillomavirus (HPV), making it the most sexually transmitted infection in the U.S. In an effort to reduce the rate of HPV infections, two vaccines are licensed and routinely recommended. Several studies have examined factors associated with HPV vaccination uptake and completion. However, given the prevalence of HPV, understanding the factors and reasons for “no future intent” to initiate the HPV vaccine may better guide future public health programs. Cross-sectional data from the 2010 National Immunization Survey (NIS) were used to examine the factors and reasons for “no future intent” of the HPV vaccine, among unvaccinated females (13 to 17 years of age, sample size = 4702). Logistic regression was used to examine the odds for “no future intent” of the HPV vaccine in association with socio-demographics, and health care access factors, when compared to future initiators. Among the “no future intent” group, we examined the reasons for no intent using logistic regression models. Data were analyzed in 2011 and accounted for the complex sampling design of the NIS. The prevalence of “no future intent” is 64.7% (95% Confidence Interval (CI): 62.4 – 67.1). In the multivariable model, teens with no physician recommendation for the HPV vaccine, and mothers with higher education, were more likely to be in the “no future intent” group [(OR: 2.2, 95% CI: 1.7 – 2.7); (OR: 2.0, 95% CI: 1.3 – 3.1)]. Physician recommendation, knowledge, and mothers with higher education, were more likely to report “safety concerns”, and “not sexually active” as reasons for “no future intent” (data not shown). These findings highlight the need for improving public information regarding the vaccine.

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A CASE OF FRAUD: IMPLICATIONS FOR EPIDEMIOLOGIC RESEARCH. *Michel Ibrahim (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD)

The symposium will begin with a brief review of the fraud involved in the research of Andrew Wakefield and his colleagues in which they linked the MMR vaccine to autism. The cover-up by the journal and the institution that followed may be as unsettling as the fraud itself. Panelists will speak to the issue from different perspectives: the investigator/author, the journal editor, the institution, and the granting agency. The basic questions these panelists would address are:

1. How did this extensive research fraud go unnoticed?
2. Why did the institution and the journal engage in denial and cover-up?
3. Was the “punishment” of the investigator/author appropriate?
4. What should the consequences have been for the journal? The institution?
5. What about funding research and litigation by the same group?
6. What safeguards should be put in place to prevent a recurrence of this type of incident?

Participants:

Overview of topic

Michel A. Ibrahim, MD, PhD, Johns Hopkins Bloomberg School of Public Health

Author/investigator’s perspective

Sandro Galea, MD, DrPH, Columbia Mailman School of Public Health

Journal editor’s perspective

Catherine DeAngelis, MD, MPH, Editor Emerita, JAMA

Institution’s perspective

Raymond S. Greenberg, MD, PhD, President, Medical University of South Carolina

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THE HISTORICAL AND POLITICAL PROCESSES GIVING RISE TO INCREASED CERVICAL CANCER INCIDENCE IN APPALACHIA. *J. Plascak, E. Paskett (Ohio State University, Columbus, Ohio, 43210).

An elevated cervical cancer risk has persisted in regions of Appalachia despite existence of possibly the most effective primary (human papillomavirus vaccine) and secondary (Papanicolaou (Pap) test) preventive measures of any major cancer. Conceptualizing cervical cancer as the biologic consequence of the socio-political milieu acting within Appalachia throughout history provides insight into the conditions initiating and propagating such a health disparity. The economies of many central Appalachian areas exhibiting high cervical cancer burden have disproportionately relied on the ‘extractive’ (i.e., agriculture, forestry, mining) and manufacturing industries throughout history. The abundance of natural resources established a rigid socioeconomic hierarchy with wealthy, absentee land-owners exploiting the resources and influencing local politics. Local, state, and national practices and policies such as unequal land-use and differential tax rates of land types, health insurance allocation, the ruling of the unconstitutionality of Ohio’s education system, disparate wage earnings, and international free trade agreements are hypothesized as contributing to the various socioeconomic disparities. Longitudinal survey data provides evidence of decreased physical activity, fruit and vegetable consumption, Pap screening, and health care access, and increased psychological distress and female tobacco usage. Stress, tobacco use, and immune suppression increase cervical cancer risk. Physical activity decreases stress risk, boosting the immune system. Collectively, the myriad pathways historically linking socio-political processes to cervical cancer incidence produces a refined model of the creation and proliferation of this disparity.

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BAYESIAN EPIDEMIOLOGY: IN PRACTICE. *G Hamra (University of North Carolina, Chapel Hill, Chapel Hill, NC)

As Bayesian inference becomes more prominent in the epidemiologic literature, the need to understand why Bayesian methods can be a helpful complement to standard likelihood-based tools increases. In this symposium, we present four cases where a Bayesian approach, implemented with Markov Chain Monte Carlo simulation (MCMC), may improve an epidemiologist’s work. Dr. Cole will compare and contrast methods for obtaining Bayesian posterior distributions; specifically, data augmentation, a rejection sampler, and MCMC. This will serve as a bridge to understanding Bayesian inference. Dr. Cole will highlight cases where an epidemiologist may find an MCMC approach to Bayesian data analysis more desirable. Dr. Hamra will present a simple approach for formally integrating the results of toxicological and experimental research into observational research using an order constrained prior. This approach will be illustrated with an example from radiation epidemiology. Dr. Chu will present a Bayesian method to estimate the measurement-error corrected exposure-disease association accounting for differential and dependent misclassification. This will include presentation of both simulation results and a case-control study examining asbestos exposure and mesothelioma. Finally, Dr. MacLehose will present an approach for combining Bayesian analysis with inverse probability weighting methods, a popular tool among epidemiologists. To date, inverse probability weights have no Bayesian counterpart; thus, researchers may find this particularly appealing for reconciling the two methods for their work.

Speakers:

A Bayesian approach to strengthen inference from occupational case-control studies with multiple non-gold standard exposure assessments

Dr. Haitao Chu

Bayesian posterior distributions without Markov chains

Dr. Stephen Cole

Integrating informative priors from experimental research with Bayesian methods: an example from radiation epidemiology

Dr. Ghassan Hamra

Bayesian approaches to inverse probability weighted models

Dr. Richard MacLehose

FOODBORNE DISEASE EPIDEMIOLOGY: GROWING IMPORTANCE AND NEGLECTED OPPORTUNITIES. *Michael T. Osterholm (School of Public Health, University of Minnesota, Minneapolis, MN)

Foodborne diseases result from dynamic interactions between agents, hosts and the environments in which they occur. Foodborne outbreak investigations represent a classical application of epidemiologic methods. The general approaches to outbreak investigation are so well established that they draw virtually no attention from public health practitioners or academic researchers. Major innovations in laboratory methods over the past 20 years permit the detection and differentiation of a wide variety of foodborne pathogens. This has greatly increased the number and complexity of large multistate outbreaks investigated and novel vehicles identified. Epidemiologic methods are now starting to be adapted to this changing food safety landscape. One particularly efficient and effective model for foodborne disease surveillance and outbreak investigation has been developed by the Minnesota Department of Health (MDH). A surveillance system centralized at MDH uses a team of student workers to conduct detailed exposure interviews that are linked to molecular subtype results to allow MDH epidemiologists to rapidly identify and solve foodborne outbreaks. Collecting detailed exposure information from controls has been a limiting factor in many outbreak investigations. Existing food and nutrient databases, diet assessment methods and dietary survey data may be useful to epidemiologists conducting foodborne illness outbreak investigations, although some modifications may be required to adapt their use for this purpose. Foodborne outbreaks represent a unique opportunity to conduct applied research in a public health practice setting. Sustained academic partnerships with public health agencies are needed to fully realize the potential to translate results of outbreak investigations to improved public health and food safety practices.

Speakers:

Challenges and Responses to the Evolving Food Safety Landscape
Robert Tauxe, . CDC

The Minnesota Model for Foodborne Disease Surveillance and Outbreak Response
Kirk Smith, Minnesota Department of Health

Potential for Food and Nutrient Databases and Dietary Survey Data to Aid in Foodborne Illness Outbreak Investigations
Lisa Harnack, School of Public Health, University of Minnesota

Gaps and Opportunities: Foodborne Outbreak Investigations as a Model for Applied Research in a Public Health Practice Setting
Craig Hedberg, School of Public Health, University of Minnesota

METHODS FOR PREDICTION OF RISK: EXAMPLES FROM CARDIOVASCULAR EPIDEMIOLOGY. *A Folsom, N Cook, M Pencina, J Pankow (University of Minnesota, Minneapolis, MN)

Besides documenting associations of risk factors with disease, epidemiologists often want to develop clinically useful models to predict disease. A good example is the Framingham equation to predict 10-year risk of coronary heart disease, which in turn is used to decide preventive therapy (e.g., statins) for patients. Statistical methods recently have been extended to determine whether novel risk markers associated with disease truly add to established prediction models. In fact, publications in our field often now require that any statements of possible clinical utility of risk markers be supported by measures documenting improved risk prediction. This symposium will provide an overview of current risk prediction methods for general epidemiologists.

Speakers:

Clinical utility of cardiovascular risk prediction

Aaron R. Folsom (University of Minnesota, Div of Epidemiology & Community Health)

Reclassification methods for comparing risk prediction models
Nancy R. Cook (Brigham & Women's Hosp, Harvard Medical School)

How to interpret improvement in risk prediction beyond statistical significance
Michael J. Pencina (Boston University, Dept. of Biostatistics, Harvard Clinical Research Institute)

Potential for new genetic discoveries to improve risk prediction
James Pankow (University of Minnesota, Div of Epidemiology & Community Health)

MENOPAUSAL HORMONE THERAPY AND WOMEN'S HEALTH: FOR WHICH WOMEN ARE HORMONES ADVISABLE? *Britton Trabert, (National Cancer Institute)

Recent research has highlighted new complexities regarding long-term effects of menopausal hormone therapy (MHT), leading to questions regarding optimal prescribing patterns. It was initially assumed that hormones could reduce certain disease risks (e.g., cardiovascular events, Alzheimer's), but this is increasingly being questioned. Further, effects on cancer risk may be broader and more complex than originally assumed. Although it had become commonplace to prescribe combination estrogen/progestin therapy, the Women's Health Initiative was stopped because of increased breast cancer incidence. Further, new data suggests that combination therapy and estrogen-alone may have markedly different effects on cancer outcomes, particularly breast cancer. Hormone effects may also depend on constitutional factors; significant interactions with age, time since menopause, obesity, and underlying cardiovascular and cancer risks can shift the risk-benefit profile. Finally, new knowledge regarding how hormones relate to such biologic parameters as endogenous hormones and disease precursors (e.g., mammographic density) might guide prescribing patterns. During this session, experts will summarize knowledge regarding hormonal effects on various diseases, with the aim of determining optimal prescribing strategies. The following questions may bring different answers depending on the diseases addressed:

- 1) What is the profile of women who might benefit most from MHT?
- 2) How can women receive the most benefit and least risk from different usage regimens?
- 3) What insights regarding biologic mechanisms could guide prescribing patterns?

Speakers:

JoAnn E. Manson, Harvard Medical School, Harvard School of Public Health, and Brigham and Women's Hospital
James V. Lacey, Jr., Beckman Research Institute and City of Hope Comprehensive Cancer Center
Susan Reed, University of Washington

SPILLOVER EFFECTS IN EPIDEMIOLOGIC RESEARCH. *Tyler VanderWeele (Harvard School of Public Health, Boston, MA)

In traditional epidemiologic studies, the exposure received by one individual affects only the outcome of that individual and not the outcomes of other individuals in the study. The assumption that this is so is sometimes referred to as a no-interference assumption. In many settings such as the study of infectious diseases, neighborhoods or classrooms, this assumption will not hold: the exposure of one individual will affect the outcomes of other individuals and it is then of interest to analyze spillover effects. The classic epidemiologic example of this is herd immunity in vaccine trials but the issue arises more generally whenever there are social interactions and the behavior of one individual influences that of others. Statistical analysis in such settings is more difficult and the estimation of spillover effects can be challenging. This symposium will cover applications and methodologies for spillover effects that are particularly relevant to epidemiologists and are reasonably straightforward to implement. The symposium will highlight concepts and methods relevant to vaccine trials, neighborhoods and social influence within households. The focus of the session will be on assessing the settings in which spillover effects arise and providing practical tools for the analysis of such effects.

Speakers:

The minicomunity design to assess indirect effects of vaccination
Elizabeth Halloran

Causal inference under interference in spatial settings: a case study evaluating the community policing program in Chicago
Natalya Verbitsky

Methodology for spillover effects within households
Tyler J. VanderWeele

Discussant: Jay Kaufman, McGill University

INDIVIDUAL AND SOCIAL DETERMINANTS OF MULTIPLE CHRONIC DISEASE BEHAVIORAL RISK FACTORS AMONG YOUTH. *A. Alamian and G. Paradis (University of Montreal, Montreal, Quebec, Canada, H3C 3J7)

Behavioral risk factors are known to co-occur among youth and increase risk of chronic disease morbidity and mortality later in life. However, little is known about determinants of multiple chronic disease behavioral risk factors, particularly among youth. Using longitudinal data (n = 1,135) from Cycle 4 (2000-2001), Cycle 5 (2002-2003) and Cycle 6 (2004-2005) of the National Longitudinal Survey of Children and Youth, a nationally representative sample of Canadian children, the present study examined the influence of a set of conceptually-related individual/social distal variables (variables situated at an intermediate distance from behaviors), and individual/social ultimate variables (variables situated at an utmost distance from behaviors) on the rate of occurrence of multiple behavioral risk factors (physical inactivity, sedentary behavior, tobacco smoking, alcohol drinking, and high body mass index) in a sample of children aged 10-11 years at baseline. Multiple behavioral risk factors were assessed using a multiple risk factor score. Multivariate longitudinal Poisson models showed that social distal variables and individual distal variables increased the rate of occurrence of multiple behavioral risk factors. Specifically, caregiver smoking (rate ratio (RR) = 1.11; 95% CI: 1.05, 1.16), peer smoking (RR = 1.41; 95% CI: 1.28, 1.55), or peer drinking (RR = 1.23; 95% CI: 1.14, 1.34) increased the likelihood of having multiple behavioral risk factors. Self-esteem (RR = 0.98; 95% CI: 0.98, 0.99) was inversely related to the rate of multiple risk factor score. The results suggest targeting individual/social distal variables in prevention programs of multiple chronic disease behavioral risk factors among youth.

RACIAL DIFFERENCES IN SEX HORMONES WITH WEIGHT LOSS AND MAINTENANCE IN OVERWEIGHT AND OBESE POSTMENOPAUSAL WOMEN. *RZ Stolzenberg-Solomon, RT Falk, FS Stanczyk, RN Hoover, LJ Appel, JD Ard, BC Batch, J Coughlin, X Han, LF Lien, C Pinkston, LP Svetkey, HA Katki (NEB, DCEG, NCI, NIH, Rockville, MD 20852)

African-Americans (AA) women have a greater prevalence of obesity and higher incidence of poorly differentiated, hormone-receptor negative breast cancer. Racial differences in endogenous sex hormone concentrations might explain this. Changes in sex hormones with intentional weight loss have not been examined extensively. We conducted a longitudinal study of 278 overweight or obese postmenopausal women (38% AA) in the Weight Loss Maintenance Trial, not taking hormone therapy, who lost at least 4 kg after a 6-month weight loss program. During the next 12 months, the maintenance phase, participants attempted to maintain their weight loss with one of two interventions or self-direction. We evaluated percent change in fasting serum concentrations of estrone(E1), total estradiol (E2), testosterone, androstenedione, dehydroepiandrosterone sulfate and sex hormone-binding globulin (SHBG) across the two phases using generalized estimating equations overall and by race. Between enrollment and the end of the weight loss intervention, mean weight loss was 7.7 kg; E1 (-5.7%, P=0.006), and E2 (-9.9%, P<0.001) decreased while SHBG (16.2%, P<0.001) increased. During the maintenance phase, body weight increased on average 2.2 kg and no hormone changed except E1 (-6.4%, P=0.003) and SHBG (-8.0%, P<0.0001) decreased. The effect differed by race, with AA women experiencing less change in estrogens (E1 0.6% vs. 1.2%, p-interaction=0.10, E2 1.1% vs. 1.9%, p-interaction=0.04) and SHBG (0.9% vs. 1.6%, p-interaction=0.006) per kg body weight change than non-AA. African-American women also had significantly higher estrogen concentrations, independent of adiposity. Overweight or obese postmenopausal women who successfully lose and maintain weight loss experience reductions in serum estrogens which may reduce breast cancer risk. The racial difference in sex hormones concentrations deserves further investigation in relation to cancer etiology.

DECOMPOSING THE DECLINE: ASSESSING THE CONTRIBUTION OF PREVENTION AND CESSATION EFFORTS TO THE DECREASED PREVALENCE OF SMOKING IN NEW YORK CITY. M. Johns*, K. Konty, M. Coady (NYC Department of Health and Mental Hygiene, Long Island City, NY, 11101)

The adult smoking prevalence declined 35% in New York City (NYC), from 21.5% in 2002 to 14.0% in 2010. The decline corresponds to a set of local tobacco control efforts composed of smoke-free air laws, increased cigarette excise taxes, anti-tobacco media campaigns and large-scale nicotine replacement medication giveaways. These efforts can reduce smoking through two pathways—encouraging current smokers to quit (cessation) and preventing non-smokers from initiating (prevention). We applied a standardized rate ratio method to assess the contribution of these pathways to the smoking decline, using data from the NYC Community Health Survey (CHS), an annual cross-sectional survey of approximately 10,000 adults. The increase in the prevalence of former smokers since 2002 captures cessation effects and the increase in the prevalence of people who never smoked captures prevention effects. Former- and never-smoker prevalences were derived separately from the 2002 CHS and served as expected values. These expected values were then divided into the former- and never-smoker prevalences derived from the 2010 CHS, separately within five age strata. We estimated that 25% (95% Confidence Interval: 20-31%) of the decline was attributable to prevention while 36% (95% CI: 30-42%) was attributable to cessation. A mathematical modeling approach produced comparable estimates and suggested that up to 39% of the decline could be attributed to secular trends. These results suggest local tobacco control efforts have made a significant contribution to declines in smoking in NYC. Additional research is needed to assess the influence of specific policies on cessation and prevention effects.

CHARACTERISTICS ASSOCIATED WITH TAMOXIFEN USE FOR CHEMOPREVENTION AFTER AGE 50: RESULTS FROM THE SISTER STUDY. *Nichols HB, DeRoo LA, Sandler DP (NIEHS, Research Triangle Park, NC, 27516)

Tamoxifen has been approved for breast cancer chemoprevention since 1999. An estimated 15% of U.S. women ages 40-75 could benefit from tamoxifen but uptake has been <0.2%. Eligibility is typically determined by a 5-year breast cancer risk assessment score of >1.66% and low risk of adverse side effects. The Sister Study enrolled 50,884 women ages 35-74 who each had a sister diagnosed with breast cancer; participants have a 5-year breast cancer risk score >1.6% after age 50 due to family history alone. We examined factors related to tamoxifen use among 28,860 Sister Study participants >50 with no history of contraindicating factors (stroke, transient ischemic attack, cataract, endometrial or uterine cancer). We used multivariate Poisson regression models to calculate prevalence ratios (PR) and 95% confidence intervals (CI). Compared to non-users, tamoxifen users (N=535) were more often older, white, never-smokers, had a normal body mass index (18.5-24.9 kg/m²), younger menarche, and a prior hysterectomy. Osteoporosis was not associated with tamoxifen use; however, 22% of tamoxifen users had also taken raloxifene (PR=1.9; CI: 1.5, 2.4), possibly to prevent bone loss. Having >1 sister (PR=2.6, CI: 2.2, 3.2), mother (PR=2.8; CI: 2.4, 3.4), or daughter (PR=1.8; CI: 1.0, 3.0) diagnosed with breast cancer was associated with increased prevalence of tamoxifen use, as was undergoing testing for BRCA1/2 mutation (PR=2.4; 1.7, 3.4). Of 103 women with known BRCA1/2 mutations, 12 reported using tamoxifen for chemoprevention; none underwent prophylactic mastectomy. These data provide a valuable opportunity to examine uptake of tamoxifen for chemoprevention in a large, population-based study.

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TRENDS IN BREAST CANCER SCREENING FOLLOWING THE 2009 USPSTF RECOMMENDATIONS. *B.Sprague, S. Herschorn, T. James, and B. Geller (University of Vermont, Burlington, VT 05401)

In November 2009 the United States Preventive Services Task Force (USPSTF) recommended that the decision to begin regular mammography before age 50 should be an individual one that takes patient context and values into account. This represented a departure from preceding recommendations by the USPSTF and other organizations to begin regular mammography at age 40, and resulted in widespread controversy. In addition, biennial (rather than annual) screening for women 50-74 was recommended. The Vermont Mammography Registry (VMR) has monitored breast cancer screening in Vermont since 1994, using patient and mammography data collected from all breast imaging facilities in the state. We evaluated trends in mammography screening from January 2006 to December 2010. Population estimates from the US Census were used to account for changes in the state population during this time. Between 2006 and 2009, there was an overall 5.1% (95% CI: 4.2, 6.1) increase in the number of screening mammograms per population aged 40 and older. The rate of screening mammography then declined by 6.2% (95% CI: -7.0, -5.4) between 2009 and 2010. The decline in screening between 2009 and 2010 was most prominent among women in their 40s (-9.6%) and women aged 80 and older (-9.9%), and less pronounced among women aged 50-79 (-4.7%). While a number of factors influence screening utilization, including economic conditions and other determinants of health care access, our findings suggest that the USPSTF recommendations led to a decline in mammography screening. These findings are consistent with the USPSTF recommendations for individualized rather than routine screening of women under age 50 and for biennial rather than annual screening among women aged 50-74.

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HEALTHY WORKER SURVIVOR BIAS: SEPARATING THE CONTRIBUTIONS OF EMPLOYMENT TERMINATION AND INTERMITTENT TIME OFF WORK IN A COHORT OF AUTOWORKERS USING G-ESTIMATION. *S Picciotto, J Chevrier, S Costello, and EA Eisen (University of California, Berkeley CA 94720)

Background: The healthy worker survivor effect is a downward bias that occurs when unhealthy workers reduce their exposure by, e.g., taking time off work or terminating employment. However, many occupational studies are restricted to active workers. We previously applied g-estimation of accelerated failure-time models in a mortality study of a cohort of autoworkers. Results demonstrated that 5 years of exposure to metalworking fluids increased risks of all-cause mortality, heart disease, and all cancers combined. **Methods:** In the original analysis, intermittent time off work was treated as a time-varying confounder affected by prior exposure. Only actively employed person-time was included in the exposure model, but follow-up time extended past termination of employment and was used in the structural model. We repeated the analysis using the same cohort and approach, but truncated person-time at termination of employment and censored survival times thereafter. We compared results to those obtained in the full dataset. **Results:** Hazard ratios for all 3 outcomes decreased after person-time truncation, sometimes crossing the null. Point estimates for the censored data and the data with full follow-up were respectively 0.94 and 1.07 for all-cause mortality, 1.04 and 1.15 for heart disease, and 0.94 and 1.07 for all cancers. **Conclusion:** The results confirm that, even taking intermittent time off work into account using g-estimation, censoring follow-up at termination of employment causes downward bias. When follow-up extends past employment termination, g-estimation of accelerated failure time models adjusts correctly for work status.

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CALENDAR TIME AS AN INSTRUMENTAL VARIABLE IN NON-EXPERIMENTAL COMPARATIVE EFFECTIVENESS RESEARCH OF DYNAMIC THERAPIES. *C Mack, A Brookhart, R Glynn, T Stürmer (University of North Carolina, Chapel Hill, NC, 27510)

Unmeasured confounding limits the ability of covariate adjustment to reduce bias. Instrumental variables (IV) replace the assumption of no unmeasured confounding in adjusted analyses with the notion that the IV affects the outcome only through treatment. Calendar time may be a strong IV in comparative effectiveness studies of new-to-market drugs, which experience dramatic changes in prescribing over time, and it would not require covariate-rich data to control confounding. To evaluate the use of calendar time as an IV compared to adjustment in hazard ratio (HR) estimation, we examined a cohort of elderly stage III colon cancer patients initiating chemotherapy between 2003-06 in Surveillance, Epidemiology and End Results-Medicare data. We used Cox models to construct HRs for all-cause mortality and built a calendar time IV to delineate patients treated prior to oxaliplatin FDA approval (pre-Nov 2004, n=2013) from those treated after (n=1175). We examined IV strength and compared IV HRs with propensity score (PS)-adjusted HRs. Overall, 863 patients received oxaliplatin and 2325 received 5-FU only. Calendar time was a robust IV, as it was strongly related to treatment (14 vs. 50% received oxaliplatin pre- and post-approval) and unassociated with confounders. The IV HR (95% confidence interval) was 0.4(0.3,0.7) compared to the PS HR of 0.7(0.6,0.9). Both methods support oxaliplatin's survival advantage, albeit with dissimilar estimates. The IV is less precise and appears to exaggerate the magnitude of effectiveness. Changes in survival over time, beyond treatment, may affect IV estimates. Because these methods require different assumptions, the IV analysis strengthens evidence of effectiveness.

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WEIGHTED LOGISTIC REGRESSION FOR MULTIPLE BIAS ANALYSIS. *C.Y. Johnson, P.P. Howards, M.J. Strickland, D.K. Waller, W.D. Flanders, and The National Birth Defects Prevention Study (Emory University, Atlanta, GA, 30322).

Exposure misclassification, selection bias, and confounding are important sources of bias in epidemiologic studies, yet only confounding is routinely addressed quantitatively. The authors describe a method to simultaneously adjust for these biases using weighted logistic regression. Selection probabilities and predictive values for exposure classification are used as weights to re-balance the joint distribution of exposure and disease to what the distribution would have been without bias. The method was applied to a case-control study of prepregnancy obesity (obese: body mass index ≥ 30 kg/m² versus normal weight: 18.5-24.9 kg/m²) and isolated cleft lip with or without cleft palate (CL/P) and cleft palate (CP) using data from the National Birth Defects Prevention Study. Adjusting for confounding only, associations were observed between prepregnancy obesity and both CL/P (odds ratio [OR] 1.20, 95% confidence interval [CI]: 1.05, 1.38) and CP (OR 1.27, 95% CI: 1.05, 1.52). After adjusting for exposure misclassification, selection bias, and confounding, given the authors' assumptions, associations were attenuated (CL/P median OR 1.01, 95% simulation interval [SI]: 0.86, 1.19; CP median OR 1.06, 95% SI: 0.87, 1.30). Considering the potential effects of biases other than confounding is important in epidemiologic studies. This approach allows simultaneous adjustment for multiple biases using logistic regression.

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ESTIMATING THE EFFECTS OF LIFESTYLE INTERVENTIONS ON CORONARY HEART DISEASE RISK REQUIRES ADJUSTMENT BY BASELINE EXPOSURE. *M. Lajous, M.A. Hernán (Harvard School of Public Health, Boston, MA, 02115)

Randomized trials to compare the effectiveness of lifestyle changes on the risk of coronary heart disease over several decades in large groups of people are impractical. Therefore, the effectiveness of lifestyle interventions can only be estimated from observational studies that emulate those trials as close as possible. In particular, estimating the effect of lifestyle changes requires adjustment for baseline values of the exposure of interest, in addition to adjustment for baseline and time-varying confounders. Conventional analyses of observational studies compare the risk of coronary heart disease across groups of individuals with different levels of prevalent exposure, conditional on the measured confounders but not on baseline values of the exposure. Further, even if adjusted for baseline exposure, conventional analyses make it difficult to evaluate the effectiveness of simultaneous interventions on different components of lifestyle (e.g., physical activity and dietary changes, replacement of one food group by another), may not appropriately adjust for measured time-dependent confounding, and do not naturally yield absolute risks for the evaluation of interactions on the additive scale and the direct estimation of population attributable risks for complex interventions over long periods. An analytic approach based on the parametric g-formula overcomes all the above shortcomings. Observational analyses based on the parametric g-formula naturally allow for the formulation of well defined questions about complex lifestyle interventions with appropriate adjustment for measured confounders, estimation of absolute risks, and adjustment for baseline covariates. We illustrate the application of the parametric g-formula to a large observational study of diet and heart disease.

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DRUG USE AND FATAL CRASH RISK IN WEEKEND NIGHTTIME DRIVERS: A NATIONWIDE POPULATION-BASED CASE-CONTROL STUDY. *Guohua Li and Joanne E. Brady (Columbia University, New York, NY 10032)

While alcohol-related motor vehicle crashes have declined in recent years, driving under the influence of illicit drugs and prescription drugs has become a major safety concern. The influence of drugs on driving safety has been studied extensively under controlled, experimental conditions based on driving simulators. This case-control study aims to assess the association of drug use with fatal crash risk in weekend nighttime drivers. Cases (n=540) were drivers who were involved in fatal crashes on Fridays and Saturdays between 10 pm and midnight or between 1 am and 3 am during July 20, 2007 and December 1, 2007 in the continental United States and who tested for drugs, identified from the Fatality Analysis Reporting System. Controls (n=5,084) were participants of the 2007 National Roadside Survey of Alcohol and Drug Use, who were randomly selected for drug testing while driving during the same time periods as the cases. Overall, 34.6% of the cases and 14.6% of the controls tested positive for at least one drug, yielding a crude odds ratio (OR) of 3.10 [95% confidence interval (CI) 2.54-3.78]. The association between drug use and fatal crash involvement was comparable across age groups (Breslow-Day X2 test for homogeneity =4.33, p=0.36) but appeared to be more pronounced in female drivers (OR 4.18, 95% CI 2.39-7.15) than in male drivers (OR 2.64, 95% CI 2.12-3.27). Use of marijuana was associated with a 2-fold increased risk of fatal crash involvement (OR 2.07, 95% CI 1.54-2.76). These results indicate that drug use by drivers is a major risk factor for weekend nighttime fatal crashes.

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YOUTH SPORTS-RELATED CONCUSSION. *L Seymour, A Gai-chas, J Roesler and M Kinde (Minnesota Department of Health, St. Paul, MN 55164)

Background: Sports-related concussion is currently a hot topic in sports medicine. There has been increased research in the past decade and much progress has been made in the management of this injury. In 2011 Minnesota passed the Concussion Procedure Statute, which outlines the steps a coach must take when an athlete shows signs/symptoms of a concussion. Will this law have any effect? Past participation in a round table discussion on youth sports and concussions provided some insight into our current surveillance system. Physicians, athletic trainers and others that participated showed that the vast majority are seen in urgent care, a physician's office, or the school's athletic trainer, if at all. Our existing data system does not have access to any of these sources and captures only those seen in the emergency department or hospitalized. To truly understand the importance of this injury, and the impact this law has, we have to be able to accurately count the injuries and describe the conditions under which they occur. Methods: We looked at 10 years of our data (2000-2010), including: TBI/SCI Registry, Hospital Billing Data and TBI Supplement Data to see what they can tell us about youth sports-related concussions. Results: In Minnesota, 31% of all concussions are associated with sports and recreational activities. In ages 10-19, the incidence goes up to 50%. Sports-related concussions have doubled since 2000, whereas those due to recreation-related activities have plateaued since 2003. Conclusions: Our TBI registry data and hospital discharge data were insufficient for fully describing the problem. Abstracted data helps, but still misses what is going on in urgent care and clinic offices. A new data system is needed. The CDC-funded development of this system will be presented.

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NEIGHBORHOOD INCOME INEQUALITY AND PHYSICAL DISORDER AND THE RISK OF FATAL PRESCRIPTION OPIOID OVERDOSE. M. Cerdá*, Y. Ransome, K. Keyes, K.C. Koenen, S. Galea (Columbia University, New York, NY, 10032)

Rates of prescription opioid fatal overdose have increased dramatically in the United States; however our understanding of the risk factors for prescription opioid death remains limited. Neighborhood income inequality and physical disorder both have been proposed as risk factors for illicit drug overdose death and may be important drivers of prescription overdose. We used data from the Office of the Chief Medical Examiner of New York City (NYC) to identify all cases of accidental deaths in NYC in 1990-2006, and linked them to data on neighborhood characteristics in 1990-2005. This multi-level case-control study included 1481 accidental prescription opioid overdose deaths (cases) and 39,199 accidental non overdose deaths (control) in 55 neighborhoods in NYC. The odds of death from prescription opiate overdose relative to the odds of death from accidental non-overdose was higher in neighborhoods with higher income inequality (odds ratio (OR): 6.25; 95% confidence interval (CI): 1.21-31.25) and higher physical disorder (OR: 1.11; 95% CI: 1.02-1.22). This study indicates that shared neighborhood factors may drive illicit and prescription opiate overdose deaths. As prescription opiate death rates continue to increase, investigation into changing contextual determinants of overdose risk may prove critical in stemming this epidemic.

NEIGHBORHOOD COLLECTIVE EFFICACY AND VIOLENCE IN NEW YORK CITY. J Ahern*, M Cerdá, SA Lippman, KJ Tardiff, D Vlahov, S Galea (University of California, Berkeley, CA 94720)

Violence is a leading cause of premature mortality and injury. Studies identified neighborhood collective efficacy (mutual trust and willingness to intervene) as a key determinant of violent victimization in Chicago, however this relation merits examination in other urban United States settings. We examined the relation of neighborhood collective efficacy with reported violent victimization and homicide in New York City (NYC). Analyses were conducted using two data sources from NYC: population survey data from 2005 (n=4,000), and homicide decedent data from 2004-2006 (n=1,614). Marginal models were applied to present results on the additive scale and estimate population intervention parameters. Marginal models estimated 8.7% lower prevalence of violent victimization (95% confidence interval (CI): 4.8%, 13.5%) and 8.9/100,000 p-y lower rate of homicide (95% CI: 7.3, 10.7) if all residents had lived in high versus low collective efficacy neighborhoods. If all residents had lived in neighborhoods with high versus observed levels of collective efficacy, marginal models estimated 2.9% lower prevalence of violent victimization (95% CI: 1.8%, 3.9%) and 3.3/100,000 p-y lower homicide rate (95% CI: 2.8, 3.9). Results were largely robust to sensitivity analyses. Collective efficacy was strongly related to violence; population intervention parameters estimated a reduction in violence outcomes by about half. Our results contribute to a growing body of evidence that suggests collective efficacy is a social mechanism that consistently protects against violence in urban settings.

DID ADOLESCENTS IN HIGHER SES FAMILIES DIFFERENTIALLY BENEFIT FROM A HOUSING MOBILITY INTERVENTION? QC Nguyen*, N Schmidt, MM Glymour, D Rehkopf, and TL Osypuk (Northeastern University, Boston, MA, 02215)

Purpose: While heterogeneous health effects for the Moving to Opportunity (MTO) Experiment have been identified by gender, little is known about differences in treatment effects by other characteristics. Greater economic resources may enable families to select better neighborhoods or housing units and to adjust and acculturate after residential relocation. We thus examined whether the effects of MTO on adolescent mental health differed by family socioeconomic status (SES). Methods: MTO was a randomized controlled trial in 5 cities. Volunteer families were randomly assigned to existing public housing (control group) or offered a Section 8 housing voucher to subsidize a private market rental apartment (experimental groups) in 1994-1997. We analyzed 4-7 year mental health outcomes of youth aged 12-19 (n=2829): internalizing (psychological distress, K6) and externalizing (behavioral problems index, BPI) behaviors. Using intent-to-treat linear regression, we tested interactions between the MTO intervention and baseline family socioeconomic factors (parental education, receipt of public assistance, and unemployment). Results: The effects of the MTO treatment did not vary by family SES, for either boys or girls, for psychological distress or BPI. Conclusions: Investigating treatment heterogeneity is important for understanding variability in program effectiveness and informing future programs and policies. Surprisingly, MTO treatment effects on adolescent mental health were homogenous by family SES. Hence, in the population of disadvantaged families in public housing, tailoring neighborhood mobility interventions by family SES may not be necessary to alter the program impact on youth mental health.

ADOLESCENT NEIGHBORHOOD SOCIAL ENVIRONMENT AND BLOOD PRESSURE IN ADULTHOOD. *Shakira F Suglia, (Columbia University, New York, NY), Seema Kara (Columbia University) and Jonathan Levy, (Boston University)

Background and Aims: Associations between features of the social environment and hypertension have been noted among adult populations. However the relationship between neighborhood social environment in adolescence and hypertension in young adulthood has not been studied. Methods: We examined the relationship between adolescent neighborhood social environment (crime, concentrated poverty, informal control, public nuisance and acquaintanceship) and elevated blood pressure in young adulthood, and whether gender modified this association in the National Longitudinal Study of Adolescent Health. Perceived informal control, public nuisance and acquaintanceship were assessed during adolescence (Wave 1 1995-1996, mean age 15.5, n=8352). Concentrated poverty was defined from US Census measures. Blood pressure was measured during an in home visit during follow-up (Wave 4 2007-2008 mean age 29.0). Hypertension was defined as systolic blood pressure ≥ 140 mmHg or diastolic ≥ 90 mmHg. Results: In analysis adjusting for individual level socio-demographics, concentrated poverty and acquaintanceship were associated with hypertension (OR 95%CI (OR 1.3 95%CI 1.0, 1.6 and OR 1.2 95%CI 1.0, 1.4, respectively). This association did not vary significantly by gender. Conclusion: Our findings suggest that adolescent neighborhood social environment may affect the development of hypertension. Further studies should examine the potential mechanisms through which the social environment could affect the development of hypertension.

EFFECTS OF HOUSING MOBILITY AND LOWER POVERTY NEIGHBORHOODS ON ADOLESCENT ASTHMA: THE MOVING TO OPPORTUNITY EXPERIMENT. *TL Osypuk, N Schmidt, Q. Nguyen, AL Lincoln. (Northeastern University, Boston, MA 02115).

Housing relocation may improve respiratory outcomes via neighborhood improvements (reduced exhaust or violent crime), or via unit improvements (reduced carpet coverage or vermin). Yet most studies are observational. We used an experimental study to examine the effects of housing relocation on youth asthma. Methods: The Moving to Opportunity (MTO) study randomized volunteer low-income families in public housing at baseline (1994-1997) (1) to a control group remaining in public housing or (2) to receive a Section 8 housing voucher to subsidize a rental apartment in lower-poverty neighborhoods (experimental group). We examined past-year self-reported asthma outcomes 4-7 years after randomization, for youth 12-19 at follow-up (n=2829). We tested treatment main effects, & effect modification by gender & site (across 5 cities) using covariate-adjusted intent-to-treat regression models. Results: We found significantly harmful treatment main effects for ever diagnosed with asthma (odds ratio(OR): 1.31; p=.032), asthma attack (OR: 1.54 p=.021), wheezing/whistling (OR: 1.23 p=.097), and speech limited from wheezing (OR:1.45 p=.095). Null effects were found for other asthma outcomes. Only 1 variable (number of wheezing episodes) exhibited gender effect modification of treatment (interaction p=.048) with adverse effects concentrated in boys (negative binomial OR: 2.00 p=.021). There was marginal qualitative effect modification of treatment effects for several asthma outcomes by site. Conclusion: Unfortunately, relocating to lower-poverty neighborhoods through MTO caused adverse asthma outcomes. Future analyses need to explore what may account for these effects, to better design housing mobility programs.

COLLECTIVE EFFICACY AND COMMUNITY VIOLENCE: WHAT IS THE DIRECTION OF ASSOCIATION? *A.M. El-Sayed, M. Tracy, S. Galea (Columbia University, New York, NY 10032)

There is a well-demonstrated link between measures of social cohesion, such as collective efficacy (CE), and community violence. This observation has had considerable valence in policy circles, inspiring investment in interventions to promote CE to reduce community violence. However, the literature in this area is almost exclusively based on cross-sectional ecologic studies, leaving the direction of the association between CE and violence unclear. We used an agent-based model (ABM) parameterized using data from New York City to characterize the relationship between changes in neighborhood CE and levels of violence over time. In our ABM, an agent's probability of experiencing violence was a function of income level, past history of violence, and neighborhood characteristics, and following exposure to violence, agents could attempt to move to lower-violence neighborhoods. Neighborhood CE changed as a function of neighborhood violence and the characteristics of agents moving in and out. Model results suggest that violence shaped levels of CE more than CE shaped levels of violence as a high CE and high violence neighborhood's probability of transitioning to low CE and high violence was substantially higher than its probability of transitioning to high CE and low violence. Our findings also suggest that the primary mechanism through which violence influences collective efficacy is through residential mobility, which decreases CE ratings in neighborhoods that receive large numbers of new residents in response to high levels of violence elsewhere, as well as in neighborhoods that lose high-income agents who are most likely to move in response to violence. Our findings suggest that anti-violence interventions targeting CE may not be effective and redoubles the imperative for longitudinal studies of the relationship between CE and community violence.

LONGITUDINAL ASSESSMENT OF CHANGES BETWEEN SERUM PERFLUOROCTANOATE, PERFLUOROCTANESULFONATE, AND SERUM LIPIDS. *J. Butenhoff, D. Ehresman, S. Chang, and G. Olsen (3M Company, St. Paul, MN 55144)

Cross-sectional studies of environmentally-exposed populations have observed a positive association between serum concentrations of perfluorooctanoate (PFOA) and perfluorooctanesulfonate (PFOS) with serum non-high-density-lipoprotein cholesterol (non-HDL). The strength of these associations paradoxically has not been observed in occupational studies. Toxicological and mechanistic studies have demonstrated that PFOA and PFOS would be expected to reduce serum cholesterol; therefore, a causal basis for the associations observed in cross-sectional studies has been questioned. This study represents a longitudinal assessment of these potential associations among individuals whose initial concentrations were predominantly at general population levels. Baseline and end-of-project PFOA, PFOS, lipid, and hepatic clinical chemistries were measured in 204 workers involved with the demolition of former perfluoroalkyl manufacturing facilities. Of interest were 179 workers who did not take lipid-lowering medications. Among the 179 workers, 116 had significant mean increases in PFOA (50.9 ng/mL) and PFOS (6.2 ng/mL), and 55 had significant mean decreases in PFOA (-85.1 ng/mL) and PFOS (-37.1 ng/mL). Among those with increased PFOA and PFOS levels, their mean changes in non-HDL and HDL were -1.3 mg/dl ($p = 0.60$) and 2.0 mg/dL ($p = 0.02$), respectively. Among those with decreased PFOA and PFOS levels, their mean changes in non-HDL and HDL were -0.2 mg/dL ($p = 0.94$) and -0.2 mg/dL ($p = 0.83$), respectively. Adverse associations were not observed with changes in PFOA or PFOS and lipid parameters in linear regression analyses adjusting for five covariates (sex, age, BMI, alcohol, and the time period between measurements).

ASSOCIATION OF SERUM DIOXIN-LIKE COMPOUNDS WITH SERUM LIPIDS IN RUSSIAN BOYS. *JS Burns¹, PL Williams¹, MM Lee², O Sergeyev^{3,4}, SA Korrick^{1,5}, AF Fleisch⁶, and R Hauser¹. (¹Harvard School of Public Health, Boston, MA, 02115; ²University of Massachusetts Medical School, Worcester, MA, 01655; ³Samara State Medical University, Samara, Russia; ⁴Chapaevsk Medical Association, Chapaevsk, Russia; ⁵Brigham and Women's Hospital and Harvard Medical School, Boston, MA, 02115; ⁶Children's Hospital Boston, Boston, MA, 02115)

Background: We examined the association of peripubertal serum dioxin-like compounds (DLCs: dioxins, furans, co-planar polychlorinated biphenyls) with serum lipids in a prospective cohort of Russian boys. **Methods:** From 2003-2005, 499 boys were enrolled at ages 8-9 yrs, and had physical exams, blood samples drawn for DLC measurement by the CDC, and guardian completed medical, demographic and dietary questionnaires. We evaluated 431 boys with fasting total cholesterol (TC) and triglycerides (TG) measured at ages 10-11 and 12-13 yrs. Multivariate generalized estimating equation regression models for repeated measures were used to examine the associations of quartiles of lipid-adjusted DLCs with longitudinal measures of TC and log TG, adjusted for age, parental education, and nutritional factors. **Results:** At entry the median (25th-75th%-iles) serum DLC was 371 (281-493) pg/g lipid. At ages 12-13 years the median (25th-75th%-iles) TC and TG were 164 (142-189) and 71 (54-97) mg/dL, respectively. In adjusted models, boys in the highest DLC quartile compared with the lowest had significantly lower TC (-11.6; 95% CI -19.5, -3.6; $p=0.004$) and log TG (-0.23; 95% CI -0.33, -0.13; $p<0.001$). **Conclusions:** The findings suggest that among Russian boys peripubertal DLCs may be associated with lower serum lipids over time. Funded by EPA Grant R82943701 & NIEHS Grants ES014370, ES000002, & ES017117.

TRENDS IN BLOOD LIPIDS AND DECLINING PFOA FROM ENVIRONMENTAL EXPOSURE. *T Fletcher, R Weldon, N Fitz-Simon, L Gibson, C Ice, W Neal (London School of Hygiene and Tropical Medicine, London, UK)

Many years of contamination from a local factory in the Mid-Ohio Valley led to raised serum concentrations of perfluorooctanoic acid (PFOA also called C8) in residents of the community. Emissions and then serum levels in the community have fallen in the past decade offering an opportunity to evaluate if observed associations between PFOA and lipids are reversible. A survey, the C8 Health Project, collected serum and data on 69,000 children and adults in 2005-6. Cross sectional analyses show positive associations between PFOA and serum lipids, especially low density lipoproteins (LDL), but there remained some uncertainty whether PFOA was driving the associations. The new findings from longitudinal analyses are less vulnerable to bias; for instance there is less possibility of confounding of the association between change with exposure and change in outcome. In 2010 we recalled a nested sample of adults and measured PFOA and lipids in new serum samples. PFOA decreased on average 49% from an initial geometric mean of 74.8 ng/mL in serum. Among the 521 not taking lipid lowering drugs, we regressed the change in log LDL on change in log PFOA, adjusting for potential confounders. We found that a halving of PFOA was associated with an adjusted decrease of 3.6% (CI: 1.5%, 5.7%) in LDL. Similar associations were evident for perfluorooctanesulfonic acid (PFOS). For the children, we have matched 275 5th grade children who participated in both the C8 study and the Cardiac Surveillance Program in West Virginia, and thus have lipid levels at two dates up to 5 years apart. PFOA was measured at one time point and change in lipids are regressed on modelled change in PFOA, yielding a similar pattern of results to the adults.

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PERFLUOROALKYL CHEMICALS AND PREDIABETES IN US ADULTS. *Omayma Alshaarawy, Jie Xiao, and Anoop Shankar (Center on Aging, West Virginia university, Morgantown, WV, 26505)

Prediabetes is a preclinical stage in the hyperglycemia continuum where subjects are at increased risk of developing diabetes in the near future. Identifying novel risk factors for prediabetes, including widely prevalent environmental exposures, is therefore important. Perfluorooctanesulfonic acid (PFOS) is a manmade chemical used in the manufacture of common consumer goods, including Scotch guard, cleaning products, textiles, carpets, polishes and paints. PFOS is known to have endocrine disrupting properties and its exposure is widespread with detectable levels reported to be present in the blood of >98% of the US adults. Studies have shown that PFOS is related to hepatic insulin resistance and low thyroid function. Therefore, we examined the association between serum PFOS levels and prediabetes among 3419 participants aged ≥ 20 years from the National Health and Nutrition Examination Survey (NHANES) 1999-06. The main outcome was prediabetes (24.8%), defined according to the current American Diabetes Association guidelines, among subjects free of diabetes. We found that serum levels of PFOS were positively associated with prediabetes, independent of confounders such as age, sex, race-ethnicity, body mass index, hypertension, and serum cholesterol. Compared to quartile 1 (referent), the multivariable odds ratio (95% confidence interval) of prediabetes among subjects in quartiles 2 to 4 of PFOS were 1.09(0.76, 1.56), 1.41(1.09, 1.82), and 1.50 (1.10, 2.05), p -trend=0.0181. Our results suggest that elevated PFOS levels are associated with future risk of developing diabetes.

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MEDICAL HISTORY OF DEPRESSION AND RISK FOR GESTATIONAL DIABETES-FINDINGS FROM A LARGE POPULATION-BASED COHORT IN THE US. *K Bowers, SK Laughon, SD Kim, SL Mumford, J Brite, M Kiely, C Zhang. (NICHD, Rockville MD 20852)

Gestational Diabetes (GDM) has health implications for both the mother and offspring. We hypothesized that depression may be associated with an increased risk of GDM. While obesity is a major risk factor for GDM, it only explains 50% of risk. Impaired glucose metabolism may result from elevated cortisol, which opposes the action of insulin, following activation of the hypothalamic pituitary adrenal (HPA) axis that accompanies depression. The Consortium on Safe Labor was a population-based retrospective study using patient electronic medical records. We included 172,567 singleton pregnancies (2002-2008) with women contributing up to 4 pregnancies. Generalized estimating equations were used to estimate the odds of developing GDM comparing women with and without a history of depression, controlling for potential confounding factors. Effect modification by race and pre-pregnancy BMI was evaluated with multiplicative interaction terms. Sensitivity analyses were employed to evaluate the robustness of the results. A history of depression was significantly associated with GDM risk (adjusted odds ratio (OR)=1.47 (95% CI: 1.33-1.63)). The association remained significant after additional adjustment for pre-pregnancy BMI (OR=1.19 (95% CI: 1.05-1.36)). The association varied across races with the strongest, although non-significant, association among Asian women (OR=1.68 (95% CI: 0.70-4.06)). Findings suggested that a medical history of depression was significantly related to an increased risk of GDM. Further studies are needed to understand underlying molecular mechanisms as the relationship between mental and reproductive health may have important etiologic and public health implications.

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PRE-PREGNANCY NUT AND PEANUT BUTTER CONSUMPTION AND THE RISK OF GESTATIONAL DIABETES MELLITUS. *Wei Bao, Katherine Bowers, Deirdre K. Tobias, Frank B. Hu, Cuilin Zhang (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, MD 20892; Harvard School of Public Health, Boston, MA 02115)

Nut consumption and some constituents in nut (e.g., unsaturated fat, fiber, and magnesium) have been linked to improved insulin sensitivity and a reduced risk of type 2 diabetes. However, the association between nut consumption and risk for gestational diabetes mellitus (GDM) remains unknown. In this prospective cohort study, we included 13,467 U.S. women who reported at least one singleton pregnancy between 1991 and 2001 in the Nurses' Health Study II. During 10 years of follow-up, 859 incident GDM cases were identified. After adjustment for age, race, family history of diabetes, parity, smoking, alcohol intake, physical activity, prepregnancy BMI, total energy intake, dietary intakes of red meat, processed meat and sugar-sweetened beverages, women who consumed ≥ 5 servings/week of peanut butter, compared with those who consumed < 1 serving/month, had a 30% lower risk for GDM (relative risk (RR) 0.70, 95% confidence interval (CI) 0.50-0.98, $P = 0.038$). The results did not alter even after additional adjustment for dietary intakes of fruits, vegetables, fiber, magnesium, and fructose (RR 0.70, 95% CI 0.50-0.99, $P = 0.043$). In the stratification analyses, the association between peanut butter consumption and GDM was slightly stronger among normal weight, white population and individuals with less physical activity. No significant association was observed between total nut (peanuts plus tree nuts), peanuts, or tree nuts intake and GDM risk. In conclusion, we observed that higher pre-pregnancy consumption of peanut butter (≥ 5 servings/week) is associated with a reduced risk of GDM.

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PREPREGNANCY ADIPONECTIN LEVELS AND RISK OF GESTATIONAL DIABETES (GDM). *M Hedderson, J Darbinian, C Quesenberry and A Ferrara (Kaiser Permanente Northern California, Oakland, CA)

Identifying biomarkers that predict GDM may improve our understanding of the disease etiology and inform prevention strategies. Measuring biomarkers before pregnancy can clarify whether the metabolic pathways leading to GDM are independent of the physiologic changes during pregnancy. Adiponectin is an adipocyte-derived polypeptide with insulin-sensitizing properties. We examined women's prepregnancy levels of adiponectin and its high molecular weight (HMW) multimer and the risk of subsequent GDM. We conducted a case-control study among women who had a multiphasic health checkup (MHC) exam and serum sample taken at Kaiser Permanente Northern California between 1984-1996 and had a subsequent pregnancy (255 GDM cases and 507 controls (matched on: year of exam, age at exam and age at pregnancy and number of intervening pregnancies)). The MHC exam occurred on average 7 years before pregnancy. Prepregnancy total adiponectin and HMW concentrations were lower in women who developed GDM than controls (7.7 vs.10.6 and 2.8 vs. 3.9 $\mu\text{g/ml}$, respectively, P -values < 0.001). Compared with women in the highest quartile of adiponectin and HMW adiponectin, women in the lowest quartile had a 4-fold increased risk of GDM after adjusting for race/ethnicity, insulin, family history of diabetes, maternal education, BMI and parity (at serum collection) [ORs (95% CI): 3.83 (2.05 - 7.16) and 4.15 (2.20 - 7.83), respectively]. There was a trend of increasing risk of GDM with decreasing adiponectin levels. The risk of GDM is increased among women with lower prepregnancy levels of adiponectin, suggesting decreased insulin sensitivity in the pregravid state when accompanied by inadequate beta cell compensation during pregnancy leads to GDM. Measuring adiponectin may help identify women at high risk for GDM.

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PARITY AND GLYCATED HEMOGLOBIN IN CHINESE SINGAPOREAN WOMEN. *N. Mueller, A. Odegaard, W. Koh, M. Gross, J. Yuan, M. Pereira (University of Minnesota, Minneapolis, MN 55454; National University of Singapore; University of Pittsburg)

The association between parity and cardiometabolic disease risk in women has been studied primarily in Western populations, with inconsistent findings. Glycated hemoglobin (HbA1c) is a strong predictor of type 2 diabetes and cardiovascular disease; however, only one study appears to have reported findings on the association between parity and HbA1c. We examined the association between parity and HbA1c in a prospective cohort study of Chinese women in Singapore, aged 45-74 at enrollment (1993-1998), who did not have a history of diabetes (n=2,962). HbA1c was measured from blood collected at visit 2 (1999-2004). Parity was defined as the number of live births reported at baseline. Multivariable generalized linear models were used to compute least squares means and 95% confidence intervals (CI) for HbA1c across levels of parity, and were adjusted for age, interview year, dialect, menarche age, smoking status, education, oral contraceptive use, menopausal status, hormone therapy use, physical activity and baseline body mass index (BMI). There was evidence of a positive linear association between parity and HbA1c. In a multivariable adjusted model without BMI, a one category increment in parity was associated with a 0.04% (95%CI: 0.01%-0.06%; p=0.01) higher HbA1c. This was attenuated slightly, but remained statistically significant, after additional adjustment for BMI (Δ HbA1c=0.03%; 95%CI: 0.001%-0.06%; p=0.04). These data suggest parity may be positively associated with HbA1c, even after adjustment for BMI later in life. This association may be explained by hormonal and metabolic changes during or following pregnancy, as well as unmeasured socioeconomic or lifestyle risk factors.

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PHYSICAL DISABILITY IS ASSOCIATED WITH HIGHER DECLINE IN COGNITIVE FUNCTION OF OLDER ADULTS. *Kumar B. Rajan, Ph.D., Denis A. Evans, M.D. (Rush University Medical Center, Chicago, IL)

To test the hypothesis that physical disability is associated with higher decline in cognitive function. As part of a longitudinal population-based cohort study, 6,678 non-disabled older adults from a biracial urban community were interviewed at 3-year intervals for up to 12 years. Cognitive function was assessed using a standardized global cognitive score, and physical disabilities using activities of daily living (ADL) and instrumental activities of daily living (IADL). During a mean of 9.3 years, 2,450 of 6,678 participants (37%) developed ADL and 2,069 of 4,287 participants (48%) developed IADL disability. After adjusting for demographic and physiologic confounders, cognitive function declined a mean of 0.048-unit per year before ADL and 0.047-unit per year before IADL. In comparison, the rate of cognitive decline accelerated by 0.076-unit per year (156% increase) after ADL and 0.054-unit per year (115% increase) after IADL. Higher levels of ADL and IADL disabilities were also associated with faster cognitive decline following disability but did not eliminate the effect of disability. However, no such decreasing trend was observed with higher levels of IADL disability. In old age, cognitive function tends to decline substantially following physical disability even after controlling for demographic and physiologic characteristics of participants.

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PULSE WAVE VELOCITY AND COGNITIVE FUNCTION AMONG OLDER ADULTS. *Wenjun Zhong, Karen J Cruickshanks, Carla R Schubert, Cynthia M Carlsson, Barbara EK Klein, Ronald Klein, Charles W Acher (University of Wisconsin - Madison, WI)

Arterial stiffness may be involved in age-related cognitive decline and dementia. The Epidemiology of Hearing Loss Study is a longitudinal study of aging among residents of Beaver Dam, WI since 1993. In 2009-2010, at the 15-year follow-up examination, pulse wave velocity was measured from carotid to femoral (CF-PWV) and from carotid to radial (CR-PWV) with the Complior device (n=1433). Cognitive function was measured by six tests of executive function, psychomotor speed, memory and language function. Linear regression models were used to evaluate the association between pulse wave velocity and cognitive function. The mean age of the participants was 75 years, and 43% were men. Adjusting for age, sex, education, smoking, heaving drinking, BMI, hemoglobin A1C, HDL cholesterol, hypertension and other CVD risk factors, a CF-PWV greater than 12 m/s was associated with a lower Mini-Mental State Examination score (coefficient: -0.24, se: 0.11, p=0.03), longer time to complete Trail Making Test-B (coefficient: 7.00, se: 3.35, p=0.04), fewer words recalled on Auditory Verbal Learning Test (coefficient: -1.17, se: 0.42, p=0.05), and fewer words on Verbal Fluency Test (coefficient: -1.44, se: 0.69, p=0.04), but was not associated with Trail Making Test-A or digit symbol substitution test. A CF-PWV > 12 m/s was also associated with a lower composite cognitive score derived from all individual tests (coefficient: -0.10, se: 0.05, p=0.04). No association was found for CR-PWV and cognitive function test performance. In this older population, arterial stiffness measured by CF-PWV was associated with cognitive function in multiple cognitive domains. Longitudinal studies are needed to confirm these associations.

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RETHINKING THE ASSOCIATION OF HIGH BLOOD PRESSURE WITH MORTALITY IN THE ELDERLY ADULTS: THE IMPACT OF FRAILTY. *MC Odden, CA Peralta, MN Haan, KE Covinsky (Oregon State University, Corvallis, Oregon, 97331)

The association between high blood pressure (BP) and risk of death is attenuated in older adults. Yet results from randomized controlled trials have found beneficial effects of lowering BP. Participants in trials are often healthier than the general population. We propose that effect modification by frailty status may explain this apparent discrepancy. The present study examined the association between BP, frailty, and mortality in 2,340 adults \geq 65 years in the National Health and Nutrition Examination Survey, 1999-2000 and 2001-2002. Mortality data was linked to death certificates in the National Death Index. Walking speed was used to assess frailty, and measured over a 20-foot walk; 243 (8%) did not complete the walk. Participants were categorized as fast or slow walkers (\geq or $<$ 0.8 meters/second), or incomplete. Potential confounders included age, sex, race, survey year, lifestyle and physiologic variables, chronic conditions, and antihypertensives. There were 589 deaths recorded through December 31st, 2006. Among faster walkers, those with elevated systolic BP (\geq 140 mmHg) had a greater adjusted risk of mortality compared to those with BP $<$ 140 mmHg (Hazard Ratio (HR): 1.37, 95% confidence interval (CI): 1.03, 1.83). Neither elevated systolic or diastolic BP (\geq 90 mmHg) was associated with risk of death among slower walkers. Strikingly, in participants who did not complete the walk, elevated BP was strongly and independently associated with a lower risk of death: HR: 0.44, 95% CI: 0.28, 0.71 (systolic) and HR: 0.10, 95% CI: 0.01, 0.82 (diastolic). Walking speed could be a simple measure to identify elderly adults who are at risk for poor outcomes related to high BP.

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LONG-TERM VARIABILITY OF INFLAMMATORY MARKERS IN A POPULATION-BASED COHORT. *SD Nash, KJ Cruickshanks, CR Schubert, BK Klein, R Klein, MY Tsai (UW, Madison, WI, 53726)

Epidemiological studies are increasingly linking inflammatory markers to chronic diseases of aging but little is known about the natural history of these markers into old age. The Beaver Dam Studies (WI) are two population-based prospective cohort studies of aging. Among 1,438 participants aged 43-79 years(yrs) at baseline (1988-1990), high sensitivity C - reactive protein (hsCRP) was measured three times during a 20 year period and interleukin-6 (IL-6) was measured twice in 1998-2000 and 2009-2010. For hsCRP, Spearman correlation coefficients were .54 (95%Confidence Interval(CI) .50-.58) between measures at 10-yrs, and .44 (95%CI .39-.48) at 20 yrs and were similar by age group and sex. When split into three hsCRP risk groups (<1.0, 1.0-3.0, >3.0 mg/L), 51.5% of participants stayed in the same group during 10 yrs (weighted Kappa(κ) =.34), and 32.4% stayed in the same group at all three times (κ =.27). Trends were similar across age groups or sex. Of participants in the high risk group (>3 mg/L) at baseline (n=393), 44.0% remained in that group at both the 10- and 20-year follow-up. Results were similar after removing participants with hsCRP levels indicating a potential acute infection at any time (>10 mg/L) (n=229). For IL-6, when participants were split into tertiles based on 1998-2000 levels (<1.07, 1.07-2.01, >2.01 pg/mL), 50.9% of participants remained in the same group 10 yrs later (κ =.34), and 20.8% remained in the highest IL-6 group. In older age groups κ were somewhat lower (Equality of κ : P=0.021). These results indicate that inflammatory marker levels tracked over the long-term into older age. Whether chronically elevated levels of inflammation are associated with chronic diseases of aging is yet to be determined.

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RELATIONSHIP BETWEEN CHRONIC CONDITIONS AND DISABILITY IN AFRICAN AMERICANS *R.J. Thorpe, Jr., A. J. Wynn, S.L. Szanton, and K. E. Whitfield (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205)

Race differences in disability are well established as are the role of chronic conditions in the onset of disability. However, little is known about the association between specific chronic conditions and disability in African Americans (AAs). This is important because AAs have higher rates and earlier onset of chronic conditions and disability than White Americans. We examined whether the relationship between chronic conditions and disability in 602 African Americans aged 50 years and older in the Baltimore Study of Black Aging. Disability was measured with activities of daily living (ADL). Medical conditions included self-report of asthma, cognitive impairment, depression, arthritis, cancer, diabetes, cardiovascular disease (CVD), stroke, and hypertension. Prevalence of ADL disability was 59.2% in women versus 50.0% in men (p=0.048). After adjusting for age, educational attainment, marital status, and income, those with diabetes (women: odds ratio [OR] =1.83, 95% confidence interval [CI] 1.14, 2.95; men: OR=3.14, 95% CI=1.24-8.15) or arthritis (women: OR=4.80, 95% CI=2.85-8.05; men: OR=3.70, 95% CI=1.60-8.55) had a higher odds of ADL disability than those without. Women with depressive symptoms (OR=2.70, 95% CI=1.48-4.94) and men (OR=5.28, 95% CI=1.49-18.81) with CVD had higher odds of ADL disability. These findings advance our understanding of the relationship between disability and chronic conditions by examining only AAs. This removes the confounding of race and SES often present in large national datasets. Also, these findings underscore the importance of developing health promoting strategies focused on chronic disease prevention and management to delay or postpone disability in AAs.

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ASSOCIATION BETWEEN HISTORY OF DEPRESSION AND DEPRESSIVE SYMPTOMS AND SUBSEQUENT CHANGE IN HIPPOCAMPAL VOLUME IN A PROSPECTIVE COHORT OF OLDER ADULTS. *Elbejjani M, Fuhrer R, Mazoyer B, Crivello F, Tzourio C, Dufouil C. (McGill University, Montreal, Canada, H3A 1A2 and INSERM U708, Bordeaux, France).

Several studies have reported a cross-sectional association between depression and smaller hippocampal volumes (HcV), but the temporal sequence of the association remains poorly explored. One of the main hypotheses is that depression may cause HcV atrophy. This study aims to estimate the association between pre-study lifetime depression and baseline depressive symptoms and subsequent change in HcV in community-dwelling older adults. We used a prospective cohort of older adults (N=1333, 65-80 years old) who had two magnetic resonance imaging scans at baseline and 4-year follow-up. Multivariable linear regression models were used to estimate the associations between annualized percent change in HcV and self-reported lifetime history of depression, age at first depression, and history of hospitalization for depression, as well as baseline depressive symptoms measured with the Center for Epidemiologic Studies-Depression scale. Lifetime history of depression, age at first depression, hospitalization for depression, and baseline depressive symptoms did not predict the subsequent change in HcV (coefficients and 95% CI=0.07 (-0.08, 0.22); -0.001 (-0.010, 0.008); -0.03 (-0.37, 0.31); 0.001 (-0.006, 0.009) respectively). A severity score grouping these variables was not associated with change in HcV. Adjustment for potential confounders did not alter the results. There was no statistical interaction between the depression variables. Our findings do not support the hypothesis of a relationship between lifetime history of depression or more proximal depressive symptoms and subsequent change in HcV.

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RACIAL DISPARITIES IN MOBILITY LIMITATION IN MIDDLE-AGED ADULTS IN THE UNITED STATES. *R.J. Thorpe, Jr., C.N. Bell, A. J. Wynn, and E.M. Simonsick. (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205)

Race-related disparities in mobility limitation, an important predictor of adverse health outcomes, are well-established in older adults. However, little is known about race differences in mobility in middle-aged adults. We examined the relationship between race and mobility in 44,997 persons aged 50 to 64 in the National Health Interview Surveys from 2008 to 2010. Mobility limitation was defined as any difficulty walking ¼ mile or climbing ten steps. Medical conditions included hypertension, coronary heart disease, arthritis, stroke, depression, cancer, and diabetes. Prevalence of mobility limitation was 35% in blacks versus 23% (p<0.001) than whites. After adjusting for sex, educational attainment, marital status, income, insurance status, drinking and smoking status, obesity, joint pain, and medical conditions, blacks continued to show greater odds of mobility limitation (odds ratio [OR] =1.30, 95% confidence interval [CI] 1.12, 1.52) than whites. These findings are consistent with notion of accelerated health declines among blacks. The major threats to mobility limitation are more common in blacks (e.g. obesity, diabetes, hypertension), but that controlling for them still does not eliminate the prevalence disparity. Further these findings demonstrate that mobility limitations are not a problem only among older adults. Efforts to develop interventions and health promoting strategies to delay or postpone mobility limitation in middle-age adults are needed to sustain independence and quality of life for middle-age adults.

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SOCIAL AND BEHAVIORAL DETERMINANTS OF ALLOSTATIC LOAD IN A COHORT OF OLDER DANISH ADULTS. *CR. Salazar, H. Bruunsgaard, EL. Mortensen, DE. Morse, K. Avlund, P. Holm-Pedersen, P. Factor-Litvak (Columbia University Mailman School of Public Health, NY, NY 10032; NYU College of Dentistry, NY, NY 10010; Copenhagen University, Copenhagen, Denmark)

Allostatic load is a cumulative measure of physiological dysregulation across multiple systems over the life course. It is not entirely clear which factors lead to higher rates of accumulation in some individuals compared to others. Using data from the 1914 Glostrup Aging Study, we identified determinants of allostatic load in a cohort of 364 fully functioning 80-year olds residing in Glostrup, Denmark based upon social and behavioral factors measured with a structured questionnaire at age 75. We used a count-based formulation to create a summary allostatic load measure incorporating 10 biological markers from blood sampled at age 80. Analysis of variance was performed to compare mean allostatic load scores across each social/ behavioral factor. Unconditional logistic regression models were constructed to examine associations between each factor and high allostatic load, defined as the highest quartile of dysregulation versus the lowest 3 quartiles. Exploratory factor analysis revealed 3 principal components that explain 47% of the variance. Findings showed a non-significant trend towards higher mean allostatic load scores among those with lower education, high alcohol consumption, institutionalized residence, and sedentary lifestyle. In our final multivariable model, low income was associated with high allostatic load (Odds ratio= 2.15, 95% Confidence Interval: 1.01-4.58). These data support the hypothesis that socioeconomic status independently predicts unequal accumulation of physiological dysregulation, consistent with a “weathering” pattern of allostatic load.

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NATIONAL POPULATION ESTIMATES AND CORRELATES OF SEXUAL ABUSE OF OLDER ADULTS. *MB Cannell, AG Hall (University of Florida, Gainesville, FL 32610)

The National Research Council repeatedly points out the lack of national population-based estimates of the prevalence of elder abuse. Specifically there is very little published research as to the prevalence or factors associated with sexual abuse in the older adult population. We were particularly interested in the association between sexual abuse and disability. In 2005, 2006, & 2007, 24 states used sexual violence modules on the Behavioral Risk Factor Surveillance System. We pooled this data to create a representative sample of 51,261 adults aged 60 & over to study the association between recent sexual abuse and various demographic & health variables. Based on this data, the weighted population estimate of recent sexual abuse among older adults is 0.8% (95% Confidence Interval [CI] 0.6% to 1.0%). Translated to the 2006 population, this would suggest that roughly between 304,000 and 508,000 older adults annually experience sexual abuse in the United States. In logistic regression analysis there was a significant association between disability and recent sexual abuse (Odds Ratio [OR] 2.2, 95% CI 1.4-3.4). In the fully adjusted model an attenuated association remained, but it was not statistically significant (OR 1.2, 95% CI 0.78-1.9). Other factors associated with reported sexual abuse are race or ethnicity other than white, black, or Hispanic (OR 2.4, 95% CI 1.3-4.7), being divorced or separated (OR 4.0, 95% CI 2.2-7.1), heavy drinking (OR 2.4, 95% CI 1.1-5.1), high blood pressure (OR 1.6, 95% CI 1.0-2.3), satisfaction with life (OR 0.4, 95% CI 0.2-0.7), presence of social support (OR 0.5, 95% CI 0.3-0.8), and poor mental health (OR 2.1, 95% CI 1.4-3.3). Findings may help identify or prevent future sexual abuse, and associated outcomes, in this population.

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SOCIAL CONNECTEDNESS AND ITS CORRELATES IN ADULTS. *B. Wood, L. Palmer, and K. Benke (Samuel Lunenfeld Research Institute, Toronto, ON, M5T3L9)

Social connectedness is strongly correlated with health and longevity. Few large community samples have evaluated the prevalence and correlates of social connectedness or its counterpart, social isolation, especially in middle-aged adults. We used data from the Ontario Health Integrated Pilot Study. For this analysis, 6837 adults were considered. Social connectedness (SC) was measured with the abbreviated Lubben Social Network Scale, which ranges from 0 to 30 (higher scores indicate increased connectedness; scores less than 12 reflect social isolation). Linear regression and 95% confidence intervals were used to assess the multivariate relationships between SC and possible predictors, including the Center for Epidemiologic Studies Depression scale, and self-reported disease status (e.g. asthma, arthritis, and diabetes). Overall, middle-aged adults (35-59 years) were more socially isolated (20.6% males; 11.5% females) than older adults (60-70 years; 17.6% men; 10.5% women). For older adults, being married compared to never being married was associated with higher levels of SC, and this was the case for both males ($\beta=-4.6$ (-7.3, -1.8)) and females ($\beta=-2.1$ (-3.7, -0.57)). For middle-aged adults, high income was the strongest correlate, for both males ($\beta=2.4$ (0.29, 4.5)) and females ($\beta=1.9$ (0.62, 3.09)). For all gender and age groups, more depressive symptoms were associated with decreased SC ($\beta= -0.21$ (-0.23, -0.19)). No significant associations were detected between SC and self-reported disease status in either age group. Our results support previous research that depression and relationship status are important factors in SC levels in community-dwelling older adults. For middle-aged adults, high income is the outstanding factor in determining SC.

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DEVELOPMENT AND VALIDATION OF THE GERIATRIC COMORBIDITY SCORE USING ADMINISTRATIVE CLAIMS DATABASES. *SG. Beland, C. Tannenbaum, T. Ducruet, M. Preville, Y. Moride. (University of Montreal, Montreal, Quebec, H3T 1J4)

Background : Comorbidity scores currently used to control for confounding in pharmacoepidemiologic studies have been developed in broad general populations. The performance of these scores in the elderly population may be questionable as disease and drug use in the elderly varies considerably compared to younger individuals **Objective:** To develop a Geriatric Disease Score based on drug use and to compare its performance with existing scores. **Methods:** The new score was developed in a retrospective cohort of 61 172 older individuals selected from the Quebec claims databases (RAMQ)(2000-2009). Risk factors for mortality were identified through a nested case-control analysis using a time window of 1 year prior to the event. Conditional logistic regression modeling was used to yield weighted coefficients and scores were developed using The Framingham Heart Study method. The performance of each score was assessed in a validation cohort (n=26 216). **Results:** During the ten-year follow-up, 7 977 deaths (30.4%) were identified in the validation cohort. Using the scoring method, the mean risk of death for the cases was 0.46 and 0.33 for the controls (t-test: 95.12; $p \leq 0.0001$). C-statistics were 0.75 (95% CI: 0.74 - 0.76) for the Geriatric Disease Score compared to 0.47 (95% CI: 0.45-0.49) for the Chronic Disease Score. **Conclusion:** Based on our results, a comorbidity score based on drug use exceeds performance for older adults compared to a score based on disease. The Geriatric Disease Score should be used in research in the elderly population where the validity of ICD codes is known to be low.

THE EFFECT OF STATINS ON TESTOSTERONE: A META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS. *CM Schooling (CUNY School of Public Health at Hunter College, New York, NY 10035), SL Au Yeung, G Freeman, BJ Cowling (School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong SAR, China)

Statins reduce mortality more than other lipid-modulating drugs. Statins increase the risk of diabetes and may improve immune function for reasons that are unclear. Physiologically statins would be expected to lower testosterone; statins' pleiotropic effects coincide with the effects of lowering testosterone. A meta-analysis of placebo-controlled randomized trials was used to test the hypothesis that statins lower testosterone. PubMed, Medline and ISI Web of Science were searched until end 2012, using "(Testosterone OR androgen) AND (CS-514 OR statin OR simvastatin OR atorvastatin OR fluvastatin OR lovastatin OR rosuvastatin OR pravastatin)" restricted to randomized controlled trials in English, supplemented by a bibliographic search. Two reviewers independently searched, selected and assessed study quality. Two statisticians independently abstracted and analyzed data, using random or fixed effects models, as appropriate, with inverse probability weighting. Of 28 studies identified 11 were eligible. In 5 homogenous trials of 501 men, mainly middle-aged with hypercholesterolemia, statins lowered testosterone by -18.9ng/dl (95% confidence interval (CI) -3.9 to -33.9). In 6 heterogeneous trials of 368 young women with polycystic ovary syndrome, statins lowered testosterone by -11.6ng/dl (95% CI -1.4 to -21.8). Statins may partially operate by lowering testosterone explaining their effect on diabetes. Whether this is a detrimental side-effect or mode of action warrants investigation given the potential implications for drug development and prevention of non-communicable chronic diseases.

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FACTORS ASSOCIATED WITH INTENTION TO QUIT SMOKING AMONG YOUNG FATHER SMOKERS IN TAIWAN. *YJ Hsu, YY Yen, Ted Chen, and HL Huang (Kaohsiung Medical University, Kaohsiung, Taiwan 807)

In Asian society father's influence is particular being considered an important predictor on youth smoking. Young adults were more likely to be interested in quitting and to quit smoking successfully. Our study is to analyze quit-smoking intention among young father smokers of elementary schoolchildren and its associated factors. Data on father's smoking status and related variables was obtained from Control of School-aged Children Smoking Study surveys of 2008-2009 in southern Taiwan. Multistage cluster sampling was used to obtain a representative sample ($n=4,564$) among fathers of 3rd to 6th grader from 65 elementary schools. Of all fathers surveyed, 36.7% ($n=1,675$) were current smokers. Regression models were used to examine the influence factors had on father's quit smoking intention. Fathers had significant lower intention to quit smoking if he smoked his first cigarette in 5 minutes after waking up than over 5 minutes (33.0% vs. 49.1%). After adjusting for socio-demographic variables, father's quit smoking intention were related to prior quitting experience (adjusted odds ratio (AOR) =3.46), first cigarette in 5 minutes after waking up (AOR=1.83), cognitive hazards of smoking (AOR=1.07) and home smoking rules (AOR=2.13). Perception of antismoking messages through newspapers and the Web were also associated with quit-smoking intention (AOR =2.61 and 1.56, respectively). The results suggest that smoking cessation programs for young father smokers should consider their higher dependence to nicotine and prior quitting experience. Moreover, providing tobacco hazard message through media such as newspaper or website and restrictions on smoking at home may enhance father's intention to quit smoking.

FETAL GROWTH AND ADOLESCENT PSYCHOLOGICAL WELL-BEING: EVIDENCE FROM HONG KONG'S "CHILDREN OF 1997" BIRTH COHORT. L.L. Hui, Gabriel M. Leung, T.H. Lam, C. Mary Schooling* (School of Public Health, the University of Hong Kong, Pokfulam, Hong Kong)

Lower birth weight is usually observed associated with poor psychological health, which has been attributed to pre-natal programming of the hypothalamic pituitary adrenal axis. However such observations may be due to confounding by social patterning of birth weight and health, making replication in other populations valuable. We used linear regression in 7670 births (92% follow-up) from a Chinese birth cohort, "Children of 1997" in Hong Kong, which is a developed non-western setting with little social patterning of birth weight, to examine the association of sex- and gestational age- specific z-score for birth weight with parent reported Rutter score, self-reported self-esteem score and depressive symptoms at 11 years, and whether the associations varied by socio-economic position or prematurity. Confounders included were sex, birth order, maternal height, maternal smoking during pregnancy, mother's place of birth, parental education and household income. Greater sex- and gestational age- specific z-score for birth weight was associated with lower Rutter score (-0.22 , 95% confidence interval -0.37 , -0.08), but was unrelated to depressive symptoms or lower self-esteem. None of these associations varied with sex, socio-economic position or prematurity. A specific association of birth weight with behavioural problems suggests that fetal environment might have an effect on some aspect of neurological development.

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A COMPARISON OF SMOKING PREVALENCE AMONG FOREIGN BORN CAMBODIAN AMERICANS IN LONG BEACH, CA AND LOWELL, MA. *R. Friis, S. Koch-Weser, C. Garrido-Ortega, A. Safer, C. Wankie, M. Forouzesheh, J. Pallasigui (California State University Long Beach, Long Beach, CA, 90840)

The two largest Cambodian settlements outside of Cambodia are in Long Beach, CA, and Lowell, MA. Smoking is prevalent in both study populations but extant data revealed a higher smoking prevalence in Lowell than in Long Beach. The present research compared the sociodemographic correlates of cigarette smoking among the two communities in order to reconcile differences in the reported prevalences. A stratified random sample of respondents ($n=1,414$ for Long Beach and $n=381$ for Lowell) was obtained from census tracts with high concentrations of Cambodian Americans. Cross-sectional survey data were collected regarding demographic characteristics and tobacco use history. Current smokers had smoked 100 or more cigarettes during their lifetimes and indicated they continued to smoke. The overall prevalence of smoking among foreign born Cambodians was 11.7% (males=23.6%; females=4.3%) in Long Beach and 22.3% (males=43.5%; females=11.1%) in Lowell. The mean age of current smokers was 50.5 years (males=54.6 years; females=54.1 years) and 43.9 years (males=46.6 years; females=42.4 years) for Long Beach and Lowell, respectively. The mean number of cigarettes smoked per day by current smokers in Long Beach was 11.2 (males=11.8 cigarettes; females=8.7 cigarettes) and in Lowell, 10.8 (males=8.8 cigarettes; females=11.6 cigarettes). Consequently, aggregate smoking prevalence was higher for both men and women in Lowell than in Long Beach. In both communities, more men than women smoked. The Lowell Cambodian population tended to be younger than the Long Beach population. This presentation provides new information on the similarities and differences between smokers in both communities.

SPATIAL ANALYSIS OF CIGARETTE SMOKING AMONG CAMBODIAN AMERICANS. *R. Friis, M. Forouzes, A. Safer, C. Garrido-Ortega, C. Wankie, J. Pallasiui (California State University Long Beach, Long Beach, CA, 90840)

As part of ongoing research regarding smoking among Cambodian Americans, we used GIS methods to characterize the spatial distribution of smokers. The study was conducted in Long Beach, CA, home of the largest Cambodian community outside of Cambodia. Identification of clusters of smokers aids in development of targeted smoking cessation interventions in this high smoking prevalence population. Respondents (n=1,414) were from a stratified random sample obtained from 15 census tracts with high concentrations of Cambodian Americans. A cross-sectional survey collected data on demographic characteristics and tobacco use history. Current smokers were defined as persons who had smoked 100 cigarettes or more in their lifetime and smoked as of the interview. Multivariate logistic regression analyses examined demographic predictors of smoking status. Spatial analysis discerned underlying smoking patterns, which might not be readily apparent in conventional statistical analyses. Choropleth maps with proportional shading and corresponding probability levels identified significant predictors of current smoking. The prevalence of current smokers was 13.0% (males=24.4%; females=5.4%). The odds of being a current smoker were 6.81 times (95% confidence interval=4.58, 10.12) higher among men than women. Age, education, marital status, and health status were statistically significant predictors for being a current smoker. Using logistic regression and geographic information system maps, we identified clusters of current smokers who tended to be younger, unmarried men, with less than a college education, and in fair or poor health. We describe applications of these findings in targeted smoking cessation programs.

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EFFECTS OF STATE-LEVEL POLICIES ON RISK BEHAVIOR IN MEN WHO HAVE SEX WITH MEN. *E.L. Fuchs, J.M. Oakes, D.J. Smolenski, and B.R.S. Rosser (University of Minnesota, Minneapolis, MN, 55455.)

Introduction: State-level policies which impact the rights of gays and lesbians vary greatly in the United States. The health implications of these policies in men who have sex with men (MSM) are not well established. This study examines the relationship between state-level policies and the sexual and alcohol risk behaviors in a sample of MSM. **Methods:** Adult MSM (n=6,648) were recruited from sex-seeking websites in three waves from 2008-2010 to complete a 70-minute self-report survey. Sixteen pair-matched cities were ranked on pro- and anti-gay state laws. Sexual risk behaviors were dichotomized as any or no unprotected anal sex and any or no unprotected anal sex while intoxicated in the last 90 days. Alcohol risk behavior was assessed using the CAGE screener. Pearson's chi-squared tests were used to conduct descriptive analyses and binomial regression analyses were used to examine risk differences, adjusted for standard demographic variables. **Results:** No differences were found for unprotected anal sex for MSM in pro- versus anti-cities (p=.44) or for unprotected anal sex while intoxicated (p=.53). The prevalence of problematic drinking was greater in pro- as compared to anti-cities (23.68% versus 19.75%, p=.004). **Conclusions:** Despite expectations of higher risk behavior in cities with anti-gay policies, no differences were found in sexual risk behavior, though there is some evidence for higher at-risk drinking in MSM living in cities with pro-gay policies. Future studies should examine the effect of change in a state-level policy, and the temporal lag between policy change and its effect, if any, on behavior.

CHARACTERISTICS OF PET OWNERSHIP IN A POPULATION-BASED COHORT: THE CORONARY ARTERY RISK DEVELOPMENT IN YOUNG ADULTS (CARDIA) STUDY. *P. Schreiner (University of Minnesota, Minneapolis, MN 55454)

Pet ownership has been positively associated with health, but limited information exists on prevalence and characteristics of pet ownership in middle age. Participants from the Minneapolis CARDIA field center, ages 43-55 years, completed a questionnaire about current, past and never pet ownership as part of the 25-year follow-up exam (2010-2011). Questionnaire completion was 95.3% (837/878) and pet data were linked cross-sectionally to demographic data. Traits for current owners were compared to past/never owners; logistic regression was used for multivariable prediction of current dog or cat ownership. 34.1% and 33.2% reported current dog and cat ownership, respectively. In crude data, current dog owners were more likely to be white, have children, be married, and have health insurance compared to past/never owners; they also were more physically active, more educated, and had lower Center for Epidemiologic Studies-Depression scores. Current cat owners were more likely to be white, drink alcohol, have health insurance, and be more educated (all p<0.05). BMI, smoking, and sex did not differ by pet ownership status. In multivariable analyses, white race, having children, physical activity, working full-time and being married were positively related to current dog ownership compared to past/never dog ownership. Only white race and lower age were positively related to current cat ownership. These results suggest that pet ownership is common in middle age, and is associated with markers of socioeconomic advantage. However, in multivariable analyses, major demographic traits such as BMI, smoking, education, and sex were not independently associated with either cat or dog ownership.

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DO HEALTHCARE WORKERS PRACTICE WHAT THEY PREACH? BKI Helfand*, KJ Mukamal, Beth Israel (Deaconess Medical Center, Boston, MA 02215)

Healthcare workers (HCW) are thought to set an example and provide guidance about healthy behaviors. Few studies have examined risk factors and preventive health behaviors in American HCW to evaluate their adherence to commonly recommended lifestyle and screening behaviors. Thus, we examined self-reported practices in the 2008 and 2010 Behavioral Risk Factor Surveillance System versions, a population-based national telephone survey. We examined the weighted prevalence of risk factors and preventive health behaviors in HCW and other Americans. The combined sample included 260,558 respondents, of whom 21,380 (8%) were HCW. Among HCW, the weighted prevalence of selected risk behaviors included: 21% (standard error (SE)=0.8) with no mammogram in the past 2 years, 3% (SE=0.3) drove after drinking, 11% (SE=0.4) did not always use seatbelts, 16% (SE=0.5) currently smoked, 31% (SE=2.1) had a sunburn in the past year, 60% (SE=0.7) had a body mass index>25 kg/m², 25% (SE=0.6) had no dental visit in the past year and 35% (SE=0.8) of those over 50 had no previous colonoscopy. When compared with non-HCW, after adjusting for age, sex, race, education, state, employment and income, HCW were less likely to report receiving a mammogram in the past 2 years [odds ratio 1.1, 95% confidence interval, 1.0-1.3], but did not differ in most other risk behaviors. In contrast, HCW were significantly less likely to not have a personal doctor, not have had a checkup in the past 2 years, not have exercised in the past 30 days and be a heavy or binge drinker. In the nationally representative sample, HCW adhered variably to healthy life choices, often similarly to other Americans. They appear to be worse than others at regular mammography checks. Thus, HCW may not always "practice what they preach".

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LIGHT AND INTERMITTENT SMOKERS: DEMOGRAPHIC, TOPOGRAPHICAL, AND TYPOLOGICAL PATTERNS. Carolyn M. Reyes-Guzman*, Neil E. Caporaso (Genetic Epidemiology Branch, DCEG, National Cancer Institute, Bethesda, MD.)

Background: The proportion of light or intermittent smokers (LITS) in the U.S. has been the fastest growing segment among smokers during the past 15 years. According to several national surveys, the prevalence of nondaily smokers ranges from about 20% to nearly 40% [1-4]. Defining this cohort and identifying the environmental basis for this behavior is a largely unexplored and important scientific question. Researchers struggle with diverse definitions for these smokers and no definition has truly encapsulated the heterogeneity of this group. Some definitions of LITS include: Chippers, occasional smokers, some-day smokers, and intermittent/light/very light smokers [5]. We are examining the characteristics of LITS and describe their demographic distributions in a variety of population-based settings, as well as the topographical (e.g. number of puffs, puff volume) and typological (e.g. motives for smoking) differences between LITS and regular smokers. **Methods:** We analyzed data from population-based surveys including the 2009 National Health Interview Survey (NHIS), 2009 National Survey on Drug Use and Health (NSDUH), and 2010 Behavioral Risk Factor Surveillance System (BRFSS). These sources are being used to examine reasons for the growing numbers of LITS. The risk of being LITS will be tested using logistic regression. **Results:** Population surveys showed differing estimates on the proportion of smokers who were LITS: 22.3% from NHIS, 38.2% from NSDUH, and 27.9% from BRFSS. However, only NSDUH used cigarettes per day to determine non-daily smoking. These differing estimates provide evidence that a more homogenous definition of LITS is warranted. Other results influencing LITS status are pending. **Conclusion:** The scientific literature on light and intermittent smoking reveals an apparent lack of consensus on what defines this group of smokers. With this study, we aim to contribute to the field by crafting more specific smoking phenotypes among LITS.

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SELF-REPORTED DEPRESSION AND HOSPITALIZATION FOR DEPRESSION IN UTAH COMPARED WITH THE UNITED STATES: 1979-2008. *R.M. Merrill, J.L. Lyon, M. Read. (Department of Family and Preventive Medicine, University of Utah, UT)

Researchers from two recent studies have reported that Utah has the highest rate of antidepressant use and self reported depression in America. While rates of self-reported depression and antidepressant use may be higher in Utah, it is unknown how these rates correlate with physician diagnosed rates of depression or hospitalization for depression. The current study was conducted to determine the incidence of hospitalizations for depression in Utah from 1997-2008, and to compare these rates to national rates. We hypothesized that Utah would have higher rates of hospitalization for depression compared with the rest of the nation based on increased self-reported rates of depression and increased antidepressant use. Contrary to our original hypothesis, rates of hospitalization for depression were significantly lower in Utah than the rest of the nation. Higher rates of anti-depressant use and survey reports of poor mental health (questions from the NSDUH and the BRFSS) do not correlate with higher rates of hospitalization for depression. After adjusting for such possible confounders as unemployment, poverty, physician supply, and hospital bed supply, people in Utah continued to have lower rates of hospitalization for depression compared with the nation.

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CHARACTERISTICS OF OLDER ADULTS WITH DEPRESSIVE SYMPTOMS. *J. S. Albrecht¹, A.L. Gruber-Baldini¹, J.M. Hirshon¹, C.H. Brown¹, R. Goldberg¹, J.H. Rosenberg¹, A.C. Comer¹, J.P. Furuno² (¹University of Maryland, Baltimore, MD 21201; ²Oregon State University, Portland, OR 97239)

Depression is associated with increased disability, mortality, and healthcare costs among older hospitalized patients. Identifying characteristics associated with depression in this population could help target screening efforts. We identified factors associated with clinically-significant depressive symptoms, defined as ≥ 6 on the Geriatric Depression Scale (GDS-15), among patients aged ≥ 65 admitted to the University of Maryland Medical Center between 6/30/11 and 1/13/12. A random sample of community-dwelling patients not admitted to intensive care, psychiatric, or obstetrics units and providing informed consent was interviewed 24-72 hours after admission. Characteristics of patients were compared using the chi-square test and $p < 0.05$ was statistically significant. Prevalence of clinically-significant depressive symptoms was 20%. Among these patients, 36% were currently taking antidepressants and 49% had been told by a doctor that they were depressed, with men significantly less likely than women to have been told (28% vs. 65%). Patients with clinically-significant depressive symptoms were also significantly less likely to rate their health as 'good' or better (28% vs. 66%) or be married (42% vs. 59%). In addition, they were more likely to have ≥ 1 disabilities in Activities of Daily Living (35% vs. 19%), ≥ 2 hospital admissions (42% vs. 23%) and ≥ 2 falls in the last 6 months (25% vs. 10%), and be at risk of social isolation (24% vs. 12%) (Lubben Social Network Scale-6). These data emphasize the importance of screening sicker patients, particularly men, to increase the recognition and potential treatment of depression in this population.

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TWINNING AND BIRTH DEFECTS. A Dawson*, S Tinker, D Jamieson, C Hobbs, RJ Berry, M Anderka, K Keppler-Noreuil, A Lin, J Reefhuis (Centers for Disease Control and Prevention, Atlanta, GA, 30333)

To investigate the association between twinning and birth defects, we analyzed data from the National Birth Defects Prevention Study, a population-based, case-control study of major birth defects in the United States. The study population included mothers of live-born infants without major birth defects (controls) and mothers of fetuses or infants with a major birth defect (cases), who delivered between October 1997 and December 2007. We compared mothers of twins with mothers of singletons. Mothers of higher order multiples were excluded. We examined associations with twinning among defect groups with at least 150 interviewed cases. Multivariable logistic regression models, adjusted for maternal age, race, parity, obesity, education, and smoking, were used to calculate adjusted odds ratios (aORs) and 95% confidence intervals (CIs); we stratified by use of fertility treatments. Among mothers reporting unassisted conception, we found a significant association between twinning and 28 of 41 defect groups. The strongest associations were observed for amniotic band syndrome (aOR=5.3, CI=3.2-8.9), esophageal atresia (aOR=4.3, CI=2.9-6.4), and hydrocephalus (aOR=4.3, CI=2.8-6.6). Among mothers reporting use of any fertility treatments, we observed a significant association with twinning for 7 of 35 defect groups, with the strongest associations for hypoplastic left heart syndrome (aOR=2.8, CI=1.2-6.7), omphalocele (aOR=2.8, CI=1.2-6.9), and atrial septal defects (aOR=2.2, CI=1.4-3.5). This study confirmed previous findings that, in comparison to singletons, twins are at increased risk of a diversity of birth defects. The findings suggest that the risk of birth defects in twins may differ by the mode of conception.

PRENATAL NITRATE INTAKE FROM DRINKING WATER AND SELECTED BIRTH DEFECTS IN OFFSPRING. *J. Brender, P. Weyer, P. Romitti, S. Horel, J. Kantamneni, M. Shinde, A. Vuong, J. Huber, Jr., J. Sharkey, P. Langlois, M. Canfield, L. Suarez, National Birth Defects Prevention Study (Texas A&M Health Science Center, College Station, TX, 77843)

Studies suggesting that prenatal exposure to drinking water nitrate increases risk of birth defects in offspring have not accounted for water consumption patterns. Using data from Iowa and Texas participants in the National Birth Defects Prevention Study, we linked addresses of 3300 case-mothers and 1121 control-mothers around conception and during the first trimester to municipal water supplies and respective nitrate measurements. We also assigned nitrate levels for bottled water based on the collection of representative samples and standard laboratory testing. Daily nitrate consumption was estimated from self-reported consumption of water at home and work. Using mixed effects models for logistic regression and the lowest tertile of water nitrate intake as the referent group, mothers of babies with spina bifida were 1.4 times more likely (95% confidence level [CI] 0.86, 2.3) to ingest between 0.91 and 4.9 mg nitrate and 2 times more likely (95% CI 1.3, 3.2) to ingest 5 mg or more nitrate per day from drinking water around conception than control-mothers (p-value for trend 0.003). During the first trimester, mothers with babies with isolated limb deficiencies, cleft palate alone, and cleft lip alone were respectively 1.8 (95% CI 1.1, 3.1), 1.9 (95% CI 1.1, 3.0), and 1.8 (95% CI 1.1, 3.1) times more likely than control-mothers to ingest more than 5.42 mg of nitrate per day from drinking water. Water nitrate intake was not associated with heart defects. Higher maternal intake of nitrate from drinking water may increase risk of selected birth defects in offspring.

RISK FACTORS FOR PRIMARY CONGENITAL HYDROCEPHALUS – A NATIONWIDE COHORT STUDY: TN Munch, M-L Rasmussen, *J Wohlfahrt, M Juhler, M Melbye. (Department of Epidemiology Research, Statens Serum Institut, Copenhagen, Denmark)

The objective of the study was to investigate to what degree the development of congenital hydrocephalus (CHC) is associated with factors related to maternal, pregnancy and birth characteristics using an unselected, nationwide population-based cohort. We identified a cohort consisting of all individuals born in Denmark from 1978 to 2008. Information on isolated CHC and maternal medical diseases was obtained from the National Patient Discharge Register, perinatal characteristics from the Danish National Birth Register, and maternal use of medicine during pregnancy from the National Prescription Drug Register. Rate ratios (RR's) of CHC with 95% confidence interval (CI) were estimated using Poisson regression. Of the 1,928,683 live born children, we observed 1175 cases of isolated CHC (0.61 ‰). CHC was significantly associated with male gender (RR 1.8 95% CI: 1.6-2.0), multiple birth (RR 2.8, 95% CI: 2.3-3.5), maternal diabetes mellitus (RR 1.9, 95% CI: 1.2-2.9), preeclampsia (RR 2.3, 95% CI: 1.2-4.3), maternal use of antidepressants (RR 2.6, 95% CI: 1.5-4.5), proton-pump inhibitors during first trimester (RR 2.2, 95% CI: 1.1-4.2), caesarian section (planned RR 2.6, 95% CI: 1.9-3.4; acute: RR 4.1, 95% CI: 2.9-5.6), being first born (RR 1.3 95% CI: 1.2-1.5), preterm birth (<28 weeks RR 24.5, 95% CI: 17.5-34.3, 28-31 weeks RR 14.6, 95% CI: 11.6-18.3, 32-36 weeks RR 4.4, 95% CI: 3.7-5.1 versus 37-41 weeks). The associations with these factors were also evaluated for syndromic CHC, CHC due to known causes and Spina bifida with CHC. We conclude that development of CHC is associated not only with genetic factors but with multiple factors related to the mother, pregnancy and birth.

PRENATAL EXPOSURE TO NITROSATABLE DRUGS, VITAMIN C, AND RISK OF SELECTED BIRTH DEFECTS. *M Shinde, A Vuong, J Brender, M Werler, K Kelley, J Huber, Jr., J Sharkey, Q Zheng, L Suarez, P Langlois, M Canfield, P Romitti, S Malik, National Birth Defects Prevention Study (Texas A&M Health Science Center, College Station, TX 77843)

Nitrosatable drugs, such as secondary or tertiary amines, and amides react with nitrite in an acidic environment to form N-nitroso compounds, teratogens in animal models. Vitamin C is a known nitrosation inhibitor. Using data from the National Birth Defects Prevention Study, we assessed nitrosatable drug exposure and vitamin C intake during the first trimester among 11,606 case mothers of infants with oral clefts, limb deficiencies (LD)s, or congenital heart defects and 6,807 control mothers of infants without major birth defects during 1997-2005. Daily intake of vitamin C was estimated from maternal interviews and a 58-item food frequency questionnaire. Using mothers with no reported use of nitrosatable drugs and no vitamin C supplementation as the referent group, mothers with daily vitamin C supplementation and secondary amine drug exposure were less likely (adjusted odds ratio [aOR] 1.2 95% confidence interval [CI] 0.81, 1.7) to have infants with transverse LDs compared to women taking these drugs and reporting no supplementation (aOR 2.5 95% CI 1.5, 4.2). Risk was lower for cleft lip with cleft palate defects in relation to amide drug exposure with daily (aOR 1.1, 95% CI 0.77, 1.5) compared to no vitamin C supplementation (aOR 2.1, 95% CI 1.2, 3.8). Risks of LDs associated with secondary and tertiary amine drug exposure were also lower with daily dietary vitamin C intake above 85 mg compared to less than 85 mg. Prenatal dietary and vitamin C supplementation may reduce the potential risks of several birth defects associated with nitrosatable drug exposure during pregnancy.

FAMILIAL AGGREGATION OF CONGENITAL HYDROCEPHALUS IN A NATIONWIDE COHORT: TN Munch, K Rostgaard, M-L Rasmussen, *J Wohlfahrt, M Juhler, M Melbye. (Department of Epidemiology Research, Statens Serum Institut, Copenhagen, Denmark)

The objective of the study was to investigate familial aggregation of primary congenital hydrocephalus (CHC) in an unselected, nationwide population. Based on the Danish Central Person Register, we identified all children in Denmark born in 1978-2008 and family members (up to third degree). Information on CHC was obtained from the National Patient Discharge Register. Using binomial log-linear regression we estimated recurrence risk ratios (RRR's) of congenital hydrocephalus. An alternative log-linear regression model was applied to quantify the genetic effect and the maternal effect. Of the 1,928,683 live born children, 2194 had a diagnosis of idiopathic congenital hydrocephalus (1.1 ‰). Of those, 75 (3.4 ‰) had at least one other family member with CHC. Significantly increased RRR's of CHC were observed for same-sex twins, first-, and second degree relatives as follows: 34.8, (95% CI: 16.4-74.0), 6.2 (95% CI: 4.3-8.9), 2.2 (95% CI: 1.6-3.1). RRR for third-degree relatives was 1.5 (95% CI: 0.8-2.7). A maternal component was supported by the facts that RRR for opposite sex twins (37.3, 95% CI: 11.9-116.7) was significantly higher than other first degree relatives, RRR for maternal half-siblings (8.4, 95% CI: 3.7-18.7) was significantly higher than for paternal half-siblings (3.0, 95% CI: 0.8-12.2) and that RRR for siblings (7.5 95% CI: 4.5-12.6) was higher than for off-springs (5.4 95% CI: 3.1-9.3). This population-based study found strong evidence of familial aggregation of CHC, which support the existence of a genetic component to the aetiology. In addition, the pattern of association suggests that a strong maternal component contribute to the familial aggregation.

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CONGENITAL ANOMALIES OF NEWBORNS AND ASSOCIATED MATERNAL RISK FACTORS IN LATVIA.* Iriša Zīle^{1,2}, Anita Villeruša¹, (Rīga Stradins University, Rīga, Latvia, LV-1007,²National Health service, Rīga, Latvia, LV-1012)

In Latvia about 3.2% of newborns have congenital anomalies (CA). Mothers diseases, smoking, drinking before and during pregnancy affect healthy growth and development of baby. Aim - analyze associated maternal risk factors between newborns with CA and without. Data source was Medical Birth register. All live newborns, which were born (2000-2010) and were diagnosed CA (International Classification of Diseases (ICD-10): Q00-Q99) at birth (n=7 451) has been analysed. As control group were used data about live newborns without any pathologies at birth (n=159 008) at the same time period. Prevalence ratio (PR) was calculated in data analysis. Period prevalence – 319.7 per 10 000 live births. The average mothers age of newborns with CA was higher – 27.65 (95%CI 27.52-27.78) than control group – 26.1 (95%CI 26.88-26.94). Different mother diseases in anamnesis in CA newborns group were 33.50% of cases against 24.40% in control group ($\chi^2=317.5$; p=0.000), complications during pregnancy – 40.30% and 38.50% ($\chi^2=10.75$; p=0.001), complications during delivery – 46.40% and 43.10% ($\chi^2=32.88$; p=0.000), alcohol use – 0.60% and 0.20% ($\chi^2=48.04$; p=0.000), drug use – 0.30% and 0.05% ($\chi^2=48.04$; p=0.000). Newborns with CA have 1.4 (95%CI 1.30-1.44) times higher different mother diseases in anamnesis compare with control group, alcohol use PR=2.9 (95%CI 2.10-3.9) and drug use PR=5.7 (95%CI 3.48-9.31). This study results also confirms findings from other studies that prenatal exposures associated with increased risk for CA of newborns. It is important to provide information to health promoters and parents on risk factors that can reduce morbidity from CA.

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IMPACT OF FOLIC ACID FORTIFICATION AND TERMINATION OF PREGNANCY ON THE GLOBAL BIRTH PREVALENCE OF SPINA BIFIDA. A Metcalfe*, A Frolkis, J Dykeman, T Rajapakse, JI Roberts, F Bernier, GG Kaplan, N Jette (University of Calgary, Calgary, Alberta, T2N 4Z6)

Background: Spina bifida results from an incomplete closure of the neural tube during the fourth week of gestation. Spina bifida is a folate sensitive birth defect and estimates of termination of pregnancy following prenatal diagnosis range from 17% to 100%. Methods: Medline and Embase databases were searched using terms specific to spina bifida, and incidence, prevalence or epidemiology. All population based studies reporting prevalence were included. Random effects models were used to generate pooled estimates of live birth prevalence, birth prevalence (live births + stillbirths), total prevalence (live births + stillbirths + terminations of pregnancy) prior mandatory folic acid fortification and birth prevalence following mandatory folic acid fortification. Results: Of 3336 abstracts, 751 articles were reviewed as full text, and 202 articles met all eligibility criteria. This analysis was limited to 61 studies representing 97,308,795 pregnancies that were pooled for the meta-analysis. Prior to folic acid fortification, the global live birth prevalence of spina bifida was 4.8 (95% CI:3.2-7.3) per 10,000 live births, the birth prevalence was 8.2 (95% CI:6.8-9.9) per 10,000 births, and the total prevalence was 9.4 (95% CI:5.8-15.3) per 10,000 pregnancies. Following mandatory folic acid fortification the birth prevalence was reduced to 5.7 (95% CI:3.6-9.0) per 10,000 births. Conclusions: Birth prevalence of spina bifida has decreased following folic acid fortification. Future studies should confirm that this observation is not primarily due to lack of clinically relevant information such as data on terminations of pregnancy.

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ASSOCIATION BETWEEN PREVIOUS FETAL LOSS AND BIRTH DEFECTS, NATIONAL BIRTH DEFECTS PREVENTION STUDY (NBDPS), 1997-2007. KND Polen*, CJ Alverson, W Callaghan, M Canfield, A Correa, CW Duke, E Marshall, R Olney, J Reefhuis, P Romitti, SM Gilboa (CDC, Atlanta, GA)

To assess whether previous fetal loss is associated with nonsyndromic birth defects in subsequent pregnancies, we analyzed data for multi-gravid mothers of singleton infants with birth defects (cases) and mothers of unaffected infants (controls) delivered from 1997-2007 and enrolled in the NBDPS. Exposure was defined as self-reported pregnancy loss (stillbirth, miscarriage, induced abortion, ectopic or molar pregnancy) before the index pregnancy. Sub-analyses focused on loss in the mother's last pregnancy and redefined exposure excluding induced abortion. We calculated odds ratios and 95% confidence intervals for 63 birth defect categories consisting of ≥ 50 cases, controlling for maternal age, race-ethnicity, education, pre-pregnancy obesity, alcohol, smoking, and folic acid use during early pregnancy. Any previous fetal loss was reported by 51% and 47% of multigravid case and control mothers, respectively—35% of case and 31% of control mothers experienced ≥ 1 miscarriage, 19% of case and 18% of control mothers experienced ≥ 1 induced abortion, and $\leq 2\%$ of mothers in both groups experienced a stillbirth, ectopic or molar pregnancy. Statistically significant associations were found between previous fetal loss and some birth defects, including esophageal atresia, anorectal atresia, hypospadias, gastroschisis, omphalocele, and several congenital heart defect subtypes. In the subanalyses, the majority of associations were unchanged, although differences were observed for some defect categories. Future analyses will account for potential effect modifiers such as recurrence, fertility treatment, interpregnancy interval, and higher-order pregnancies.

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ANORECTAL MALFORMATIONS AND PREGNANCY-RELATED DISORDERS: A REGISTRY-BASED CASE-CONTROL STUDY IN 17 EUROPEAN REGIONS. C Wijers, I van Rooij, M Bakker, C Marcellis, I de Blaauw, *N Roeleveld, H de Walle, and EUROCAT Working Group (Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands)

To identify pregnancy-related risk factors for congenital anorectal malformations (ARM), we performed a population-based case-control study using the EUROCAT (European Surveillance of Congenital Anomalies) central database with hospital record data from 17 European congenital anomaly and birth registries, 1980–2008. The study population consisted of 1,417 ARM cases, including 648 isolated ARM cases, 601 ARM cases with additional congenital anomalies, and 168 ARM-VACTERL (Vertebral, Anal, Cardiac, Tracheo-Esophageal, Renal, and Limb defects) cases, and 13,371 controls with recognized syndromes or chromosomal abnormalities. Adjusted odds ratios (OR) with 95% confidence intervals (CI) were calculated for several potential risk factors. ARM cases were more likely to be firstborn than controls (OR 1.6, 95%CI 1.4-1.8). Fertility treatment and being part of a twin or triplet seemed to increase the risk of ARM in cases with additional congenital anomalies or VACTERL (ORs ranging from 1.5 to 2.5). Maternal fever during the first trimester of pregnancy and preeclampsia were only associated with ARM when additional congenital anomalies were present (OR 3.9, 95%CI 1.3-11.6 and OR 3.4, 95%CI 1.6-7.1, respectively), whereas maternal epilepsy during pregnancy resulted in a fivefold increased risk of all manifestations of ARM (OR 5.1, 95% CI 1.7-15.6). This large European study identified fertility treatment, multiple pregnancy, primiparity, preeclampsia, and maternal epilepsy or fever during pregnancy as potential risk factors for ARM, in particular for ARM with additional congenital anomalies and ARM-VACTERL.

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TRICUSPID ATRESIA: AN EPIDEMIOLOGIC INVESTIGATION OF LIVE-BORN CASES IN THE BALTIMORE-WASHINGTON AREA. *S. Kelly, K. Kuehl, C. Loffredo (Georgetown University and Children's National Medical Center, Washington, DC, 20007)

Tricuspid atresia is a rare congenital cardiovascular malformation (CCVM) in which the tricuspid valve fails to develop normally, often in combination with other CCVM, resulting in a wide range of serious clinical presentations requiring intervention. We aimed to shed etiologic light on potential risk factors of CCVM from a population-based epidemiological study. Data were obtained from the Baltimore-Washington Infant Study, a case-control study of CCVM. Information from questionnaires administered to parents of live-born cases with tricuspid atresia (N=59), diagnosed in the first year of life, was compared to controls (N=3,572). Odds ratios (OR) and 95% confidence intervals (CI) were obtained using exact logistic regression, adjusted for age and sex of infant. There were 32 cases (54%) with isolated tricuspid atresia, 18 with d-transposition of the great arteries, and 9 with other types of CCVM. Compared to controls, cases were more likely to be males (63% vs. 51% of controls), and to have a smaller mean birth weight (3062g vs. 3351g in controls). Increased odds of tricuspid atresia was associated with maternal overt diabetes (OR=7.0; 95% CI: 1.5-32.7), influenza during early pregnancy (OR=2.4; 95% CI: 1.2-5.1), maternal use of corticosteroids (OR=6.3; 95% CI: 1.3-30.1) and narcotic medications (OR=4.0; 95% CI: 1.5-10.4). These results suggest that potentially modifiable risk factors including maternal illnesses and medications should be investigated as possible areas for prevention in future research.

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MATERNAL PRE-PREGNANCY BODY MASS INDEX AND CHILDHOOD CANCER. *S. Puumala, K. Burgess, and M. Klebanoff (Sanford Research/University of South Dakota, Sioux Falls, SD, 57104)

Possible risk factors relating to fetal growth and birth weight have been associated with several childhood cancers. High maternal pre-pregnancy body mass index (BMI) could contribute to carcinogenesis by influencing both fetal growth and the gestational milieu, but has rarely been studied in childhood cancer. This study examined the possible relationship in the Collaborative Perinatal Project (CPP). The CPP followed 59,843 pregnancies of which 54,795 resulted in a live birth between 1959 and 1966. Cancer was diagnosed in 51 children up to the age of eight. Maternal pre-pregnancy BMI was calculated using self-reported pre-pregnancy weight and measured height, missing heights were imputed from other pregnancies in the same woman. Analysis was conducted using Cox proportional hazards regression controlling for maternal age, education, and race, child's gender, and socioeconomic status. An examination of the functional form of maternal pre-pregnancy BMI suggested a linear form was appropriate, thus a continuous version of BMI was used. A total of 49,186 children (49 with a cancer diagnosis) were included in the modeling. A statistically significant association was observed (Hazard Ratio (HR) = 1.06, 95% Confidence Interval (CI) = 1.01-1.12, for a one unit increase in BMI). In subgroup analysis, a similar effect was seen for embryonal tumors (HR = 1.06, 95% CI = 0.98-1.16), but not for leukemia (HR = 0.99, 95% CI = 0.87-1.12). Although the analysis was based on a small number of childhood cancer cases, the results are potentially important if confirmed. Given the rise of BMI levels in mothers today compared to the CPP cohort, if the linear relationship holds for higher levels of BMI, the impact of this risk factor could be increased.

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SEXUAL CIRCUMSTANCES AND PROSTATE CANCER RISK IN MONTRÉAL, CANADA. *A. Spence, M.-C. Rousseau, M.-E. Parent (INRS-Institut Armand-Frappier, Laval, Quebec, Canada. H7V 1B7)

Background: Prostate cancer aetiology remains poorly understood. Sexual behaviour and sexually transmitted infections (STIs) are among the many factors under scrutiny, with largely inconclusive findings to date. Objective: To examine the associations between sexual behaviour, STIs, and the risk of prostate cancer. Methods: A case-control study was conducted in Montreal, Canada, a city predominantly composed of residents of French ancestry. Cases (n=1590) were histologically-confirmed primary prostate cancer patients diagnosed across French Montreal hospitals between 2005 and 2007. Population controls (n=1618) were selected from French electoral lists, frequency-matched to cases by age, and resided in the same electoral districts as the cases. Data was collected via an in-person interview using a structured questionnaire. Unconditional logistic regression was used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) adjusting for age, ancestry, first-degree family history of prostate cancer, and prostate cancer screening history. Results: Risk of prostate cancer was not associated with ever having sexual relations; age at first sexual relations; total number of sexual partners; number of female sexual partners; circumcision; vasectomy; or infertility problems. A slight excess in risk of prostate cancer was observed among men who self-identified as homosexual or bisexual (OR 1.4, 95% CI 1.0-2.1). Risk was greater for men who had more than one male sexual partner compared to those with one (OR 3.2, 95% CI 1.2-8.0). A history of STIs was not found to be associated with prostate cancer, although the prevalence of STIs was low. There was no association between sexual circumstances and prostate cancer aggressiveness. Conclusion: Most sexual circumstances under study were unrelated to prostate cancer risk. Some higher risks were found among men reporting sexual encounters with other men. This finding has seemingly not been reported previously and deserves further investigation.

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THE IMPACT OF RACE ON PROGNOSIS OF THYROID CANCER: A POPULATION-BASED COMPETING RISKS ANALYSIS. *Limin Yang¹, Weidong Shen² and Naoko Sakamoto¹ (¹Division of Epidemiology, National Research Institute for Child Health and Development, Japan 157-8535; ²The Institute of Otolaryngology, Department of Otolaryngology - Head and Neck Surgery, General Hospital of People's Liberation Army (PLA), China 100853)

Objectives: The aim of this study was to evaluate the impact of race on the probability of death among patients with thyroid cancer. Methods: Patients diagnosed with thyroid cancer were selected from the Surveillance Epidemiology and End Results data set. We used the cumulative incidence function to estimate cause-specific mortality. Fine and Gray competing risks proportional hazards regression was performed for multivariate analysis. Results: There was no significant difference in thyroid cancer-specific mortality between whites and blacks. Race did not affect probability of death from other cancer causes in thyroid cancer patients. However, significant mortality differences between white and black patients with thyroid cancer were found among those who died from other non-cancer-related causes. After adjusting for age at diagnosis, sex, histologic subtype, tumor extent, tumor size, lymph node involvement and radiation therapy, black patients with thyroid cancer had a significantly higher non-cancer-related mortality than white patients (Hazard Ratio, 1.9; 95%CI, 1.5 to 2.4; p < 0.001). Conclusions: A racial difference in prognosis of thyroid cancer was observed among deaths from non-cancer-related causes, but not among deaths from cancer. These findings suggest that the biological behavior of thyroid cancer is relatively independent of race. Differences in comorbidity between races might be a determinant of the prognosis disparity for black patients with thyroid cancer.

ESTABLISHMENT OF THE CANCER PREVENTION STUDY-II (CPS-II) NUTRITION COHORT COLORECTAL TISSUE BLOCK REPOSITORY. *A. Deka, P. J. Briggs, and P. T. Campbell (American Cancer Society, Atlanta, GA 30303)

There is growing evidence that molecular pathological epidemiology, research which combines traditional epidemiologic methods with the examination of tumor molecular characteristics, advances our understanding of carcinogenesis. Establishing a colorectal cancer tissue repository within a cohort study allows for the examination of molecular biomarkers to improve knowledge of factors associated with colorectal cancer incidence and survival. The American Cancer Society CPS-II Nutrition Cohort is a nationwide longitudinal study of 184,000 men and women, aged 40 to 92 years at enrollment in 1992. Eligible cases for block collection were participants who reported a diagnosis of colon or rectal cancer between 1992 and 2009, confirmed through medical record abstraction. Cases or next-of-kin were contacted via mailed letters for written consent to obtain archived tissue. Among consenting cases, pathology laboratories were contacted for the retrieval of tissue blocks and/or unstained slides. Of the 1,881 cases diagnosed with colon or rectal cancer from 1992-2009, 62.2% provided written consent (N=1,170). Pathology specimens were received for 70.5% of cases who consented (N=825). Blocks were collected for 578 cases, unstained slides were obtained for 207 cases, and H&E slides-only were received for 40 cases. Stage at diagnosis, smoking status, and BMI at baseline did not differ between cases for whom we did or did not receive tissue (all p-values >0.05). Combined with previously collected biospecimen data (from blood or buccal samples) and extensive questionnaire data on lifestyle, demographic and medical factors, this tissue repository will serve as a unique resource to conduct patho-epidemiology studies.

GEOGRAPHIC AND HOSPITAL VARIATION IN 30-DAY POST-OPERATIVE MORTALITY FOLLOWING COLORECTAL CANCER SURGERY. *M Schootman, SL Pruitt, M Lian (Washington University, St. Louis, MO 63108)

Important variation in survival occurs in the first month after surgery for colorectal cancer (CRC). We examined the extent of this variation across neighborhoods (census tracts) versus hospitals and if living in neighborhoods with high poverty rates increases 30-day postoperative mortality. We analyzed SEER-Medicare data from 47,201 CRC patients aged 66 or older who underwent resection between 2000 and 2005 using a Bayesian cross-classified logistic regression model in which variation in all-cause 30-day postoperative mortality was partitioned to 13,200 census tracts and 1,452 hospitals. 7.4% died within 30 days following surgery. Variation across census tracts (median odds ratio [MOR]: 1.43; 95% CI: 1.34; 1.51) was similar in magnitude to the variation across hospitals (MOR: 1.40; 95% CI: 1.33; 1.47). CRC patients who lived in census tracts where at least 20% of the population lived below poverty were 1.39 times (95% CI: 1.26-1.53) more likely to die within 30 days compared to those in census tracts with poverty rates <10%. Patients in census tracts with 10-19% poverty rate (vs. <10%) were 1.21 times (95% CI: 1.11-1.32) more likely to die within 30 days. None of the variables examined (hospital characteristics, patient and tumor characteristics, comorbidity, surgical and other complications, treatment type, readmission, receipt of a colostomy, and surveillance colonoscopy) explained the geographic or hospital variation. Although more attention has been focused on differences between hospitals, geographic variation in 30-day postoperative mortality was similar in magnitude to hospital variation. Neighborhood poverty was an independent risk factor for 30-day postoperative mortality.

RISK OF DIGESTIVE TRACT CANCER IN PATIENTS WITH PEP-TIC ULCERS. *S.W. Lin, C.C. Abnet, W. Ricker, J.L. Warren, R. Parsons, E.A. Engels, and N.D. Freedman (NCI, Bethesda, MD, 20892; IMS, Inc., Silver Spring, MD 20910)

We studied the association between peptic ulcers and digestive tract cancers in the U.S. Surveillance Epidemiology and End Results (SEER)-Medicare database. Elderly cases of digestive tract cancers (aged 66+ years) were ascertained (1992-2005), and 100,000 age-, sex-, and calendar-year-matched controls were selected from a 5% random sample of Medicare beneficiaries. Gastric and duodenal ulcers were identified from Medicare claims. Associations between these ulcers and subsequent incident digestive tract cancers were estimated from logistic regression models. Gastric ulcers were associated with increased risk for gastric cardia adenocarcinoma (n=5,749; odds ratio (OR) 1.50, 95% confidence interval (CI) 1.25-1.79), gastric non-cardia adenocarcinoma (n=13,366; OR 2.08, CI 1.87-2.32), carcinoids in the small intestine (n=1,684; OR 1.76, CI 1.31-2.37), and liver cancer (n=10,662; OR 2.55, CI 2.28-2.85); and decreased risk for distal colon (n=42,222; OR 0.83, CI 0.75-0.91) and rectal (n=25,555; OR 0.72, CI 0.64-0.82) cancer. By contrast, duodenal ulcers were associated with increased risk of small intestine adenocarcinoma (n=1,538; OR 2.14, CI 1.64-2.52) and liver cancer (OR 2.20, CI 1.93-2.52). Neither ulcer was associated with esophageal, proximal colon, gallbladder, or pancreatic cancer risk. In this population-based case-control study, we found different patterns of association between history of peptic ulcer and digestive tract cancer risk. Because *Helicobacter pylori* infection is the leading cause of peptic ulcer, these findings raise the hypothesis that *H. pylori* infection is associated with not only gastric cancer, but also with altered risk of other cancers in the digestive tract.

CASE-CONTROL STUDY OF INFLAMMATORY MARKERS AND ENDOMETRIAL CANCER. CM Friedenreich, *AR Langley, DCW Lau, KS Courneya, I Csizmadi, AM Magliocco, Y Yasui, LS Cook (Population Health Research, Alberta Health Services, Calgary, AB, Canada)

Chronic inflammation may be important in endometrial cancer (EC) etiology. Several established EC risk factors, particularly obesity, are hypothesized to operate through this pathway by increasing pro-inflammatory cytokines such as tumor necrosis factor alpha (TNF- α), interleukin-6 (IL-6) and acute-phase protein C-reactive protein (CRP). This study sought to investigate the association between inflammatory markers and EC (types I and II) risk. 519 incident EC cases and 964 frequency age-matched controls were recruited to participate in a population-based case-control study in Alberta, Canada from 2002-6. Participants completed interview-administered questionnaires, were assessed for anthropometric measures, and provided 8-hr fasting blood samples either pre- or post-operatively. Blood was analyzed for concentrations of TNF- α , IL-6 and CRP by immunoassay. EC cases had consistently higher mean levels of TNF- α , IL-6 and CRP compared to controls in these predominantly post-menopausal women. After adjusting for age, all markers were associated with statistically significant increased risks for EC; however, after full multivariable-adjustment only the risk for CRP remained elevated (odds ratio, OR=1.22 95% confidence interval, 95% CI: 1.02-1.47). Upon stratification by cancer type, all markers were positively associated with an increased risk for type I EC (TNF- α : OR=1.24 95% CI: 1.08-1.42; IL-6: OR=1.96 95% CI: 1.53-2.51; CRP: OR=1.79 95% CI: 1.51-2.12), but not for the more rare and aggressive type II cancers. This study provides some epidemiologic evidence for an association between CRP, TNF- α and IL-6 and the risk of type I EC.

USE OF RADIOTHERAPY (RT) FOR PROSTATE CANCER (PC) PATIENTS IN WISCONSIN (WI): DOES GEOGRAPHIC DISPARITY EXIST? *Alex Ho, Dian Wang, Jean Owen, J. Frank Wilson (American College of Radiology, Philadelphia, PA 19103)

Little is known about geographic disparity in the treatment (RX) of PC patients. As part of the cross sectional CDC Patterns of Care Study—Breast and Prostate, we examined RT use by geographic factors for PC patients diagnosed in 2004 in WI. Information on socio-demographics (SDG), disease status (DS), and RX were obtained from the cancer registry. Supplemental data were abstracted from medical charts. Patients were grouped into Low (LR), Intermediate (IR), and High/Very High (HR) risk according to NCCN 2002 Guidelines. Geographic regions: Northeastern (NE), Northern (N), Southeastern (SE), Southern (S), Western (W) were defined by WI Dept of Health Services (DHS). Multivariate logistic model and odds ratio (OR) adjusting for SDG and DS were used to explore the relationship of RT and geographic regions. 1169 patient records from 65 counties were reabstracted. In LR patients: RT completion (RTC) was 100% in NE & W regions, 98% in SE, 95% in S and 94% in N. W region had a significantly higher mono-brachytherapy mBT use (83%) compared to other regions ($p < 0.0001$). In the N 50% received external beam radiotherapy (EBRT) alone vs. 48% in the S. In IR patients: RTC was 100% in the N, S, and W; N had the highest mBT use (33%) but NE had highest EBRT (81%); In HR patients: W had 100% RTC, SE (97%), NE and S (both 92%). In NE and SE $< 10\%$ had mBT, others (0%). Patients in the N and S regions were less likely to receive mBT compared to SE (OR=0.27, $p=0.024$; OR= 0.30, $p=0.017$, respectively). In summary, geographic disparity in RT use for WI PC patients existed. Differences in RTC rates were observed by DHS regions that varied by DS. Compared to other regions, patients in SE were more likely to receive mBT.

POOLED ANALYSIS OF PARENTAL AGE AND EWING SARCOMA. L. G. Spector*, C. Bain, P. M. Bracci, Z. Burningham, C.W. Douglass, E.A. Holly, P. Kaatsch, N. Kreiger, S.A. Savage, J.D. Schiffman, J. Schuz, P.C. Valery, D.M. Winn (University of Minnesota, Minneapolis, MN 55455)

Ewing sarcoma (ES) is a rare bone tumor that appears most frequently in adolescents and young adults. Although its etiology is mostly obscure both European ancestry and prior diagnosis of hernia have emerged as consistent risk factors. Recently, a population-based record linkage study using data from five state cancer and birth registries found a novel, independent association of paternal age at birth of child and ES [Odds Ratio (OR) per 5-year increase: 1.17; 95% Confidence Interval (CI): 1.00-1.37]. As this could be indicative of point mutations in the paternal germ line, and suggest a new line of inquiry in ES, we wished to determine if this finding could be replicated. Accordingly, we pooled data from five case-control studies and two case-series totaling 560 cases and 4394 controls. Unconditional logistic regression models were used to examine maternal and paternal age simultaneously as either continuous or categorical variables. The correlation between maternal and paternal ages was high ($r = 0.74$); mean age of mothers was 26.4 among cases and 27.3 and 29.1 and 30.3 for fathers. There was an inverse association of paternal age with ES (OR per 5-year increase: 0.88; 95% CI: 0.78-0.99) while the OR for maternal age was not associated (OR: 0.93; 95% CI: 0.81-1.08); categorical models generally supported the observed linear trends. Similar results obtained when the two studies that contributed no controls were dropped. Rather than supporting the previous observation, this pooled analysis found the opposite. All but one contributing study collected data by interview, suggesting differential participation of controls by parental age as one possible explanation for these results. Further studies should use registry data to avoid selection bias.

A STUDY OF FGFR2 SNPs IN RELATION TO THE NMSC CANCER-PRONE PHENOTYPE. T Jorgensen¹, I Ruczinski², Y Yao Shugart³, L Wheless⁴, Y Berthier Schaad^{2,5}, B Kessing⁵, J Hoffman-Bolton², K Helzlsouer⁶, WHL Kao², L Francis⁴, R Alani⁷, P Strickland², MW Smith⁸, *A Alberg⁴ (¹Georgetown Univ., ²JHU Bloomberg School of Public Health, ³National Inst. of Mental Health; ⁴Medical Univ. of South Carolina; ⁵Lab. Genomic Diversity, SAIC-Frederick Inc, NCI-Frederick; ⁶Mercy Medical Ctr.; ⁷Boston Univ.; ⁸Advanced Technology Program, SAIC-Frederick Inc, NCI-Frederick).

Nonmelanoma skin cancer (NMSC) is associated with increased risk of other cancers. To investigate why, we tested the hypothesis that fibroblast growth factor receptor 2 gene (FGFR2) SNPs contribute to this increased cancer risk, as FGFR2 has been linked to skin carcinogenesis in animals and FGFR2 SNPs are associated with breast cancer. Methods: From the parent CLUE II cohort study, established in 1989, the frequency of minor alleles in 25 FGFR2 SNPs was compared across four groups: 1) cancer-free control group ($n=2,296$); 2) Other (non-NMSC) cancer only ($n=2,349$); 3) NMSC only ($n=694$); and 4) NMSC plus other cancer ($n=577$). Results: Compared to those with no cancer, 3 FGFR2 SNPs had additive model p -values < 0.05 in those with both NMSC plus another cancer. In stratified analyses, none of the SNPs were associated with squamous cell carcinoma (all $p > 0.28$), whereas for basal cell carcinoma (BCC) nine SNPs had p -values < 0.05 with similar associations for BCC groups with and without other cancers. When combined into a single BCC group, 8 SNPs had additive model p -values < 0.02 . For six SNPs, the dominant model p -values ≤ 0.0008 . The two top SNPs were tightly linked ($R^2=0.99$) with minor allele frequencies of 0.41: rs1078806 (odds ratio (OR) 0.66, $p=1.4 \times 10^{-7}$) and rs2981579 (OR 0.67, $p=4.5 \times 10^{-7}$). Conclusion: FGFR2 SNPs were identified to be associated with BCC.

NUTRIENTS FROM FRUIT AND VEGETABLE CONSUMPTION REDUCE THE RISK OF PANCREATIC CANCER. *Rick J. Jansen, Dennis P. Robinson, Rachael Z. Stolzenberg-Solomon, William R. Bamlet, Mariza de Andrade, Ann L. Oberg, Traci J. Hammer, Kari G. Rabe, Kristin E. Anderson, Janet E. Olson, Rashmi Sinha, and Gloria M. Petersen (Department of Health Sciences Research, Mayo Clinic, Rochester, Minnesota 55905).

Pancreatic cancer is a devastating disease for which the role of dietary factors remains inconclusive. Our objective was to evaluate risk of pancreatic cancer with nutrients associated with fruit and vegetable consumption and nutrient supplementation with risk of pancreatic cancer using a clinic-based case-control design. Our study included 384 rapidly ascertained cases and 983 controls frequency matched on age at time of recruitment (in 5-year increments), race, sex, and region of residence. All subjects provided demographic information and completed a 144-item food frequency questionnaire in which they reported no change to their diet within 5 years prior to entering the study. Logistic regression was used to calculate odds ratios (OR) and 95% CIs, adjusted for age, sex, smoking, body mass index, energy intake, and alcohol consumption. Results show a significant (trend p -value < 0.05) inverse association between pancreatic cancer and nutrient groupings in a dose-dependent manner including magnesium, potassium, alpha-carotene, beta-carotene, beta-cryptoxanthin, lutein and zeaxanthin, niacin, total alpha-tocopherol, vitamin B6, vitamin C. Adjusting for diabetes or total sugar intake did not result in significant changes. We conclude that most nutrients obtained through consumption of fruits and vegetables may reduce the risk of developing pancreatic cancer.

SCHOOL MILK CONSUMPTION AND REDUCED RISK OF COLORECTAL CANCER. Brian Cox*, Mary Jane Sneyd (University of Otago, Dunedin, New Zealand)

To assess the hypothesis that calcium intake in childhood might prevent colorectal cancer in adulthood, possibly by inhibiting the development of adenomatous polyps, we conducted a case-control study. We found an overall 30% reduction in the risk of colorectal cancer for men and women who had school milk as children. Odds ratios (OR) decreased with increasing numbers of bottles of milk drunk compared to no school milk (OR = 1.04, 95% CI: 0.66, 1.67, for 1 to 799 bottles; OR = 0.81, 95% CI: 0.51, 1.29, for 800 to 1199 bottles; OR = 0.62, 95% CI: 0.41, 0.93, for 1200 to 1599 bottles; OR = 0.57, 95% CI: 0.37, 0.90, for 1600 to 1799 bottles; and OR = 0.62, 95% CI: 0.41, 0.96, for 1800 or more bottles) (AJE 2011:173:394-403). Recall of participation in school milk programs in New Zealand corresponded to contemporaneous measures of participation and was associated with a 2.1% reduction (95% CI: 0.7%, 3.5%) in the odds ratio for colorectal cancer for every 100 half-pint bottles drunk. Analysis by subregion of the colon and rectum will be presented.

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CIRCULATING ADIPONECTIN AND LEPTIN AND RISK OF PROSTATE CANCER INCIDENCE AND PROGRESSION: A SYSTEMATIC REVIEW AND META-ANALYSIS. *Anya Burton, Becky Gilbert, Kate Tilling, Jenny Donovan, Jeff Holly, Richard M Martin (University of Bristol, United Kingdom)

Introduction: Obesity is associated with an increased risk of advanced prostate cancer, biochemical recurrence following primary treatment and prostate cancer mortality. Adipokines may mediate this relationship. Our aim was to systematically review the current literature examining associations of leptin and/or adiponectin with prostate cancer incidence and/or progression. **Methods:** Four electronic databases were searched (Medline, Embase, BIOSIS and Web of Science) and 484 papers were screened for inclusion. 28 studies met the inclusion criteria and 19 of these contained extractable data. Effect estimates were converted to odds ratio per adipokine unit and random effects meta-analysis was conducted to calculate summary odds ratios. **Results:** Based on 9 papers, adiponectin was inversely associated with prostate cancer incidence (pooled OR 0.97 (95% confidence interval (CI) 0.94-1.00 per $\mu\text{g/ml}$) but not associated with risk of 'aggressive' (advanced, high grade or fatal) disease. Based on 13 papers, leptin was not associated with prostate cancer incidence, but was positively associated with aggressive disease (OR 1.03, 95% CI 1.01-1.06 per ng/ml). We anticipate including further papers in the analysis after contact with authors. **Conclusion:** These preliminary results indicate leptin may mediate associations of obesity with aggressive prostate cancer while adiponectin may play a role in prostate cancer development.

POLYMORPHISMS OF GENES ON THE ETHANOL METABOLIZING PATHWAY AND RISK OF HEAD AND NECK CANCER. *J S Chang, J Hsiao, T Wong, S Tsai, C Ou, H Lo, C Huang, W Lee, K Chen, J Huang, Y Wang, Y Weng, H Yang (National Health Research Institutes, Taiwan, R.O.C; Medical College and Hospital, National Cheng Kung University, Tainan, Taiwan, R.O.C)

Head and neck cancer (HNC), including cancers of the oral cavity, pharynx, and larynx, is the fifth most common cancer in the world. One of the major risk factors of HNC is alcohol drinking; however, most alcohol drinkers do not develop HNC, suggesting a role of genetics. The current study recruited 133 incident cases of HNC and 128 sex- and age- matched controls from the department of otolaryngology and department of stomatology. Data on alcohol drinking were ascertained through in-person interview. Twenty-seven functional and tag single nucleotide polymorphisms (SNPs) of five alcohol metabolizing genes (ADH1B, ADH1C, ADH4, ADH7, and ALDH2) were genotyped. Single SNP analysis, haplotype analysis, and gene-environment interaction analysis were performed using unconditional logistic regression adjusted for age, gender, and betel-quid chewing. Single SNP and haplotype analyses did not show any statistically significant ($P < 0.05$) association with HNC risk. Three SNPs (ADH1B rs1229984, ADH1C rs3762896, and ADH7 rs971074) showed a significant interaction with alcohol drinking to influence HNC risk. Combining the three SNPs, daily alcohol drinking increased HNC risk among those with < 2 variant alleles [odds ratio (OR) = 2.4, 95% confidence interval (CI): 1.1-5.2] but not among those with two or more variant alleles [OR = 1.2, 95% CI: 0.5-3.2]. The current study indicates that polymorphisms of alcohol metabolizing genes may modify the risk of HNC due to alcohol drinking.

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LOWER URINARY TRACT SYMPTOMS AS AN INDICATOR OF FUTURE RISK OF BLADDER CANCER. *Jiachen Zhou, Elizabeth A. Platz, Edward Giovannucci, and Dominique S. Michaud (Brown University, Providence, RI, 02912)

Benign prostatic hyperplasia (BPH) causes urological symptoms, including urination frequency, urgency and incomplete bladder emptying. These symptoms can result in bladder irritation and inflammation, and may also lead to increased contact time of carcinogens with bladder epithelial. Urinary tract symptoms were evaluated in relation to development of bladder cancer in a cohort study of male health professional. Men who answered seven lower urinary tract symptom questions modified from the American Urological Association symptom index in 1992 or who had an enlarged prostate diagnosed by a rectal exam or surgery for benign prostatic hyperplasia before 1992 were followed for incidence of bladder cancer from 1992 to 2008. We conducted an analysis using baseline exposure (1992) and starting follow-up in 1996 (including a 4-year lag to reduce possibility of reverse causation). A total of 456 incident cases of bladder cancer were available for this analysis. Cox proportional hazard regression analysis was used to adjust for risk factors for bladder cancer. Men who scored ≥ 20 points of 35 on the seven lower urinary tract symptom questions had an elevated, but insignificant, risk of bladder cancer compared to those who scored ≤ 7 points (relative risk (RR) = 1.40, 95% confidence interval (CI) : 0.71, 2.77). Those who reported both irritative and obstructive symptoms had a RR of 1.72 (95% CI: 1.03, 2.86) comparing to those who scored ≤ 7 points. Our findings suggested that benign prostatic hyperplasia, or other factors influencing urinary symptoms, may be a risk factor for bladder cancer in men.

SERUM MAGNESIUM, PHOSPHOROUS, AND CALCIUM AND RISK OF INCIDENT HEART FAILURE: THE ATHEROSCLEROSIS RISK IN COMMUNITIES (ARIC) STUDY. *P.L. Lutsey, A. Alonso, L.R. Loehr, B.C. Astor, J. Coresh, A.R. Folsom (University of Minnesota, Minneapolis, MN, 55454)

Background: Heart failure (HF) is a major source of morbidity and mortality. Using data from the ARIC cohort we tested the hypotheses that incidence of HF is greater among individuals with low magnesium and those with high phosphorous, but unrelated to calcium. Methods: A total of 14,709 African Americans (27%) and Caucasians, aged 45-64 at baseline (1987-89), were followed through 2008. Proportional hazards regression was used to explore relations between minerals and incident HF. Minerals were modeled as quintiles, and linear trends (p-trend) across the quintiles were evaluated. Serum calcium was corrected for albumin level. Models were adjusted for demographics, behaviors, and physiologic characteristics (e.g. body mass index, prevalent diabetes, systolic blood pressure, hypertension medication use, history of CHD, estimated glomerular filtration rate). Results: 2,102 incident HF events accrued. Participants in the highest quintile of magnesium were at lower risk of HF than those in the lowest quintile [HR: 0.58 (0.49-0.68); p-trend<0.0001]. For phosphorous, there appeared to be a threshold whereby only those in the highest quintile were at greater HF risk [HR_(Q5 vs. Q1): 1.33 (1.15-1.54)]. Higher levels of calcium were also associated with greater risk of HF [HR_(Q5 vs. Q1): 1.27 (1.09-1.47); p-trend=0.002]. Associations between minerals and HF were not modified by race, gender, or prevalent CVD risk factors. Discussion: Low serum magnesium and high serum phosphorous and calcium were associated with greater risk of incident HF in this population-based cohort. Future research should evaluate whether assessment of these minerals improve HF risk prediction.

THE EFFECT OF THE SMOKE-FREE ORDINANCE ON ACUTE MYOCARDIAL INFARCTION IN SOUTH CAROLINA. *K. Johnson (University of South Carolina, Columbia, SC, 29208).

Introduction: Smoke-free ordinances that prohibit smoking in workplaces and public places can both eliminate exposure to secondhand smoke and possibly reduce the prevalence of smoking and cigarette consumption. We propose to evaluate the effectiveness of South Carolina's smoke-free ordinances. Methods: In 2007, both Greenville and Charleston city governments enforced a citywide smoke-free ordinance that regulated smoking in public places such as the workplace, restaurants, and bars. Separate analyses were conducted due to different implementation dates, when comparing to Spartanburg the control city. The analysis was conducted using health claims data aggregated by zip codes with a primary diagnosis of an acute myocardial infarction (AMI). Poisson regression models were used to compare monthly AMI hospitalizations before and after implementation of the smoke-free ordinance among residents of the three cities. Results: Greenville residents experienced a 1.97% reduction in AMI hospitalizations compared to a 2.58% reduction in Spartanburg. Charleston experienced a 9.54% reduction in AMI hospitalizations compared to Spartanburg's 9.03% reduction. Although the rates differed between cities, there were no significant changes in AMI hospitalization rates due to the smoke-free ordinance among residents in both Greenville and Charleston. Furthermore, the same result was seen after adjusting for seasonality. Conclusion: Although not significant, Greenville and Charleston's AMI hospitalizations decreased after implementation of the smoke-free ordinance. Due to the limitations, future studies should explore other cities and counties within South Carolina to determine if there is a decrease in AMI hospitalizations as a result of the smoke-free ordinance.

RACE AND INCOME MAY MODIFY ASSOCIATIONS BETWEEN KIDNEY DISEASE AND BONE MINERAL METABOLISM DISORDER. *L. Plantinga, W. McClellan (Emory University, Atlanta, GA 30033)

Bone mineral metabolism disorder (BMMD) is common in kidney disease. We examined whether associations between kidney disease severity and BMMD markers differ by race or income. Among 3,005 adults (>20 years) of black or white race in the 2005-2006 National Health and Nutrition Examination Survey, reduced kidney function was categorized as normal, moderate, severe (estimated glomerular filtration rate >60, >45-<60, >15-<45 ml/min/1.73 m²); albuminuria was defined as no, micro-, macroalbuminuria (<30, >30-<300, >300 mg/g albumin:creatinine ratio); and high/low income was defined by poverty index ratio of >4/<4. Adjusted (age, sex, race) prevalence of hyperphosphatemia (phosphate>4.5 mg/dl), hyperparathyroidism (parathyroid hormone>70 pg/ml), and osteopenia (femoral bone mineral density *t*-score<-1) was calculated within subgroups using multivariable logistic regression and predictive margins, with U.S. population weighting. Generally, blacks had higher prevalence of hyperphosphatemia and hyperparathyroidism; those with low income had higher prevalence of all markers. The association between hyperphosphatemia and albuminuria was modified by income (prevalence among those with macroalbuminuria: low income, 19.3%; high income, 2.4%; *P*_{int}=0.039); similarly for reduced kidney function (*P*_{int}=0.119). Race appeared to modify the association between reduced kidney function and hyperparathyroidism (prevalence among those with severely reduced function: whites, 29.6%; 57.0%, blacks; *P*_{int}=0.102). No effect modifications were noted for kidney disease and osteopenia. Beyond the effects of kidney disease, low income and black race may additionally increase the prevalence of some BMMD markers.

DURATION OF FIRST PREGNANCY PREDICTS MATERNAL CARDIOVASCULAR DEATH, WHETHER DELIVERY WAS MEDICALLY INDICATED OR SPONTANEOUS. *J Rich-Edwards, K Klóngsoyr, A Wilcox, R Skjaerven (Harvard, Boston, MA 02120)

Background: Studies have shown associations of preterm delivery with maternal cardiovascular disease (CVD). This may reflect pregnancy complications associated with CVD risk that are also medical indications for preterm delivery. It is not known whether women with spontaneous preterm births are also at risk. Methods: We used proportional hazards models to predict incidence of CVD death, adjusted for maternal age, education, and delivery year, among 694,863 first births from 1967-1999 in the Medical Birth Registry of Norway. Mothers were traced in the National Cause of Death Registry through 2009; there were 2324 deaths from coronary heart disease or stroke. Results: Compared with women who spontaneously delivered at 39-41 weeks' gestation, we found statistically significant increases in hazard ratios (HR) for women with spontaneous preterm and early term deliveries (HR 1.9 at 22-31 weeks; 2.2 at 32-34 weeks; 1.6 at 35-36 weeks; 1.4 at 37-38 weeks), and for women with medically indicated preterm and early term deliveries (HR 4.8 at 22-31 weeks; 2.7 at 32-34 weeks; 4.3 at 35-36 weeks; 1.6 at 37-38 weeks). Neither spontaneous nor indicated post-term delivery at 42-44 weeks were associated with CVD risk. Risks were higher with recurrent preterm deliveries, and when preterm delivery was the last birth recorded. Conclusion: Highest CVD risk was among women with medically indicated preterm deliveries. Still, women with a history of spontaneous preterm delivery before 37 weeks had roughly two-fold increased risk of CVD mortality compared with women who had delivered after 38 weeks. Even with spontaneous deliveries at early term (37-38 weeks), CVD death was increased 40% compared with delivery after 38 weeks.

INCOME AND HEART DISEASE MORTALITY TRENDS IN SAO PAULO, BRAZIL, 1996 TO 2010. IM. Benseñor, TG. Fernandes, DH. Bando, *PA. Lotufo (Center of Clinical Research, University of Sao Paulo, Sao Paulo, Brazil, 05508)

Reductions in heart disease mortality rates are variable according to gender and socioeconomic status. We performed a time trend analysis of all heart diseases (all circulatory diseases, except rheumatic, cerebrovascular, and aortic diseases) using joinpoint regression comparing three different household income levels (high, middle, and low) in the city of Sao Paulo from 1996 to 2010. A total of 197,770 deaths were attributed to heart diseases; 62% of them were due to coronary diseases. The rate of death due to heart diseases declined for the city as a whole. The annual percent change (APC) and 95% confidence intervals for men living in the high, middle and low income areas were -4.1 (-4.5 to -3.8), -3.0 (-3.5 to -2.6), and -2.5 (-2.8 to -2.1), respectively. The decline in death rate was greatest among men in the wealthiest area. The trend rates of women living in the high-income area had one joinpoint; APC was -4.4 (-4.8 to -3.9) from 1996-2005 and -2.6 (-3.8 to -1.4) from 2005-2010. Middle and low income areas had an APC of 3.6 (-4.1 to -3.1) and -3.0 (-3.2 to -2.7) from 1996-2010, respectively. For women, the decline was significantly different only between the middle and low income areas. During the last five years of observation, the decline persisted for all age strata, except for women aged 35- to 44-years-old. Concluding, the reduction in deaths due to heart diseases is greatest for men living in the wealthiest neighborhoods for all age strata.

FOOD INSECURITY, FAT INTAKE, AND DYSLIPIDEMIA: THE SURVEY OF THE HEALTH OF WISCONSIN (SHOW), 2008-2010. * Shin J, Walsh MC, Malecki KM, Bautista LE, Nieto FJ (University of Wisconsin, Madison 53706)

We investigated whether food insecurity, lack of consistent access to adequate food, was associated with higher saturated fat intake and dyslipidemia, in a population-based sample of 1355 adults from the Survey of the Health of Wisconsin (2008-2010). The Blocked Dietary Data System survey was used to assess dietary intake. We used multiple logistic and linear regression models to estimate the associations, while controlling for age, gender, race and ethnicity, education, income, smoking, alcohol use, body mass index, and physical activity. Food insecurity, measured by responding yes to any of five food security questions adapted from the National Health and Nutrition Examination Survey, had a prevalence of 25.4% in our study. Compared to food-secure participants, food-insecure participants were more likely to have hypercholesterolemia (total blood cholesterol level >240mg/dl or taking prescribed lipid-lowering medication): adjusted odds ratio (AOR) 1.7 [95% confidence limit (CL) 1.0-2.9], $p=0.03$. Also, food-insecure participants were more likely to have low high-density lipoprotein (HDL) cholesterol level (<40mg/dl in men and <50 mg/dl in women): AOR 2.1 [95% CL 1.0-4.4], $p=0.05$. Among participants with hypercholesterolemia, food-insecure participants had higher saturated fat intake than food-secure participants only among those who are unaware of their condition (mean difference = 10.9g [95% CL 10.3-11.5g], $p<0.01$). Our findings suggest that food insecurity is associated with higher saturated fat intake and may increase the risk of dyslipidemia. Policy changes to support reductions in food insecurity may help to reduce health disparities in cardiovascular disease outcomes.

DEPRESSIVE SYMPTOM PERSISTENCE, MEDICATION USE, AND STROKE RISK. *P Gilsanz, KK Patton, MM Glymour (Harvard School of Public Health, Boston, MA, 02115)

Background: Depressive symptoms predict stroke and data suggest resolution of depressive symptoms attenuates stroke risk. However, the role of antidepressants remains unclear. Hypothesis: 1) Among individuals whose depressive symptoms resolve, use of psychiatric medications is not associated with stroke risk. 2) Individuals whose depressive symptoms do not resolve are at elevated stroke risk, regardless of medication use. Methods: Health and Retirement Study (n=7435, ages 50+) respondents who reported ever having doctor diagnosed depression were followed 1998-2008. We examined whether persistence of elevated depressive symptoms (3+ on an 8-item Centers for the Epidemiologic Study of Depression) after self-reported diagnosis, with or without concurrent initiation of psychiatric medications, predicted first stroke onset (154 events) during the subsequent 2-years. A pooled logistic regression estimated adjusted odds ratios (aORs) controlling for prior wave's continuous CES-D score. Results: Compared to those whose depressive symptoms resolved without medications, the highest stroke risk was among adults who initiated psychiatric medications but whose symptoms did not resolve (aOR=2.02; 95% CI: 1.14, 3.55), followed by those whose symptoms resolved concurrent with medication initiation (aOR=1.36; 95% CI: 0.55, 3.44), and then those with stable high symptoms and no medication use (aOR=1.09; 95% CI: 0.61, 1.9). Conclusions: Anti-depressant use among individuals whose symptoms resolved was not significantly associated with stroke, although the non-significant association merits consideration. Persistent elevation of depressive symptoms significantly predicted stroke only among medication users. The role of residual confounding by depression severity requires further research.

THE ORIGINS AND LASTING INFLUENCE OF THE FRAMINGHAM HEART DISEASE STUDY. *Gerald Oppenheimer (Columbia University, New York, NY 10032)

2012 marks the 65th anniversary of the ongoing Framingham Study. This paper will examine the origins, initial purpose, organization and early outcomes of this historic cohort study. It will also link Framingham's purpose with that of contemporary coronary heart disease (CHD) cohort investigations. The paper will show why, in the decades following World War II, epidemiology focused increasingly on chronic, non-infectious disease. It will describe how epidemiology scored a particular success in elucidating the factors responsible for CHD. In turn, it will demonstrate how heart disease research played a signal role in the development of contemporary epidemiology. The paper, focusing on the United States, elucidates the influence of CHD investigations, Framingham in particular, on the epidemiological construction of the cohort study design. In addition, in coming to grips with CHD, epidemiologists were compelled to conceptualize disease as the outcome of multiple forces, a critical component of modern epidemiology. With heart disease the consequence of many small effects, neither necessary nor sufficient, causation was difficult to determine. Instead, CHD epidemiologists in the U.S. developed "risk factor thinking," the notion that certain behaviors or measured characteristics affected the probability of disease. Such thinking had clinical and public health, preventive and therapeutic applications. Incorporated first by Framingham into CHD research, the "risk factor" has since become a central logical element in the current epidemiological paradigm.

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RISK FACTORS FOR ISCHEMIC STROKE AMONG SOUTH ASIANS COMPARED TO OTHER RACIAL/ETHNIC GROUPS.

*Tefera Gezmu MPH₁, Dona Schneider PhD MPH₂, Kitaw Demissie MD PhD₁, Yong Lin PhD₁, Jay Shah₃ and Martin Gizzi MD PhD₃ (₁UMDNJ-School of Public Health, Piscataway, NJ; ₂Rutgers, The State University of New Jersey, New Brunswick, NJ; ₃New Jersey Neuroscience Institute at JFK Medical Center, Edison, NJ)

Studies of racial/ethnic variations of stroke have not fully considered the South Asian population, one of the fastest growing sub-groups in the United States. This study compares stroke risk factors for ischemic stroke for South Asians with other racial/ethnic groups in a highly diversified regional population. Data on 3290 patients admitted to a regional stroke center were analyzed to examine risk differences for ischemic stroke (including subtypes of small and large vessel disease) among four racial/ethnic groups (South Asians, whites, African Americans and Hispanics). South Asians were younger than whites at the time of acute stroke (mean age 68 v 76 years). They had the highest blood pressures, fasting blood glucose levels and rates of diabetes mellitus compared to other race/ethnicities. Diabetic and antiplatelet medication uses, as well as the incidence of small-artery occlusion ischemic stroke were also highest among South Asians. South Asians were almost a decade younger and had comparable socioeconomic levels as whites; however, their stroke risk factors were comparable to that of African Americans and Hispanics. This variation may be partially explained by dietary and life style choices of this sub-population. Additional studies should address whether small vessel disease risk factors can be modified for this sub-population.

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PARTICULATE MATTER AND PRETERM BIRTH. *KM Rappazzo, JL Daniels, LC Messer, C Poole, DT Lobdell (University of North Carolina, Chapel Hill, NC 27599)

Particulate matter (PM) has been variably associated with preterm birth (PTB) (gestation <37 weeks), but the role played by specific chemical components of PM has been little studied. We examined the association between ambient PM <2.5 micrometers in aerodynamic diameter (PM_{2.5}) and the elemental carbon (EC) fraction of PM_{2.5} and the risk of preterm birth in Ohio. We constructed a cohort of pregnancies at risk of preterm delivery (i.e., 20-week gestational age cohort) between Jan 1, 2000 and Dec 31, 2005 using live birth certificates for Ohio (n=612115, 8.45% PTB). We assigned mean estimates of PM_{2.5} and EC exposure over the first 4 weeks of gestation from Community Multi-Scale Air Quality modeling system output corrected with air monitoring data. We performed log-risk regression, adjusted for maternal marital status, education, and race to estimate risk ratios and 95% confidence intervals (RR, 95%CI) for PTB for a 1 microgram/cubic meter (µg/m³) increase in PM_{2.5} and EC exposures. We also stratified models by race. Baseline risks for PTB were 7.59% in white births, and 10.77% in black births. RR (95%CI) for PM_{2.5} exposure in the first 4 weeks of gestation was 0.995 (0.992, 0.998) among white births and 1.000 (0.994, 1.005) among black births. For EC exposure in the first 4 weeks of gestation baseline risks were 6.92% (white) and 9.98% (black). RR for EC were 1.057 (1.000, 1.116) in white and 1.143 (1.038, 1.258) in black births. Though potential for residual confounding exists, these preliminary results suggest an association between EC exposure early in pregnancy and risk of preterm birth. This abstract does not necessarily reflect EPA policy.

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ARE LEVELS OF HYPERCHOLESTEROLEMIA AND TRIGLYCERIDE ASSOCIATED WITH GENDER IN PREDICTING THE RISK FOR THE DIFFERENT SUBTYPES OF STROKE? *Tefera Gezmu MPH₁, Dona Schneider PhD MPH₂, Kitaw Demissie MD PhD₁, Yong Lin PhD₁ and Martin Gizzi MD PhD₃ (₁UMDNJ-School of Public Health, Piscataway, NJ; ₂Rutgers, The State University of New Jersey, New Brunswick, NJ; ₃New Jersey Neuroscience Institute at JFK Medical Center, Edison, NJ)

The objective of this study was to assess whether lipid abnormalities can be used as a predictors for the risk of ischemic stroke subtypes between the genders of different racial/ethnic groups. Data elements related to stroke risk, diagnosis and outcomes were abstracted from the medical records of acute stroke admissions. Data contained all elements of Center for Disease Control's (CDC) Coverdell registry including the Trial of Org 10 172 in Acute Stroke Treatment (TOAST) for etiologic classifications of ischemic stroke. A decade increase in age raised the risk for large artery atherosclerosis (LAA) by 27% (Relative Risk (RR) =1.27, 95%CI; 1.02, 1.58) among South Asians (SA) women while this risk was reduced by 17% among SA men (RR=0.83, 95%CI; 0.58, 1.17). SA and Hispanics had higher proportion of men with ischemic stroke than women, while the inverse was true for whites and African Americans (p=0.0014). All women, except SAs, were more likely to have low density lipoprotein concentrations that are ≥100mg/dL upon admission. High density lipoprotein levels were marginally associated with reduced risk of developing LAA. In conclusion, we observed a trend that stroke risk factors were more prevalent among South Asian and Hispanic men than women and this may be an indication that factors such as lack of health insurance, lower utilization of health care services or quality of care may contribute to the incidence of stroke among immigrant or non-U.S. born subpopulations.

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COMPONENTS OF FINE PARTICLE AIR POLLUTION AND HOSPITALIZATIONS FOR RESPIRATORY DISEASE. Rena Jones*, Shao Lin, Christian Hogrefe, Edward F. Fitzgerald, and Syni-An Hwang (New York State Department of Health, Troy, NY 12180)

Background: Despite observed geographic and temporal variation in particulate matter-related health morbidities, few epidemiologic studies have examined associations between the chemical constituents of fine particulate matter (PM_{2.5}) and respiratory disease. Most assessments are limited by poor spatial and/or temporal resolution of ambient measurements and by their modeling approaches which inadequately adjust for co-pollutants. Methods: We examined the association between chemical species of PM_{2.5} and respiratory hospitalizations in a case-crossover analysis using daily average ambient PM_{2.5} estimates from the Environmental Protection Agency's Community Multiscale Air Quality (CMAQ) model. A principal components (PC) analysis was used to aggregate species into linear combinations for logistic regression in lieu of a traditional multi-pollutant approach. Results: Year-round data showed significant positive associations in single-pollutant models of respiratory hospitalizations and sulfates on lag day 3 (1% increase per IQR), and with a PC reflecting the carbonaceous PM species (P1) at 0 and 1 lag day (0.05, 1.0%). In the winter months, the greatest risks of respiratory hospitalizations were related to sulfate concentrations at lags of 2-4 days (1.0-2.0%). P1 remained positively associated with admissions during the spring and summer, but not the fall. Other PM_{2.5} species were not significantly associated with admissions. Conclusions: Ambient concentrations of several fine PM species including sulfate and carbon-containing components were positively associated with respiratory hospitalizations, though results differed between single- and multi-pollutant modeling approaches. Exposure to some ambient PM constituents and/or their sources may be a preventable risk factor for respiratory hospitalization.

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SECONDARY PESTICIDE EXPOSURE IS ASSOCIATED WITH HEAD CIRCUMFERENCE AND GROWTH IN CHILDREN.
*Suarez-Lopez JR, Himes JH, Jacobs Jr. DR, Alexander BH, Lazovich D, Gunnar M (University of Minnesota, Minneapolis, MN 55454)

Low-dose cholinesterase inhibitor pesticide exposures occur frequently, especially in agricultural communities. The effect of pesticide exposure on growth in children is not clear; most of a few pertinent studies focused on birth outcomes. Some studies found greater head circumference with pesticide exposure. We hypothesized that acetylcholinesterase (AChE) inhibition and other surrogates of pesticide exposure are associated with decreased growth and greater head circumference in children. Methods: In 2004, we examined 853 children <5y who lived in agricultural (primarily floricultural) communities in Ecuador and re-examined 188 of these in 2008 in The Effects of Secondary Pesticide Exposure in Infants, Children and Adolescents (ESPINA) study. AChE activity was measured in 2008 (EQM Testmate system). Results: Stunting prevalence was 39% in 2004 and 26% in 2008; 63% in 2004 and 55% in 2008 lived with a flower plantation worker. Cross-sectionally in 2004, flower worker cohabitation was not associated with growth after adjusting for demographic and socio-economic factors. Longitudinally, child cohabitation with a flower worker was associated with decreased mean BMI-for-age (-0.36 standard deviations (SD), 95%CI: -0.66, -0.06) and weight-for-age (-0.33 SD, 95%CI: -0.61, -0.05). In 2008, flower worker cohabitation and lower AChE (per U/ml, mean=3.1 U/ml, SD=0.5) were associated with larger head circumference (0.37 cm, 95%CI: 0.00, 0.74 and 0.75 cm, 95%CI: 0.30, 1.19, respectively). Conclusions: Our findings suggest that indirect pesticide exposures (estimated by AChE activity and flower worker cohabitation) can affect growth and head circumference in children in agricultural communities.

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PESTICIDE USE AND INCIDENT DIABETES AMONG WOMEN IN THE AGRICULTURAL HEALTH STUDY. *A.P. Starling, F. Kamel, D.M. Umbach, D.P. Sandler, J.A. Hoppin (Epidemiology Branch, NIEHS/NIH/DHHS, RTP, NC 27709).

Agricultural pesticides may contribute to the development of diabetes mellitus. Data from the Agricultural Health Study, a large prospective cohort in Iowa and North Carolina, were used to estimate associations between use of specific agricultural pesticides and incident diabetes in women. For comparability with previous studies of farmers, the analysis was limited to the 10,709 farmers' wives who reported ever personally mixing or applying pesticides at enrollment (1993-1997) and completed one or two follow-up interviews at approximately 5-year intervals. Lifetime use of 50 specific pesticides was obtained at enrollment. Incident diabetes was self-reported (n=533). The mean duration of follow-up was 8.6 years. Hazard ratios (HR) and 95% confidence intervals (CI) were calculated using a Cox proportional hazards model for each pesticide, adjusted for age, state, and body mass index at enrollment. Seven pesticides were positively associated with incident diabetes: two organochlorines, DDT (HR=1.37, 95% CI=1.06, 1.78) and dieldrin (HR=1.92, 95% CI=1.02, 3.60); three organophosphates, fonofos (HR=1.62, 95% CI=1.12, 2.33), phorate (HR=1.52, 95% CI=1.06, 2.16), and parathion (HR=1.66, 95% CI=1.05, 2.64); and two herbicides, 2,4,5-T/2,4,5-TP (HR=1.76, 95% CI=1.11, 2.79) and EPTC (HR=1.73, 95% CI=1.14, 2.64). When adjusted for use of correlated pesticides ($r>0.3$), the HRs for dieldrin, fonofos, phorate, EPTC and 2,4,5-T/2,4,5-TP remained elevated although attenuated. DDT and parathion were not correlated with other pesticides. Results are consistent with previous studies reporting an association between organochlorines and diabetes, and add to growing evidence that certain organophosphates also may increase risk.

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ASSOCIATION BETWEEN EXPOSURE TO ORGANOPHOSPHATES AND AGE-RELATED MACULAR DEGENERATION: NHANES 1999-2004. *Y. Aoki (Morgan State University, Baltimore, MD 21251)

The study investigated association between exposure to organophosphates and age-related macular degeneration (AMD) in general population of age 50 and older. Data from National Health and Nutrition Examination Survey (NHANES) were analyzed in two phases using Stata survey suite. First, based on NHANES 2005-2008 data (n = 2083) a logistic regression model with excellent fit (goodness-of-fit $p = 0.87$) for predicting the presence of AMD determined from digital retinal image using several vision-related covariates (visual acuity with objective refraction and responses to vision questionnaire) was constructed. Second, linear regression models were fit to data from NHANES 1999-2004 (n = 460) to investigate association between organophosphate exposure and logarithm of probability of having ADM derived from the aforementioned predictive logistic model. Exposure to organophosphates was measured as urine concentrations of specific and non-specific metabolites. Covariates adjusted for are: age decade; sex; race; log(urine creatinine); fasting time; history of smoking, drinking, diabetes, cardiovascular diseases; and stroke and current hypertension. Preliminary analyses revealed that dimethylphosphate and diethylthiophosphate in urine were positively associated with the probability of having AMD with relative risks of 1.12 ($p = 0.01$) and 1.11 ($p = 0.05$), respectively, for each 10-fold increase in metabolite concentration when adjusted for each other. While cross-sectional nature of the observed association limits causal interpretation, it coincides with other recent observations, some from longitudinal studies, that low-level, yet widespread, exposure to organophosphates in general population may have adverse effects on nervous system.

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LEAD TOXICITY AND MOROCCAN CHILDREN'S INTELLIGENCE. *Azzaoui F-Z¹, Hami H.², Ahami A.O.T.¹, El Hamri H.³ (¹-Equip of Clinic and Cognitive Neuroscience and Health, Laboratory of Biology and Health, Department of Biology, Faculty of Science, Ibn TOFAIL University, Kenitra, Morocco; ²- Laboratory of Genetic and Biometry, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco; ³- National Institute of Hygiene, Rabat, Morocco)

The area of our study "Gharb plain" localized in the North-West of Morocco is one of the most important agricultural and industrial regions of the Kingdom. Unfortunately, both of these human activities generate irregular incomes that affect the families' quality of life, and produce an important pollution in the region which expose the population, especially children to serious health problems. The aim of this study is to diagnose the general intelligence of children aged 6 to 8 years and living in urban, periurban and rural region of Gharb plain using Raven's Standard Progressive Matrices (RSPM), to study the relationship between the performance in this test and the quality of environment, using a questionnaire and to measure the children's hair lead level by the ICP-AES. The obtained results had shown that the best scores of RSPM was registered among the urban children and that was significant correlations between the low performance in this test and the most exposed living zone to sources of lead ($p<0.001$), the construction made material ($p<0.01$), the source of pollution near to school ($p<0.001$) and the consumption of well water ($p<0.01$). Also, high level of hair lead was registered in the studied children. Key words: Intelligence, children, pollution, lead, Gharb plain, Morocco.

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RELATIONSHIP BETWEEN CHRONIC EXPOSITION TO PESTICIDES AND SCHOOL ACHIEVEMENTS AMONG IVORIAN CHILDREN. *N'go P.K., Azzaoui F-Z., Ahami A. (Equip of Clinic and Cognitive Neurosciences and Health, Department of Biology, Faculty of Science, Kenitra, Morocco)

The use of pesticides has strongly increased in the agricultural region of cocoa in Ivory Coast during the last years, in order to improve quality and quantity of its production and to maintain the row of the country as a world leadership. Mainly used pesticides are organophosphate, known for their harmful effects on the nervous system. It impairs cholinergic activity and consequently, faculties which are dependent such as memorizing and learning. The aim of this study is to measure the school failure's level among children living in cocoa area of Soubre (Ivory Coast) (exposed area) and those living in control area of Dimbokro (Ivory Coast), and study the relationship between environmental quality and academic performance of these children. Cross sectional study was realized among 95 children aged 7 to 14 years, living and studying in the exposed (n=49) and in the control (n=46) areas. Questionnaire about frequency use of pesticides and the environmental life quality was realized. The academic performance was evaluated by the Cumulative grade point average (CGPA). The obtained results showed that the rate of school failure was 67.34 % in cocoa agricultural area against 17.36% to in non-agricultural area. This rate is more important in exposed children aged 7 to 10 years (63.3%) compared to those living in control area (8.57%), (p<0.001). Indeed, high significant correlation between school failure and living area (p<0.001) was registered. Key words: Pesticides, school failure, academic performances, children, Ivory Coast

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ACYCLOVIR AND REPEATED HERPES SIMPLEX VIRUS RECURRENCE. *C Ludema, SR Cole (UNC, Chapel Hill, NC 27599)

Infections with herpes simplex virus are common and can lead to damaging recurrences. In clinical trials, antivirals such as acyclovir have reduced the hazard of first recurrence after randomization. We assessed whether the protective effect of acyclovir persists beyond the first non-ocular recurrence. Of the 703 participants in the Herpetic Eye Disease study, 241 enrolled in a substudy to assess potential triggers of recurrence. We fit an unadjusted Cox model counting person-time from randomization (Wei et al., JASA, 1989). Participants were 49% female, 86% Caucasian, had a median age of 49, and reported a median of 1 prior non-ocular recurrence (interquartile range: 0, 11). During follow up, 92 non-ocular recurrences were reported: 47 were first, 23 were second, 11 were third, 7 were fourth, and 5 were fifth or greater recurrences. The number of non-ocular recurrences per 100 person-years in the placebo and acyclovir groups were 45 (95% confidence interval (CI): 33, 57) and 23 (95% CI: 14, 32) for the first, and 18 (95% CI: 10, 27) and 11 (95% CI: 4, 17) for the second recurrence. The unadjusted hazard of first and second recurrence was about half in the acyclovir group relative to the placebo group with hazard ratios of 0.51 (95% CI: 0.28, 0.92) and 0.55 (95% CI: 0.29, 1.03), respectively (P value for homogeneity = 0.82). The summary (across recurrences) hazard ratio was 0.52 (95% CI: 0.28, 0.96). A limitation of this study was that events were self-reported. Additionally, we could not investigate the effect of acyclovir on recurrences subsequent to the 2nd due to few events. Strengths of this study include randomization of exposure and the use of methods that estimate unbiased hazard ratios of first and second recurrences. There is no indication of lower efficacy of acyclovir on second recurrence.

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PESTICIDE: POLLUTION AND HEALTH RISKS IN MOROCCO. *H. Hami¹, F.-Z. Azzaoui², M. Idrissi³, L. Ouammi³, A. Mokhtari¹, R. Soulaymani-Bencheikh³, A. Soulaymani¹ (¹ Laboratory of Genetic and Biometry, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco; ² Unit of Clinic and Cognitive Neuroscience and Health, Laboratory of Biology and Health, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco; ³ Moroccan Poison Control Center, Rabat, Morocco)

In Morocco, pesticide poisoning has become a major public health problem, following the intensification of agriculture. The easy availability of highly toxic pesticides in the homes of farming communities has made pesticides the preferred means of suicide with an extremely high fatality rate. Similarly, the extensive use of pesticides exposes the community to both long-term and acute occupational health problems. To describe the main characteristics of acute pesticide poisoning in Morocco, a descriptive retrospective analysis of poisoning cases, notified between 2000 and 2008 in the Moroccan Poison Control Center (MPCC), was performed. A total of 6 915 cases of acute pesticide poisoning have been identified, constituting 13,4% of poisoning cases notified during the period of study. These products were responsible for poisoning of varying severity, depending on the nature of the compounds and the ingested quantity. The average age of victims is 22 years. Almost 90,5% of reported cases result from oral exposure, 7,6% from inhalation and only 1,4% from dermal exposure. The risk is mainly related to the use of organophosphates. The analysis of existing information indicates that self-poisoning with pesticides is one of the most predominant means of suicide. Among the 4 764 cases for whom the evolution is known, 291 of them died. For other cases, the outcome was favorable with or without sequelae.

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NEONATAL SEPSIS IN ASIAN COUNTRIES. *Al-Taiar A, Hammoud M, Cuiqing L, Lee J, Lui K, Nakwan N, Isaacs D. (Department of Community Medicine and Behavioural Sciences, Faculty of Medicine, Kuwait University, Kuwait & Department of Infectious Diseases and Microbiology, Children's Hospital at Westmead, Sydney, Australia)

Background and objective: Neonatal sepsis is a major cause of neonatal deaths in Asia but data remain scarce. We aimed to investigate the causative organisms and antibiotic resistance in neonatal care units in China, Malaysia, Hong Kong, and Thailand. Methods: Prospective four year study of neonatal sepsis defined as positive culture of a single potentially pathogenic organism from blood or cerebrospinal fluid differentiated into early-onset sepsis (EOS) occurring <3 days of birth and late-onset sepsis (LOS) ≥3 days after birth. Findings: From 2006 to 2009, there were 963 episodes of neonatal sepsis. The incidence of EOS was 0.62 (95% CI: 0.45-0.82) per 1000 live births or 4.91 (95% CI: 4.22-5.68) per 1000 admissions while the incidence of LOS was 5.00 (95% CI: 4.51-5.53) per 1000 live births or 21.22 (95% CI: 19.79-22.77) per 1000 admissions. The incidence of Group B Streptococcus (GBS) sepsis was low but remained the most common single pathogen for EOS among inborn babies. Klebsiella was the most common Gram-negative organism causing most deaths. The case-fatality was 7.0% (95% CI: 3.9-12.0%) for EOS and 16.0% (95% CI: 13.7-19.0%) for LOS, and was significantly different between participating units after adjusting for potential confounders. Of all Gram-negative organisms, 47%, 37%, and 32% were resistant to third-generation cephalosporins, gentamicin or both. Conclusion: The pattern of EOS is similar to that in industrialised countries, suggesting similar preventive approaches may be effective. The important features of neonatal sepsis in Asia are the burden of Klebsiella and high level of antibiotic resistance. These should be addressed while developing measures to reduce neonatal mortality due to infection.

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THE EPIDEMIOLOGIC PROFILE OF PULMONARY TUBERCULOSIS IN KAZAKHSTAN, 2007 - 2010. A Terlikbayeva, *S Hermosilla, T Abildayev, T Muminov, F Akiyanova, Zh Zhumadilov, S Galea, N Schluger, L Bartkowiak, S Yegeubayeva, N El-Bassel (Columbia University, New York, NY, 10032)

Despite recent global declines in pulmonary tuberculosis (TB) morbidity and mortality, the disease remains a threat in many regions. The potential for reservoirs of TB to threaten global public health warrants epidemiologic study. In Kazakhstan, one such region, development and transmission is poorly understood. Kazakhstan National Institute of Geography and Tuberculosis Program surveillance data are pooled to compare geographic and temporal changes in TB and multidrug-resistant TB (MDR-TB) incidence and prevalence from 2007 - 2010. National TB incidence and prevalence decreased significantly (126.4-95.3 per 100,000, $p=0.02$, and 283.6-166.3 per 100,000, $p<0.01$, respectively) and MDR-TB incidence and prevalence increased (5.8-10.5 per 100,000, $p=0.12$, and 54.4-61.6 per 100,000, $p=0.25$). These national level trends are not homogeneous across provinces. Atyrauskaya and Kyzylordinskaya provinces present significant anomalies with decreases in TB incidence (168.1-130.8 per 100,000, $p<0.01$, and 167.5-110.5 per 100,000, $p<0.01$, respectively) and increases in MDR-TB incidence (13.2-22.8 per 100,000, $p=0.05$, and 5.1-15.4 per 100,000, $p=0.01$, respectively). Surveillance variables statistically correlated with incident cases of TB are: incarceration in past two years; registered contact of a TB case; detainee, officer, worker, or unemployed; and unknown risk factors. This preliminary epidemiologic profile of TB and MDR-TB in Kazakhstan suggests an increasing prevalence of MDR-TB, particularly among the recently incarcerated and their social networks. Further work will aim to understand contextual drivers of TB and MDR-TB transmission.

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TOWARDS THE UNDERSTANDING OF SMALL SCALE DISPERSAL DYNAMICS OF URBAN DENGUE. *H Salje¹, J Lessler¹, RV Gibbons², IK Yoon², AD Tomayao², DR Macasocol³, SM Ygoña³, RG Jarman⁴, SJ Thomas⁴, DS Burke⁵ and DAT Cummings¹ (¹Johns Hopkins Bloomberg School of Public Health; ²Armed Forces Research Institute of Medical Sciences; ³Cebu City Health Department; ⁴Walter Reed Army Institute of Research; ⁵University of Pittsburgh)

In the Philippines the majority of individuals will be infected by the potentially fatal dengue virus at least twice by the time they reach adulthood. The principal drivers of the spread of the disease within urban communities remains unclear. If we could understand the contribution of human and mosquito movements and the impact of immunity to how the virus moves around, we could tailor interventions, including targeted insecticide spraying or the rollout of any future vaccine. Here we analyzed the geocoded location of 5,795 hospitalized dengue patient homes in Cebu, Philippines between 2007 and 2010. We found significant clustering of cases occurring within the same month at distances up to 750 m. Furthermore, we found that individuals that were hospitalized within a month of each other and lived under 200 m apart were 1.3 times more likely to be under a year apart in age than if age was ignored and 1.1 times more likely to both suffer from the more severe dengue hemorrhagic fever than dengue fever, after adjusting for underlying distributions in age and disease severity, respectively. Using agent based simulations we explored how the impact of prior homotypic and heterotypic immunity could potentially explain these observations. In addition we showed how distances of under 100 m between sequential cases in a transmission chain, distances marginally greater than the estimated flight range of the dengue vector, were able to recreate the observed patterns. These findings indicate that mosquitos may have a crucial role in the neighborhood spread of the disease.

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HOUSEHOLD CHARACTERISTICS ASSOCIATED WITH RODENT PRESENCE AND {LEPTOSPIRA} INFECTION IN THREE COMMUNITY SETTINGS IN CHILE. *M. Mason,¹ M. Gonzalez,² C. Encina,² G. Acosta,² C. Muñoz-Zanzi^{1,2} (¹ University of Minnesota, Minneapolis, MN, 55454,² Universidad Austral de Chile, Valdivia, Chile.)

Leptospirosis is caused by pathogenic strains of the *Leptospira* bacteria that rodents can carry and shed into the environment through their urine. It is hypothesized that a higher density of rodents in the peri-domestic area contributes to transmission of *Leptospira* to other hosts. This study examined the association between household characteristics and the presence of rodents in the peri-domestic area, whether trapped rodents carried *Leptospira*, and whether households captured positive rodents. Results are reported from 212 households in six communities; two urban slums, two small villages, and two rural farm areas. Logistic and Poisson regression models with random intercepts were used to analyze associations between questionnaire responses and rodent outcomes. Owning at least two cats (Rate Ratio: 0.56), having an average age of household members above the study median (RR: 0.73), and indoor tap water (RR: 0.23) was associated with fewer rodents trapped per household. Good lighting and ventilation (RR: 1.49) was associated with an increase in the number of rodents captured. The effect of indoor tap water was modified by having a septic system/tank ($p<0.01$). Average age of household members being above the study median was associated with a rodent testing positive for *Leptospira* (Odds Ratio: 9.89) and households trapping positive rodents (OR: 4.70). *Rattus sp.* rodents (OR: 0.18) were less likely to be carriers of *Leptospira* than *Mus musculus* rodents. Of note, no *Leptospira*-positive rodents were captured in urban slums, suggesting that transmission mechanisms of *Leptospira* differ by community type.

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USING EPIDEMIOLOGICAL METHODS TO EVALUATE HEPATITIS B (HB) VACCINE IMPACT AFTER 20 YEARS OF VACCINATION ON THE COLOMBIAN AMAZON. F. De la Hoz Restrepo, *Choconta-Piraquive LA (Universidad Nacional de Colombia, Bogotá, Colombia)

A cross sectional study is being performed in rural areas of the Colombian Amazon, a highly endemic area for HB infection, in order to evaluate the effectiveness of the HB vaccine (introduced in 1993) and factors related to receiving the birth dose timely (introduced in 2004). Venous blood samples from 159 women and 329 children < 12 yrs were screened for HB markers using ELISA techniques (core antibody [AntiHBc], surface antigen [HBsAg]). 33.3% (n=53) of the women and 1.8% (n=6) of the children were AntiHBc+. Prevalence of HB infection (AntiHBc(+) only) rose steadily with age among mothers, ranging from 6.3% in women <20 yrs to 57.1% in women > 40 yrs ($p<0.01$). Infection among children was related to being born to an infected mother (3 out of 6 positives had that antecedent). Prevalence of HBsAg carriers was very low in mothers (0.6%) and 0% in children even among those born to an AntiHBc+ mother. 284 children born after 2004 had a vaccine card, 77.5% received the HB birth dose but only 25% received it within their first day of life. Timely birth dose was related to have been born in a hospital (92.2%). Only 2 out of 6 AntiHBc+ children received the birth dose timely. HB infection and carriage has decreased among children and mothers born after the introduction of the vaccination program by more than 80% compared to levels observed before 1993 suggesting a high impact of the vaccination program. However, more efforts should be put to reach children in the first 3 days after birth in order to improve the coverage with the birth dose. Current infection among children is related to the infection status of mothers and not receiving the birth dose timely.

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THE INCUBATION PERIOD OF CHOLERA: A POOLED PARAMETRIC SURVIVAL ANALYSIS OF DOUBLY INTERVAL CENSORED DATA. Andrew Azman*, Kara E Rudolf, Derek Cummings, Justin Lessler (Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD)

Recent outbreaks of cholera in Haiti and increasingly frequent outbreaks throughout Africa highlight the need for improved understanding of its epidemiology. The incubation period of cholera, a key property with clinical, ecological, and epidemiological significance, remains poorly defined. Statements of the incubation period of cholera are often imprecise and provide either a range or a simple point estimate. These statements fail to adequately characterize the expected variability in individual incubation periods, which plays an important role in shaping disease transmission. We systematically review published literature for both general statements and individual-level estimates of the incubation period. Using parametric survival methods appropriate for interval censored data, we model the full distribution of the incubation period of toxigenic O1 and O139 cholera evaluate evidence for differences by serogroup, serotype, and biotype. We find consensus in general statements of the incubation period for the interval of 1 to 5 days - which is expected to include only 67% (Confidence Interval (CI) 0.60-0.73) of individual incubation periods. We estimate the median incubation period to be 1.4 (95% CI 1.3-1.6) days with 5% of cases expected to develop symptoms within 0.5 (95% CI 0.4-0.5) days, and 95% within 4.4 (95% CI 3.9-5.0) days. Models of different serogroups and biotypes show considerable differences in the tails of their distributions. Characterizing the full distribution of the incubation period of cholera can help improve clinical and public health practice in addition to advancing epidemiological research.

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TNF -308, TNF +252, TNF -238, TNF -376, IL1B, IL6, IL8, CCL1 AND INFECTION BY H1N1 PANDEMIC VIRUS IN MEXICAN POPULATION. G. Morales-García, R. Falfán-Valencia, R.AGarcía-Ramírez, A. Camarena, A. Ramirez-Venegas, M. Castillejos-López, M. Pérez-Rodríguez, C. González-Bonilla, C. Grajales-Muñiz, V. Borja-Aburto, *J. M. Mejía-Aranguré (Instituto Mexicano del Seguro Social & Instituto Nacional de Enfermedades Respiratorias Ismael Cosío Villegas, Mexico, 06720, Mexico)

The novel swine origin 2009 influenza A (H1N1) virus was discovered in Mexico causing human infection and acute respiratory illness. Rates of hospitalization and death have varied widely according to country. The objective was to identify if the polymorphisms at TNF -308, TNF +252, TNF -238, TNF -376, IL1 β , IL6, IL8, CCL1 are related with the infection and severity of the infection by the H1N1 pandemic virus in patients from Mexico. A Case-Control study. The cases were patients confirmed with real time RT-PCR with infection by the H1N1 pandemic virus. The controls were patients with infection like to influenza and non-familial contacts of the patients with influenza. Medical history and outcome of the disease was registered. DNA samples were genotyped for TNF -308 (rs1800629), TNF +252 (rs909253), TNF -238 (rs361525), TNF -376 (rs1800750), IL1 β (rs16944), IL6 (rs1818879), IL8 (rs4073), CCL1 (rs2282691) with RT-PCR. Odds Ratios (OR) and logistic model analysis were done. The infection with the H1N1 pandemic virus was related with TNF -238 (AA genotype) with an OR of 33.41 (95% Confidence Interval (CI) 3.77-297.29); TNF+252 (AG genotype) with an OR of 4.33 (95% CI 1.82-10.32); TNF -376 (AA genotype) with an OR of 4.33 (95% CI 1.48-12.64). Not associations were found with the mortality by H1N1 pandemic virus infection. Carriers of AG genotype, TNF -308 had the highest levels of BUN (p=0.05); AA genotype TNF -376 has the highest levels of CPK (p=0.05); AA genotype IL1 β had the highest number of leucocytes (0.000) and AA genotype IL8 had the highest concentration of PaO₂mmHg. Genetic variants within genes involved in the inflammatory process could have contributed to the differences in clinical behavior of the infection by H1N1 pandemic influenza virus.

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CLINICAL OUTCOMES OF A COHORT OF HOSPITAL PATIENTS WITH HEALTHCARE-ASSOCIATED *CLOSTRIDIUM DIFFICILE* INFECTION. E.T. Lofgren*, R. Moehring and D. Anderson (University of North Carolina, Chapel Hill, NC 27599)

Clostridium difficile is the most commonly recognized etiological agent for healthcare-associated diarrhea. Consequences of infection range from uncomplicated diarrhea to colitis and death. *C. difficile* infection (CDI) represents a major burden on the medical system. We estimate the difference in clinical outcomes between patients in the Intensive Care Unit (ICU) and those in the general hospital population using a cohort of 782 incident cases of CDI collected as part of routine infection control surveillance in the Duke Infection Control Outreach Network. Inverse-probability-of-exposure weighted parametric survival models were used to estimate relative hazard (HR) of overall mortality between the two populations, the relative time (RT) to develop CDI, and the length of hospital (LOS) stay. While ICU patients did not develop CDI substantially faster than non-ICU patients (RT = 0.88, 95% Confidence Interval: 0.74, 1.05), the burden of mortality was higher (HR = 1.79, 95% CI: 1.16, 2.76) and their LOS in the hospital was markedly shorter (RT = 0.59, 95% CI: 0.49, 0.71). In those who did not die, the LOS remained shorter for ICU patients than non-ICU patients (RT = 0.60, 95% CI: 0.48, 0.74) suggesting this was not purely the result of higher mortality. These results may have important implications for infection prevention. While ICU patients at higher risk of death from CDI, non-ICU patients may represent a larger source of transmission. The relative merits of targeting transmission versus clinical outcomes must be weighed, and no single in-hospital population represents the "perfect" target for intensified infection control efforts.

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QUANTIFYING THE UNDERESTIMATION OF MORTALITY FROM THE PANDEMIC CAUSED BY THE H1N1 INFLUENZA VIRUS IN MEXICO. E. Pérez-Flores, J.C. Izquierdo-Puente, J.J. Castillo-Pérez, G. Ramírez-Rosales, I. Grijalva-Otero, C. López-Macías, R. García-Ramírez4, C. Grajales-Muñiz, *J.M. Mejía-Aranguré (Instituto Mexicano del Seguro Social, Mexico, 06720, Mexico)

The frequency and mortality of pandemic caused by H1N1 (H1N1p) influenza A might have been underestimated, especially in developing countries. The Instituto Mexicano del Seguro Social (IMSS) maintains an outbreaks and epidemics registration system, and a register of the medical records and death certificates of its rights holders, and the information contained in its registration systems can be validated. This work had two main objectives: first, to quantify the possible underestimation of pandemic influenza mortality between April 2009 and February 2010; and second, to evaluate the relationship between the data reported for H1N1p influenza mortality during the pandemic period of April 2009 to February 2010 and the causes of death reported on the death certificates of patients infected by influenza virus. Mortality was calculated using the number of deaths recorded from H1N1p influenza as the numerator and the rights-holder population of the IMSS as the denominator. The death certificates of 754 confirmed cases of H1N1p influenza were analyzed. A simple model designed by the US Centers for Disease Control (CDC) was used; the model accounts for the variability in the proportion at each step using the Monte Carlo probabilistic model sampled from a uniform probability distribution. Estimates developed using the CDC method yielded the following results: death toll estimate of 1,969, with a range between 1,246 and 3,118 deaths; and estimated mortality rate of 5.53 per 100,000 (range, 3.5-8.76 per 100,000). No diagnosis of H1N1p influenza was recorded in the death certificates for 631 of 754 (83.7%) deaths. One source of error that could explain this underestimation is in the filling of death certificates, because in >80% of confirmed cases of infection with influenza virus, this was not reported as the cause of death.

SPATIO-TEMPORAL PREDICTION MODELLING OF INFLUENZA IN ALBERTA, CANADA. *LJ Martin, W Qiu, H Dong, S Fan, J Talbot, Y Yasui (University of Alberta, Edmonton, AB, T6G 1C9, Canada)

Background: A timely response to influenza epidemics can be facilitated by using syndromic surveillance systems, such as the Alberta Real Time Syndromic Surveillance Net (ARTSSN). ARTSSN monitors HEALTHlink Alberta (HL) calls (a telephone health advice service), emergency department (ED) visits, school absenteeism reports, and laboratory results for current and potential future health events. Using ARTSSN data, we developed statistical models to predict influenza-like-illness (ILI) patterns and trends in Edmonton, Alberta, Canada. Methods: We analyzed HL calls (2003-2009) and ED visits (2004-2009) related to cough, as a marker for ILI, using spatio-temporal modelling and cross-validated predictions, focusing on predicting peak ILI rates, and mapped geographic spread. Results: In total, 34,796 ED visits and 25,493 HL calls fit our ILI definition. Modelling these data without spatial or temporal correlations showed the seasonal trends. However, incorporating these correlations dramatically improved the models' predictive abilities. Using 2 weeks of data, our models were able to detect peak days with over 30 ILI-related HL calls/day, 7 days ahead (sensitivity=0.667, specificity=0.939) and peak days with over 32 ILI-related ED visits/day, 7 days ahead (sensitivity=0.577, specificity=0.932). Conclusions: We are working to improve the predictive ability of these models to ultimately enable ARTSSN to forecast the probability of future influenza epidemics, providing valuable information to health care workers, public health professionals, and policy makers. These methods could be applied in other jurisdictions and aid in preparedness for pandemic influenza.

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H. PYLORI INFECTION AND PARASITIC CO-INFECTIONS IN ANDEAN CHILDREN. MS Sierra*, KJ Goodman, P Correa, MC Yépez, LE Bravo, W Chan, GP Delclos. (University of Texas)

Acute H. pylori (Hp) infection is associated with increased gastric pH, which may increase the risk of other enteric pathogens. We estimated the effect of Hp infection on the frequency of parasites in 326 3-8-year-old Colombian children examined at 3-month intervals from 2004-2008. Hp status was ascertained by urea breath test every 6 months and classified for the entire follow-up duration as: persistently positive, intermittently positive, or persistently negative. Parasites were ascertained every 3 months by ova and parasite examination of stool samples. We modeled the effect of Hp status on incidence and recurrence of any parasites and specific parasites (*Giardia duodenalis*, *Entamoeba histolytica*, *Ascaris lumbricoides*) using generalized estimating equations with the Zhang-Yu risk-ratio algorithm for incidence and Cox regression with the Andersen Gill extension for recurrence. Multivariable models included socio-demographic factors, symptoms, and medication use. Hp status was clearly associated with the incidence of any parasitic infections, giardia and amebas, with the highest incidence occurring in persistently positive children. With persistent positivity as the referent, adjusted risk ratios [95% confidence interval] corresponding to intermittent positivity were 0.83 [0.71-0.95] for any parasitic infection, 0.53 [0.37-0.77] for giardia, and 0.64 [0.47-0.87] for amebas; those corresponding to persistent negativity were 0.83 [0.68-1.0] for any parasitic infections, 0.72 [0.44-1.2] for giardia, and 0.76 [0.48-1.2] for amebas. Results for recurrence were weak and imprecise. These results support the hypothesis that persistent Hp infection increases the risk of protozoan infections.

INTENSITY AND DURATION OF CIGARETTE SMOKING IN RELATION TO TUBERCULOSIS: FINDINGS FROM THE 2011 NATIONAL ADULT TOBACCO SURVEY OF CAMBODIA. *Singh PN, Hurd G, Yel D, Job J. (Loma Linda University, Loma Linda, CA; WHO, Phnom Penh, Cambodia).

Data from global epidemiology studies of tuberculosis indicate that smoking will contribute to an excess of 40 million deaths from tuberculosis during the next forty years and will delay millennium goals to reduce incident cases by 50%. During the largest adult tobacco survey of Cambodia conducted to date (n=15,615, ages 15 and older), we used validated measures of daily smoking and number cigarettes smoked to examine the relation between cigarette smoking and self-reported tuberculosis. In 2011, subjects were selected from all provinces by a stratified, multi-stage cluster sampling that used the census data as a sampling frame. The survey identified 1.5 million adult smokers. In multivariable logistic regression models that adjusted for age, environmental tobacco smoke, and multiple indicators of poverty, we found that relative to non-smokers, current smokers of manufactured cigarettes were more likely to have developed tuberculosis (OR [95% CI]=1.54[0.86,2.76]). When modeling cigarette smoking with a log-transformed term for pack years, a significant positive association with developing tuberculosis (OR [95% CI]=1.61[1.11,2.34]) was found. Among daily cigarette smokers, there was a very strong association between number of cigarettes smoked and tuberculosis (OR[95% CI] relative to < 5 cigarettes = 7.27[1.39,37.87] for 5-9 cigarettes, 7.09 [1.48,33.92] for 10-14 cigarettes, 13.07[2.79,61.27] for 15-24 cigarettes, 13.97 [2.30,84.82] for >24 cigarettes). A significant trend (p<0.03) was found using a log transformed variable for number of cigarettes. Long duration, high intensity cigarette smoking is contributing to an important excess of tuberculosis cases in Cambodia.

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PEDIATRIC MEASURES IN THE PHENX TOOLKIT. Whitehead N*, Huggins W, Hammond J, Hancock DB, Pan H., Levy J, Junkins HA, Ramos EM, Haines J, Harlan W, Strader LC, Hamilton CM. (RTI International, Atlanta, GA.)

Standard measures for risk factors and disease phenotypes that are shared across research studies promote data pooling and comparison across studies. With increased statistical power, cross-study analysis can help elucidate the roles of co-morbid conditions and environmental factors in the susceptibility, presentation, and progression of disease. PhenX (consensus measures for Phenotypes and eXposures) has identified and cataloged well-established measures for 21 research domains for use in large-scale genomic and epidemiologic research. Preliminary measures were selected by a Working Group whose members have expertise in the domain and vetted with the larger research community. The selected protocols are available from the PhenX Toolkit, www.phenxtoolkit.org, which also describes the measure's personnel, equipment, and other requirements and provides associated data collection forms and data dictionary entries. Search features allow the identification of measures suitable for specific life stages such as childhood or adolescence. The Toolkit contains 108 measures valid for children aged 1-13 years and 33 child-specific measurement protocols. These measures are spread across 18 domains. The Anthropometrics and Respiratory domains have the most measures (11) valid for children. The Psychiatric domain has the most child-specific measures and protocols (6). More pediatric-specific protocols may be added to the PhenX Toolkit in the future. We welcome suggestions for key pediatric measures that meet PhenX criteria (see the PhenX Toolkit, Resources).

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METHODOLOGIES FOR MEASURING PROGRESS AND DISPARITIES IN HEALTHY PEOPLE 2010. *Leda Gurley (Centers for Disease Control and Prevention, HHS, Hyattsville, MD 20872)

For three decades, Healthy People has provided a comprehensive set of national 10-year health promotion and disease prevention objectives aimed at improving the health of all Americans. It is grounded in the principle that establishing objectives and providing benchmarks to track and monitor progress over time can motivate, guide, and focus action. Healthy People 2010 (HP2010) continued in this tradition by identifying 28 public health priorities and 969 objectives designed to improve the health of all people by the year 2010. HP2010 has two overarching goals: 1) increase the quality and length of healthy life and 2) eliminate health disparities. An evaluation of the methodologies used to assess progress toward the HP2010 target for each objective and toward eliminating racial and ethnic disparities among all population-based objectives was conducted. Progress was measured using the percentage of targeted change that was achieved. This measurement expresses the change from the baseline to the most recent data point relative to the initial difference between the baseline and the target. Disparities were defined as the percent difference between the racial/ethnic (r/e) group with the “best” or most favorable rate and the rates for each of the other r/e groups. A summary index was used to describe the average percent difference from the best r/e group rate for all of the other group rates and to evaluate changes in disparity over time among all r/e groups. Results from the evaluation of progress show that 71% of the objectives with tracking data are moving towards their targets (23% of these have met their HP2010 targets), 24% of the objectives were moving away from their targets, and 5% showed no change. Results for disparities show that substantial health disparities between populations were observed for many objectives and there was no change in disparity over time for most objectives.

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THE TABLE 2 FALLACY: PRESENTING AND INTERPRETING CONFOUNDER AND MODIFIER COEFFICIENTS. *Daniel Westreich, Sander Greenland (Duke University,)

It is common to present multiple adjusted effect estimates from a single model in a single table. For example, a table might show rate ratios for one or more exposures and also for several confounders from a single Poisson or Cox regression. This can lead to mistaken interpretations of these estimates. We use causal diagrams to display the sources of the problems. Presentation of exposure and confounder effect estimates from a single model may lead to several interpretative difficulties, inviting confusion of direct-effect estimates with total-effect estimates, as well as potentially increased confounding and distorted estimates of modification of effects. We offer suggestions for harm reduction when multiple effect estimates are presented. The inclusion of multiple effect estimates in a table can lead to confusion in interpretation of those estimates. Several steps can be taken to limit potential misunderstandings.

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ESTIMATION OF INTERACTION EFFECTS USING POOLED BIOSPECIMENS. *M.R. Danaher, P.S. Albert, A. Roy, and E.F. Schisterman (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD 20854, and University of Maryland, Baltimore County, Baltimore, MD 21250)

Due to the cost and biospecimen availability constraints, it has become increasingly popular to measure exposures in pools of randomly grouped biospecimens within strata of the outcome. Pooled exposure measurements have been used to obtain powerful estimators of main effects in the logistic regression model. However, current methods cannot estimate interactions, quadratic or higher order effects of exposures measured in pools. Motivated by a study of the relationship between cytokines and miscarriage (binary outcome), where cytokines are measured in pools of two, we are interested in estimating interaction effects between cytokines. We propose a Monte Carlo Expectation Maximization (MCEM) algorithm based approach to obtain maximum likelihood estimator of interaction of exposures measured in pools. Using a simulation study we demonstrate that the proposed method provides an estimator with good finite sample properties. Simulating 1000 individuals pooled in groups of two from a case-control study, we found that our estimator for the interaction was unbiased under a range of interaction parameters between 0 and 1. For example, when the interaction parameter was 0.5, the bias was 0.0176 (standard error 0.1513). Additionally, we present comparisons of efficiency under different scenarios where exposures have been measured in pools and individually. Providing methods to estimate interaction effects of pooled biospecimens is an important methodological challenge in the analysis of pooled exposure data. The MCEM approach offers a promising method for estimating interaction effects using pooled data.

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SENTINEL SCHOOLS TO DESCRIBE 3RD GRADERS' ORAL HEALTH. J Roesler, *MS Moua, B Khan, A Adeniyi, MJ Thoele, B Hann (MN Health Dept, St Paul, MN 55101)

Background: Dental caries is the most common childhood chronic disease. Children's oral health is often addressed through state programs. Estimates of oral health status are important to inform those programs. This study aims to identify determinants of oral health in high-risk 3rd graders, as compared to statewide estimates. **Methods:** We conducted a Basic Screening Survey (BSS) to describe the prevalence of caries, fillings, and sealants, as well as treatment urgency. We used a simple random sample of 40 schools to provide a statewide estimate of 3rd graders' oral health. With the limited sample size, we could not describe findings on race and other factors. Therefore, we selected 10 sentinel schools using race, proportion of free/reduced-price lunch, and urban/rural status. **Results:** Sentinel school 3rd graders had rates of dental sealants comparable to 3rd graders statewide (62% vs 64%), much higher than that of the US average (23%). The prevalence of caries experience was almost 50% higher than that of the state (77% vs 55%) and the US average (52%). The prevalence of untreated caries was almost double that of the statewide average (35% vs 18%) and higher than that of the US (29%). **Discussion:** We devised a sentinel approach to gather oral health data. The most common use of sentinel sites is by infectious disease specialists to identify trends/changes in a single indicator. Our approach allows estimates to be generated that are indicative of the health status of sub-populations at a lower cost than large, statewide surveys. In sentinel schools, a high prevalence of untreated caries and caries experience existed despite a high sealant rate. This may be due to the high proportion of immigrants and lack of prior fluoridation exposure.

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ADDRESS-BASED SAMPLING IN A LARGE POPULATION-BASED SURVEY: LESSONS LEARNED. *AJ Bersch, FJ Nieto, EJ Bergman, K Malecki (University of Wisconsin - Madison 53726)

Address-based sampling (ABS) is a rapidly-evolving sampling method for geographically-based population surveys, which has the potential to reduce costs and improve coverage relative to traditional hand enumeration (Iannacchione Public Opinion Quarterly 2011 75 (3): 556-575). The Survey of the Health of Wisconsin (SHOW), an annual household-based survey of a representative sample of Wisconsin adults, utilizes ABS, tax parcel records, as well as other GIS desktop and web-based programs to develop its sampling frame. SHOW also uses a missed dwelling unit procedure in the field to ensure that addresses missing from the sampling frame have a non-zero probability of selection. The goal of this paper is to describe these methods and discuss issues of coverage, challenges and successes of using this approach from 2008-2010. Using the missed dwelling unit procedure results, we estimated the statewide coverage of our sampling frame to be 93.9%, and stratified by urban and non-urban status to be 99.8% and 88.3%, respectively. ABS is an efficient, cost-effective method for developing sampling frames for area-probability samples, especially in urban areas.

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DIETARY COMPENSATION IN RANDOMIZED NUTRITION TRIALS: ARE WE OBSERVING A NUTRIENT EFFECT OR A COMPENSATION EFFECT? *C.L.Carpenter and W.Robbins (University of California at Los Angeles, Los Angeles, CA 90095)

Randomized trials that compare nutritional supplementation in one group to usual diet in another are fairly common. The question is whether supplementing nutrients to an underlying usual diet results in the underlying diet changing, and, is the dietary change responsible for the observed effects? Conversely, do the effects result from nutritional supplementation, and, not the dietary change? We conducted a three-month phase II randomized controlled trial on 117 young adult men (age 20-35) attending a major university. The intervention group received 75 grams of whole-shelled walnuts per day compared to controls who avoided tree nuts. Both groups consumed an *ad libitum* diet. We primarily determined whether walnut supplementation would affect male fertility and sperm parameters. Baseline and follow-up measures were weight, height, exercise, semen analysis, serum fatty acids, selenium, other micronutrients, seminal fluid anti-oxidation, hormones, baseline NCI (National Cancer Institute) Diet History Questionnaire, and 3-day Food Records at baseline and study end. We conducted 24-hour recalls every 2 weeks using the NCI ASA24 (Automated-Self-Administered 24-hour Recall) assessment to evaluate whether dietary compensation occurred. Preliminary results indicate that men in the walnut group did not gain weight compared to the control group ($p=0.90$). The walnut supplementation group, by consuming 75 grams of walnuts, received almost 500 additional calories per day, suggesting that if weight remained constant, some compensation occurred in the walnut group. This compensation may have influenced the protective serum alpha linolenic acid ($p=0.001$) and sperm motility ($p=0.04$) effects that we observed.

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THE IDENTIFICATION OF RESTRICTIVE LUNG DISEASE IN TACONITE MINERS. *N.U. Odo, J.H. Mandel, D. Perlman, B. Alexander (University of Minnesota, Minneapolis, Minnesota, MN 55455)

Identifying restrictive lung disease (RLD) using spirometry can be influenced by individual performance and test acceptability standards. Achieving these criteria is potentially related to the health of participants. We assessed the impact of adherence to American Thoracic Society (ATS) guidelines for pulmonary function testing on estimating RLD in a mining cohort. The pulmonary function results of 1150 current and former workers were evaluated using current guidelines for spirometry and based on meeting some or all the acceptability criteria. A restrictive pattern was considered if the FEV1/FVC (Forced expiratory volume in one second/ Forced vital capacity) was normal and the FVC was below the lower limit of normal (LLN). Other tests, alveolar volume (VA) and diffusing capacity (DLCO) were considered abnormal when below the LLN. Prevalence estimates were determined for restrictive disease by the different methods. Subjects were categorized by the degree to which tests met acceptability criteria. Of the 1150 tests, only 547 (47.6%) met all criteria for acceptable spirometry. In the total group ($n=1150$), 17.4% had obstructive pattern and 4.3% had restrictive pattern on spirometry. Using the strictest criteria ($n=547$), 6.2% had restriction on spirometry. In the rest ($n=603$), 2.7% were identified as having restriction. Prevalence estimates for reduced VA and DLCO in the strictest group were 8.6% and 11.2%, respectively. Acceptability criteria have important effects on prevalence estimates of restriction using spirometry. Restriction estimates differed significantly between spirometry and other test methods. These findings provide further insight to the use of spirometry and other tests for longitudinal screening.

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USING DAGS TO GUIDE THE TRANSLATION OF PRIORS FOR RECORD-LEVEL ANALYSIS OF BIAS DUE TO UNMEASURED CONFOUNDING. C. A. Thompson, O. A. Arah (UCLA School of Public Health, Los Angeles, CA 90095)

Probabilistic bias analysis is a task that is daunting to many epidemiologists, often because of highly complex model-specific external formula adjustments that are required. A simplified approach may be accessed through directed acyclic graphs (DAGs), which describe causal relationships that can be translated into probabilities. Augmenting each edge of a DAG to show the direction of known or assumed effect, we demonstrate a transparent algorithm for specifying an expression for the unmeasured confounding variable as a function of the known variables in system. With some additional guidance from the literature and/or empirical findings from the data, the relationships embodied in the DAG can be translated into realistic priors that take into account the assumed data-generating causal structure. These priors can then be used for prediction of the missing confounding variables at the record-level using the observed data as additional input. We demonstrate these methods using simulated case-control and cohort data emulating etiologic studies of endometrial cancer. Record-level bias adjustment introduces substantial flexibility of model selection and covariate choice compared to bias formulas for external adjustment.

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METHODOLOGICAL CHALLENGES IN ASSESSING CHANGES IN INCIDENCE OVER TIME: RESULTS FROM A META-ANALYSIS. *A Frolkis, J Dykeman, S Wiebe, ME Negron, N Jette, J deBruyn, GG Kaplan (University of Calgary, Calgary, Alberta, T2N 4N1)

Background: Using meta-analyses to explore time trends has inherent methodological challenges, particularly when study periods cross clinically significant dates. Our aim was to examine the differences between various models assessing the one-year surgical risk (SR) of Crohn's disease (CD) over time. Methods: We used data from a meta-analysis containing 13 studies conducted from 1955 to 2008. One-year SR was pooled using random effects models. We compared models using the start, mid-, and end- point of each study. Time was assessed using mixed-effects models as both a continuous and categorical variable. Cutoffs (1990 and 2000) for the categorical variable were chosen a priori based on approval of novel CD medications. Between-study variance (tau-squared [τ^2]) was estimated using restricted maximum likelihood estimation (REML). Residual τ^2 was used to calculate the percent heterogeneity accounted for by time. Results: Midpoint models were similar between categorical (77.1%) and continuous (80.4%). Endpoint models were similar between categorical (69.9%) and continuous (70.3%). Start point resulted in noticeable differences between categorical (50.7%) and continuous (73.9%) models. Continuous models yielded significant relative percent decreases in SR ($p < 0.001$) over time, but start (2.6% SR decrease/year), mid- (3.9% SR decrease /year), and end-point (6.0% SR decrease /year) differed in the amount of decrease. Only endpoint had a significant decrease ($p < 0.001$) across all categories. Conclusion: The decision of how studies are pooled by time has important implications on the conclusions reached. Time-point choice should be evaluated using a priori model selection rules.

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IMPROVING BEHAVIORAL INTERVENTIONS VIA THE MULTIPHASE OPTIMIZATION STRATEGY. K.C. Kugler*, L.M. Collins (Penn State, State College, PA, 16801), D.L. Wyrick (University of North Carolina, Greensboro, NC, 27412), & M.D. Fearnow-Kenney (Prevention Strategies, Browns Summit, NC, 27214)

Behavioral interventions aim to change behaviors and associated mediators to improve public health. Because most behaviors are complex, behavioral interventions often target many levels of influence (e.g., individual, peer) and include many components (e.g., improving skills, removing barriers). These components are usually packaged together and evaluated in a randomized controlled trial (RCT); however, this does not provide the information needed to optimize an intervention. The multiphase optimization strategy (MOST), inspired by methods widely used in engineering, provides a principled framework for optimizing behavioral interventions. Using the resource management and continuous optimization principles, and gathering information via highly efficient experimental designs, this approach helps the researcher identify which components of an intervention are worth retaining, given the constraints of time, money, and other resources. Using a universal, Internet-delivered HIV/alcohol preventive intervention for college students, we demonstrate how MOST can guide intervention optimization. Specifically, we detail the systematic and principled steps of MOST from the theoretical underpinning to evaluation of the optimized intervention. We also demonstrate how this approach can isolate particular meditational and moderational pathways that are useful for refining and tailoring the intervention to high-risk populations (e.g., MSM and African American young adults). As availability of resources diminishes, optimization has the potential to create powerful, efficient interventions that can be delivered within given constraints.

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ESTIMATING PREDICTED PROBABILITIES FROM LOGISTIC REGRESSION: WHICH METHOD TO CHOOSE? *Clemma Muller, Richard MacLehose (University of Minnesota, MN, 55454)

In epidemiology, logistic regression is the modeling technique most commonly applied to binary outcome data. Logistic regression models the log-odds on an additive scale; however, it is often the risk (as well as risk difference or risk ratio) that is of more clinical interest. A variety of solutions have been proposed to estimate risks from logistic models. We review three methods: averaging, which uses a weighted function of predicted probabilities calculated for exposed and unexposed observations in each confounder stratum; stratification at the mode, which calculates predicted probabilities by exposure status in the stratum defined by setting each confounder equal to its most common value; and stratification at the mean, which calculates predicted probabilities by exposure status when each confounder is set to its overall mean value. Effect measure estimates and populations of inference can differ dramatically across the three methods, but these distinctions are unclear to many investigators. The averaging technique is the most appropriate choice when one's goal is to estimate the confounder-adjusted marginal risk ratio or risk difference across the entire population of interest. In contrast, stratification methods are relevant only to the specified confounder strata. For models with multiple covariates, stratification at the mode may result in a stratum with few (if any) observations. Similarly, stratification at the mean is only relevant for continuous factors, and can result in substantial bias when applied to categorical confounders. We present an applied example to demonstrate these concepts, and include SAS and Stata syntax for each method.

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SUBJECTIVE VERSUS OBJECTIVE MEASURES OF SLEEP DURATION IN OLDER AMERICANS. R. A. Thisted, L. P. Schumm, J.-H. Chen, L. M. Kurina, M. McClintock, L. Waite, *D. S. Lauderdale (University of Chicago, Chicago, IL)

Most reports of sleep duration as a risk factor for health effects are based on subjective reports of sleep duration (SSD). The relationship of SSD to objective sleep measures is poorly characterized, particularly in older adults. In the 2010/11 wave of the National Social Life, Health, and Aging Project, a nationally representative probability sample of adults aged 60-90, both SSD and actigraphy-measured sleep duration (ASD) were collected on a subsample of 796 individuals over 3 nights. Unlike younger adults, weekdays and weekends did not differ in average within-subject ASD ($p = 0.34$ using mixed-effects regression). Using errors-in-covariates regression to account for the error involved in measuring ASD based on the average across only 3 nights (reliability = 0.41), the correlation of SSD with ASD was 0.28. Lowess-smoothed plots of age-specific SSD-ASD correlations showed that the correlation decreased with age, from 0.40 at age 60 to 0.15 at age 85. However, this variation differed by sex: the correlation declined sharply with age in men, but not in women. ASD and average wake-after-sleep-onset (WASO), an objective measure related to insomnia, were independent predictors of SSD. Average SSD increased 0.55 hours per hour of ASD and 0.40 hours per hour of WASO. Systematic biases in subjective sleep duration as an estimate for objective sleep were found. At a typical ASD of 6 hours, average SSD was 7.12 hours. Controlling for age, ASD, and WASO, women reported 0.3 hours less SSD than men; blacks reported 0.45 hours less SSD than other race/ethnic groups; and subjects with poor physical health reported 0.54 hours less SSD than those with better self-reported health.

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NON-COLLAPSIBILITY OF ODDS RATIOS MEASURED FROM MARGINAL STRUCTURAL MODELS AND LOGISTIC REGRESSION MODELS. *M Pang, JS Kaufman and RW Platt (McGill University, Montreal, Quebec, H3A 1A2)

An approach to quantify the magnitude of confounding is to compare estimates with and without adjustment for a covariate, but this is not appropriate for the odds ratio (OR) due to non-collapsibility. Using marginal structural models and adjusted logistic regression, the total difference between the conditional and crude effects can be decomposed into a sum of the non-collapsibility effect and the confounding bias. An analytic approach is proposed to assess the non-collapsibility effect in a point-time study. This approach can be used to verify the conditions for the absence of non-collapsibility and to examine the phenomenon of confounding without non-collapsibility. We provide a general formula for expressing the non-collapsibility effect under different scenarios. Our analytic approach provided similar results to related formulae in the literature. A graphical approach shows the relationship between the non-collapsibility effect and the baseline risk or the marginal outcome probability, and reveals the non-collapsibility behavior with a range of different exposure effects and different covariate effects. Various interesting observations about non-collapsibility can be made from the different scenarios with or without confounding. The non-collapsibility effect is symmetric if two exposure effects and covariate effects are both opposite but with the same magnitude. Somewhat surprisingly, the effect of the covariate plays a more important role in the non-collapsibility effect than does the effect of the exposure. In order to explore non-collapsibility effect of the OR in the presence of time-varying confounding, an observational cohort study was simulated. The results were compared with the point-time study.

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INVESTIGATING EFFECT MODIFICATION AND INTERACTION USING MULTIPLY ROBUST ESTIMATION. M. DerSarkissian*, O.A. Arah (UCLA School of Public Health, Los Angeles, CA, 90095)

It is becoming increasingly important to investigate effect modification (EM) and causal interaction in epidemiologic studies. This is especially true in the context of comparative effectiveness research, where finding low cost treatments for target populations who stand to benefit most is a priority. However, model misspecification may preclude the investigation of EM and interaction as a result of bias due to uncontrolled confounding of the main exposure when it is subject to EM, or of the two or more exposures when they interact to produce the outcome. Multiply robust (MR) estimation combines three or more estimators in a single union model to obtain unbiased effect estimates provided at least one of the submodels is correctly specified. In settings with high dimensionality of variables, investigators may use the MR approach to present a single set of results incorporating different covariate adjustment schemes to examine EM or interaction. In this study, we use Monte Carlo methods to simulate 1000 cohorts of varying sample sizes with binary exposures and modifiers, continuous outcomes, and several confounders. We examine the performance of MR estimation for assessing EM and interaction in various model misspecification scenarios where at least one submodel is correctly specified. We demonstrate the conditions under which EM versus causal interaction may be investigated using MR estimation. When these conditions are satisfied, our results indicate that the MR approach provides unbiased estimates for the exposure(s) and product term. Thus the MR approach allows investigators to increase their chances of achieving confounding control of the respective exposure(s) by combining competing covariate adjustment schemes into a union model.

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PERFORMANCE OF MULTIPLY ROBUST ESTIMATORS. M. DerSarkissian* O.A. Arah (UCLA School of Public Health, Los Angeles, CA, 90095)

Correct model specification for confounding control is likely the most common assumption made in causal inference. Yet the validity of this assumption cannot be verified using data or statistical tests. Typically, investigators collect as much data on confounders as possible and then consider multiple models singly. This is a tedious process, thus making multiply robust (MR) estimation, an extension of doubly robust estimation, particularly appealing as it affords investigators with more than two chances to specify a correct model within a union model, obviating multiple results presentation. We introduce a MR approach that combines three or more estimators in a union model, yielding unbiased effect estimates provided at least one of the estimators is correctly specified, no new bias is introduced, and there is no uncontrolled confounding. Monte Carlo methods were used to simulate 1000 cohorts of varying sample sizes to examine the causal effect of a binary exposure on a continuous outcome given multiple confounders. We combined propensity score adjustment, outcome regression, and inverse probability of treatment weighted fitting of a marginal structural model. We examined the performance of MR estimation using a union of the submodels in different model specification scenarios where at least one is correctly specified. Our results showed that effect estimates for the exposure of interest were unbiased in all scenarios, regardless of which submodel was misspecified. In addition to bias and variance performance assessment, we also assessed confidence interval (CI) coverage and found that bootstrapped CIs performed best while model-based CIs were conservative. Thus, MR estimation allows investigators to hedge their bets on obtaining valid effect estimates by using a union model.

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VALIDITY AND EFFICIENCY OF PROSPECTIVE DESIGNS WITH INTENTIONAL MISSING DATA. *Anthony Nunes, PhD, MS, Elizabeth Triche, PhD, E Andres Houseman, ScD, Maureen Phipps, MD, MPH, Gregory Wellenius, ScD (Women and Infants Hospital, Providence, RI 02905)

Missing data has traditionally been viewed as a nuisance in observational epidemiology; however, more recently, methods have enabled epidemiologists to exploit missing data to the benefit of studies. While improved efficiency has been observed in idealized simulation scenarios, prior studies have not evaluated the performance of designs with intentional missing data in scenarios with less than perfect compliance and follow-up. We describe and evaluate intentional missing data in scenarios likely encountered in observational epidemiology. Using data simulations and observational data, study designs with unique patterns of intentional missing exposure data were compared to cohort designs with intended complete exposure ascertainment. We use simulations to quantify bias and relative efficiency in the presence of non-intentional missing data due to non-compliance. We evaluate the performance of missing data designs in observational data by quantifying the association between smoking and birth weight using multiple prospectively collected missing data designs. Through our simulations, we observed that missing data designs were unbiased relative to the traditional cohort study and that efficiency was dependent on the between time correlation of the true exposure, the within time correlation between proxy exposures and the true exposure, and the prevalence of non-designed missing data. Missing data designs were more susceptible to a loss of precision in the presence of non-designed missing data. In our analysis of the observational data, designed missing data lead to increased precision, increased compliance with study protocols, and no systematic bias in the magnitude of association between smoking and birth weight. Our findings support the use of intentional missing data in some scenarios as a means to improve efficiency, reduce subject burden, and improve compliance.

EFFECT OF THE 2010 CHILEAN GREAT EARTHQUAKE ON POSTTRAUMATIC STRESS: AN ANALYSIS USING MULTIVARIATE MATCHING AND SENSITIVITY ANALYSIS. *J. Zubizarreta, M. Cerdá, and P. Rosenbaum (University of Pennsylvania)

In February 2010, an earthquake of magnitude 8.8 hit Chile, causing devastation in certain parts of the country and leaving other areas untouched. With prospective longitudinal data, free of recall bias, we used new optimal matching methods to pair respondents who were similar prior to the earthquake and who had vastly different exposures to the earthquake, as measured objectively by peak ground acceleration. Posttraumatic stress symptoms (PTS) were measured using the Davidson Trauma Scale. Exposure to the earthquake was not random: residents of highly-affected areas were more economically disadvantaged than residents of unaffected areas; however, these measured biases were removed by matching. PTS was dramatically elevated among some residents of strongly shaken areas of Chile when compared to similar individuals in largely untouched parts of the country. This comparison was less sensitive to unmeasured biases than studies linking heavy smoking with lung cancer, hence, less sensitive than some of the least sensitive studies ever reported in epidemiology. Moreover, the earthquake effect on stress was not uniform, but rather affected some severely exposed individuals far more than others with similar exposure. Our presentation illustrates recent statistical methodology aimed at more effectively removing measured biases using matching and reducing sensitivity to unmeasured biases through design choices guided by design sensitivity.

COMBINED LIFESTYLE FACTORS AND CHRONIC DISEASE RISK. *Ute Nöthlings (Christian-Albrechts-University, Kiel, Germany)

Lifestyle factors have been associated with risk for chronic disease. We conducted a systematic literature search to review all prospective studies investigating the combination of lifestyle factors with respect to risk for morbidity or mortality. Out of 29 studies, 16 analyzed mortality and 15 incident diseases risk, predominantly cardiovascular diseases or type 2 diabetes. Healthy lifestyle factors included being physically active (n=28), eating a healthy diet (n=26), not smoking (n=25), consuming alcohol in moderation (n=23), having a healthy body mass index (n=21) and waist-to-hip ratio (n=3). A healthy diet was categorized based on different variables, including fruit and vegetable, meat or whole grain intake, fatty acid composition, glycemic index, plasma vitamin C levels, or exploratory or a priori dietary patterns like the Healthy Eating Index or a Mediterranean diet. Maximum scores achievable ranged from 3 to 6, only two studies used maximum scores of 8 or 20, respectively. The relative risks (RR) for all-cause mortality for maximum score achievements compared to minimum scores were statistically significant in all studies. RR ranged from 0.35 (95% CI 0.28-0.44) to 0.60 (0.39-0.92) for comparing healthy to unhealthy behaviors, and from 4.31 (3.51-5.31) to 1.3 (1.1-1.5) comparing unhealthy to healthy behaviors. In general, associations were stronger for cardiovascular than for cancer mortality. For incident diseases, RR ranged from 0.08 (0.02-0.28) to 0.65 (0.52-0.81). Combinations of factors were more favorable than any factor alone. Available studies provide a homogenous picture illustrating the power adherence to a number of healthful behaviors can have on chronic disease prevention. Of note, studies on incident cancers and studies for different ethnic groups are warranted.

DIETARY PATTERNS AND DEPRESSION IN THE NURSES' HEALTH STUDY. *P. Chocano-Bedoya, E. O'Reilly, M. Lucas, F. Mirzaei, O. Okereke, T. Fung, F. Hu and A. Ascherio (Harvard School of Public Health, Boston, MA 02115)

Although some nutrients have been investigated in relation to depression risk, little is known about the overall role of diet in depression. Therefore, we conducted a prospective study of dietary patterns and depression among participants in the Nurses' Health Study. We included in the analyses 44,406 women (age 50-77) without depression in 1996. Diet information from food frequency questionnaires collected every 4 years from 1986 to 2006 was used to estimate diet patterns using principal component analysis. Two major patterns were identified: the "prudent pattern" (high in vegetables, fruits, fish and whole grains) and the "western pattern" (high in refined grains, desserts and red meats). To estimate long-term intake, the cumulative average was calculated for each score and categorized by quintiles. From 1996 to 2008, the 2,731 women who reported a diagnosis of depression by a clinician and use of antidepressants were considered as incident cases. We used Cox proportional hazards models to calculate relative risks and 95% confidence intervals (CI) using the lowest quintile as the reference group. After adjustment by age, body mass index, physical activity, smoking, menopause status, and other factors, no significant association was found between the prudent pattern and depression risk. However, women with the highest scores of the western pattern had a 15% higher risk of depression (95% CI=1.01-1.30; P trend=0.02) compared to those with the lowest scores. These results suggest that a diet rich in refined grains, desserts and red meat, previously related to an increased risk of diabetes and cardiovascular disease, may also be associated with an increased risk of depression.

SELF-PERCEIVED VEGETARIANISM IN THE US: PREVALENCE AND SOCIO-DEMOGRAPHIC CHARACTERISTICS. *AM Branum, YN Tarasenko (National Center for Health Statistics, Hyattsville, MD, 20782)

Despite heightened media and public interests in vegetarian diets, epidemiologic research on the prevalence and contribution of vegetarianism to health promotion and disease prevention remains scarce. More specifically, little is known about the characteristics of persons who perceive themselves as vegetarian in the United States. Using data from the 2007-2008 National Health and Nutrition Examination Survey, we assessed prevalence of and demographic characteristics associated with self-reported vegetarianism based on the question "Do you consider yourself to be a vegetarian?" asked as part of the Dietary Behavior and Nutrition questionnaire. The NHANES 2-year interview weights were used to make nationally representative estimates of characteristics. We assessed differences by gender, race/ethnicity (Mexican-American/Other Hispanic, non-Hispanic white, non-Hispanic Black/Other), age (<18, 18-39, 40+ years), and socioeconomic status (poor, near poor, not poor). Approximately 2 percent (Standard error (SE): 0.3) of NHANES participants identified as vegetarian. A greater proportion of self-perceived vegetarians were female ([85% SE: 4.1] vs. [51% SE: 0.5]) and non-Hispanic black or Other race/ethnicity ([29% SE: 6.4] vs. [18% SE: 2.6]), compared to non-vegetarians. Among adult participants, a greater proportion of vegetarians had at least some college education compared to non-vegetarians ([67% SE: 6.5] vs. [54% SE: 2.5]); however, there were no differences in age distribution or socioeconomic status according to vegetarian status. Our findings provide a foundation for further research on who chooses vegetarian diets, the quality of those diets, and their potential to improve health outcomes in the US population.

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PHYSICAL ACTIVITY DURING PREGNANCY AND LANGUAGE DEVELOPMENT IN OFFSPRING. *Jukic AM, Lawlor DA, Juhl M, Owe KM, Lewis B, Liu J, Wilcox AJ, Longnecker MP (NIEHS, Durham, NC 27709).

In rodents, physical activity during pregnancy has been associated with improved learning and memory in the offspring. The authors used data from the Avon Longitudinal Study of Parents and Children (ALSPAC) to investigate mother's physical activity during pregnancy and language development in their offspring. Pregnant women reported leisure-time physical activity and total physical activity at 18 weeks of gestation. Caregivers completed a modified MacArthur Infant Communication scale for the child at 15, 24 and 38 months. Verbal IQ was measured at age 8 years. Regression analysis was used to examine the association of physical activity with MacArthur score (>75th percentile) and verbal IQ. The number of participants available for analyses ranged from 4517 to 7162. Sensitivity analyses were used to examine the robustness of the results. Children of women in the two highest quintiles of leisure activities were more likely to have high MacArthur scores at 15 months compared with women who reported no leisure activities (Adjusted odds ratio (95% Confidence Interval): 1.2 (0.99, 1.5) and 1.5 (1.2, 1.9), respectively). These associations remained at 24 months but were attenuated at 38 months. Leisure activity was not associated with IQ, while total physical activity was linked with lower verbal IQ (1 and 3 points lower for the two highest quintiles of activity). These associations were substantially weakened after adjustments for possible confounders, suggesting that residual confounding may still be present. Inconsistencies with the two measures of activity need further exploration. The most robust finding was a transient increase in offspring vocabulary score at young ages with maternal leisure activity.

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LEPTIN LEVELS ARE ASSOCIATED WITH KNEE OSTEOARTHRITIS. C. Karvonen-Gutierrez*, S. Harlow (University of Michigan, Ann Arbor, MI, 48109)

Purpose: To relate levels of leptin to knee osteoarthritis (OA) in a population of mid-aged women. Methods: Data from 515 participants in the Michigan site of the Study of Women's Health Across the Nation with leptin measures and knee OA data were examined. Knee OA was defined as a Kellgren-Lawrence score ≥ 2 . Logistic regression was used to relate leptin to concurrent knee OA status. Due to collinearity between leptin and body size, statistical models included residuals of body mass index (BMI) to control for the effect of BMI that is not related to leptin. Models were additionally adjusted for race/ethnicity and age. Results: The prevalence of knee OA was 18% among this population of women (mean 46.1 years). The mean leptin value was 30.7 ng/mL (standard deviation [SD] 18.7). Leptin levels were greater among women with knee OA (40.6 ng/mL, SD=20.1) as compared to women without knee OA (28.4 ng/mL, SD=17.2) ($P<0.0001$). BMI was 24% higher among women with knee OA but the average BMI among both groups was greater than 30 kg/m². After adjustment for age, race/ethnicity and BMI residuals, a 1 ng/mL higher leptin level was associated with 7% higher odds of having knee OA (95% CI 1.05, 1.09). Conclusions: Leptin levels are related to knee OA prevalence, even after adjustment BMI. Obesity is a major risk factor for OA, and this work suggests that leptin, a product of fat tissue, may be an important part of the obesity-OA relationship. Replication of this finding may be important for therapeutic interventions over-and-above weight reduction. Grant Support: The Study of Women's Health Across the Nation (SWAN) is supported by NR004061, AG012505, AG012535, AG012531, AG012539, AG012546, AG012553, AG012554, AG012495. The Michigan SWAN site-specific study is supported by AG017104.

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FACTORS ASSOCIATED WITH PHYSICAL ACTIVITY IN 12-17 YEAR OLDS. *B. Martin, M. Ventresca, J. Liu (Brock University, St. Catharines, Ontario, Canada, L2S3A1)

Background: Physical activity is commonly known to have health benefits during adolescence and adulthood. Findings will enhance health promotion programs by specifically targeting factors associated with being active. Objective: To determine factors associated with physical activity in boys and girls aged 12-17. Methods: A cross sectional study of 3760 adolescents (2061 males, 1764 females) were collected from the 2010 Canadian Community Health Survey. Multiple weighted logistic regression models were used to identify significant predictors of being physically active between genders. Results: The overall model presented income ($p<0.001$), self-perceived health ($p<0.002$), gender ($p<0.000$), HUI score ($p<0.007$), depression state ($p<0.024$), and opinion of own weight ($p<0.041$) as significant factors of activity in all adolescents. Significant factors of activity in boys were HUI score ($p<0.007$) and self-perceived as overweight ($p<0.004$) when compared to individuals of normal weight. Significant factors in girls were having income of \$20,000-\$39,999 ($p<0.048$), \$40,000-\$59,999 ($p<0.012$), \$60,000-\$79,999 ($p<0.012$), \$80,000 or more ($p<0.000$) when compared to having a total household income of less than \$20 000. Also significant in females was having a perceived health of excellent ($p<0.003$), very good ($p<0.007$), and good ($p<0.028$) when compared to having fair perceived health. Conclusions: Influential factors of physical activity vary between individuals. However, it can be seen that different life-style factors significantly impact an adolescent's activity, depending on their gender. Health promotion programs should target their programs by gender and address significant factors.

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MATERNAL SMOKING DURING PREGNANCY AND RISK OF ADOLESCENT OBESITY. *L. Wang, H-M. Mamudu, J-L. Anderson, A. Alamian (East Tennessee State University, Johnson City, USA 37614).

Obesity among adolescents has more than tripled over the past three decades. The relationship between maternal smoking during pregnancy and obesity in their adolescent-age children was examined by analyzing data from 1,189 participants in the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development (SECCY). Mothers were asked whether they had smoked at any time from one year before birth of the child up through the pregnancy. Adolescent obesity was defined as a measured BMI equal to or greater than 95th percentile at 15 years of age. Weight and height were measured using standardized procedures. The effect of maternal smoking during pregnancy on the risk of adolescent obesity was evaluated using multiple logistic regression. The prevalence of obesity was significantly higher in adolescents whose mothers smoked during pregnancy (22.7%) than in adolescents of mothers who did not smoke (13.9%) ($P=0.014$). After adjusting for seven potential confounders (birth weight, maternal education, poverty level, employment status, household type, maternal depressive symptoms, and Watching TV, video, or DVD hours), the risk of adolescent obesity was increased in smoking mothers by about two times (OR = 1.69, 95% CI: 1.01, 2.84). The results show that maternal smoking during pregnancy is associated with an increased risk of adolescent obesity. These findings, if confirmed by longitudinal studies, would provide another good reason for promoting smoking cessation during pregnancy.

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RELATIONSHIP BETWEEN LEISURE TIME AND OCCUPATIONAL PHYSICAL ACTIVITY AND INCIDENCE OF HYPERTENSION AND DIABETES: THE NATIONAL POPULATION HEALTH SURVEY (1994-2009). *BT Smith, A Hotermann, CA Mustard and PM Smith (University of Toronto, Toronto, ON, CA, M5G 2E9)

We examined the association between leisure time and occupational physical activity and incidence of hypertension and diabetes among working-aged Canadians. The National Population Health Survey includes over 15 years of follow-up in a nationally representative cohort of Canadians. Multivariable Cox proportional hazards models were used to estimate the association between leisure time physical activity and self-report hypertension incidence in subset of respondents over 29 years of age and working more than 10 hours per week at study baseline (N=4,459, 45% women). All analyses were adjusted for confounders (age, sex, marital status, visible minority, depression and education) with subsequent models adjusted for occupational physical activity; shift work; and smoking, alcohol consumption and body mass index. The method was also used to estimate the association between occupational physical activity and hypertension incidence and both measures of physical activity and self-report diabetes incidence. Leisure time physical activity was inversely associated with hypertension incidence (confounder-adjusted hazard ratio (HR) = 0.71, 95% confidence interval (CI): 0.55,0.93 comparing active to inactive groups). Leisure time physical activity was also associated with diabetes incidence, however, these results did not reach statistical significance (confounder-adjusted HR = 0.67, 95%CI: 0.41,1.10 comparing active to inactive groups). No association was observed between occupational physical activity and hypertension or diabetes. The present study provides evidence that leisure time physical activity has a greater impact on reducing hypertension and diabetes incidence than occupational physical activity.

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COMPARISON OF TWO APPROACHES TO HANDLING BMI MEASUREMENT BIAS IN GROWING ADOLESCENTS. *C.L.Gray and W.R.Robinson (University of North Carolina, Chapel Hill, NC, 27599)

In childhood obesity research, measurement bias in height presents unique challenges. Because height should increase over time in youth, decreased height in longitudinal studies, or “shrinking,” is especially implausible. However, if measurement bias in height is normally distributed, excluding shrinkers could cause selection bias with larger effects than the original measurement bias. This analysis uses data from wave 2 (1995-6) and wave 3 (2001) of the National Longitudinal Study of Adolescent Health to examine the effects on estimated BMI and obesity prevalence of two methods of handling implausible shrinking: 1) exclude shrinkers from all analyses or 2) ignore the measurement bias. In the overall sample, 10% appeared to shrink between waves 2 and 3. To create a validation dataset, we limited the study population to adolescents ≥ 17 years old (3,415 boys, 3,308 girls). Because $>95\%$ of these older adolescents are height-stable, we substituted mis-measured wave 2 height with well-measured wave 3 height to create corrected height values. At wave 2, excluding shrinkers underestimated BMI and obesity in males ($p < 0.01$): after excluding shrinkers, validated BMI=23.4 kg/m² and obesity prevalence=9.8%; in the overall sample, validated BMI=24.1 kg/m² and obesity prevalence=11.9%. Results were similar but less pronounced in females. The bias from excluding shrinkers was most pronounced in wave 3, young adulthood. True obesity prevalence was 22.5% in males and 27.0% in females. Excluding shrinkers, estimated obesity prevalence was only 19.6% in males and 24.9% in females. In pediatric obesity research, excluding shrinkers from analyses can significantly underestimate BMI and obesity prevalence. Ignoring the bias may be a preferable strategy.

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EXPLORING ENERGY BALANCE AMONG POSTPARTUM ADOLESCENTS. *K. Schliep (University of Utah, Salt Lake City, UT)

Pregnant adolescents are susceptible to weight gain and postpartum weight retention. While obesity is a complex issue, energy intake and expenditure remain critical components. The purpose of this pilot study was to explore the relationships between energy balance and body mass index (BMI) of postpartum adolescents. Fifty postpartum adolescents were recruited from 1 clinic and 2 schools in Salt Lake City, Utah. Anthropometric measurements were obtained from a trained researcher. Participants completed 2 short-form International Physical Activity Questionnaires (IPAQ-S), 1 week apart, along with 2 unannounced 24-hour diet recalls (1 weekday and 1 weekend) corresponding to the same time frame. BMI-for-age percentile was dichotomously coded into normal weight (BMI-for-age $< 85\%$) and overweight (BMI-for-age percentile $\geq 85\%$). We used IPAQ standard protocol to calculate total energy expenditure and ESHA food processor software to calculate total energy intake and dietary components. Analysis of covariance was used to determine mean differences in outcomes between normal and overweight adolescents, taking into account race, income, basal metabolic rate, breastfeeding status, and weeks postpartum. Overweight adolescents had a significantly lower total energy (fat, protein, carbohydrate, and sugar) intake per kilogram (kg) of bodyweight (total energy mean=22 kilocalories (kcal)/kg versus 38 kcal/kg, $P < 0.01$) and tended towards a negative 24-hour total energy balance (mean=-531.7 kcals versus -67.7 kcals, $P = 0.07$). Negative energy balance could be due to under-reporting of food consumption by overweight adolescents. Future weight-reducing interventions targeted at this high-risk population should validate diet measurement tools among their study populations for adequate outcome assessment.

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ASSESSMENT OF NEIGHBORHOOD PARK FEATURES FOR YOUTH PHYSICAL ACTIVITY. *M. Bird (University of Montreal, CHU Sainte-Justine Research Centre, Montreal, Quebec, H3S 2C3), G.D. Datta, A. van Hulst, Y. Kestens, M. Lambert, and T. Barnett.

Parks provide important potential for physical activity (PA) among youth. However, existing measures are not tailored to assess park features hypothesized to be appealing for youth PA. Our aims were to develop a youth-oriented assessment tool, estimate its reliability and generate factors using an established parks and PA conceptual model (1). Objectives were addressed in QUALITY, a study on the natural history of obesity among youth considered at high risk due to their parental history. A youth-oriented tool was adapted from the Public Open Space Tool (POST) and the Bedimo-Rung Assessment Tool to include features of particular interest to youth. Five independent observer pairs audited up to the 3 closest parks (n=584) within a 1 km buffer zone of participating families' residences (n=368) between April -December, 2008-2010. Inter- and intra-rater reliability were estimated. Principal component analysis (PCA) was used to confirm factors from the conceptual model and possibly identify new ones. A 90-item youth-oriented assessment tool was developed following extensive field-testing. Most (86%) paired observer episodes had $\geq 75\%$ agreement. Kappa coefficients for 83% of items were between 0.41-1. Overall correlation and kappa results were high for 41 test-retest episodes. Kappa results for items shared with the POST were found to be of similar magnitude. PCA yielded 10 factors explaining 60% of the data. Some factors overlap with the conceptual model (Incivilities, Safety, Esthetics). This tool was feasible, demonstrated high reliability and is recommended for assessing park features believed to promote physical activity among youth. 1. Bedimo-Rung et al., AJPM 2005;28:159-68.

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DOES OBESITY INCREASE THE RISK OF CHRONIC CONDITIONS AMONG SOUTH AFRICAN ADULTS? FINDINGS FROM THE SOUTH AFRICAN NATIONAL INCOME DYNAMICS SURVEY. *Kedir Turi and Diana S. Grigsby-Toussaint (University of Illinois, Champaign, IL)

Historically, public health programs in sub-Saharan Africa have focused on infectious diseases and conditions related to under-nutrition (Kruger et al, 2005). However, due to the “nutrition transition,” obesity and associated chronic conditions are becoming increasingly prevalent in upper middle-income countries such as South Africa. Since obesity is considered a precursor to many chronic conditions, examinations of the association between obesity status and chronic disease risk are important for public health planning in South Africa and other developing countries experiencing economies in transition. Using data derived from the 2008 South African National Income Dynamics Survey, we examine associations between obesity status and three chronic conditions: high blood pressure, diabetes and heart disease, among South African adults. We estimated a seemingly unrelated probit model while controlling for age, gender, population group, household income, exercise, marital status, educational attainment, and smoking status. This approach improves the estimation result by controlling for endogeneity and unobserved heterogeneity. Accordingly, the estimated ρ is 0.233 ($\chi^2=125.8, p\text{-value}<0.05$) for high blood pressure, 0.187 ($\chi^2=38.5, p\text{-value}<0.05$) for diabetes and 0.054 ($\chi^2=2.90, p\text{-value}>0.05$) for heart disease. In addition, the estimated conditional probability shows that on average, obesity increases the probability of individuals to develop high blood pressure, diabetes and heart disease by 19.25%, 5.70% and 3.58% respectively. Our results suggest that interventions focusing on obesity prevention may reduce chronic disease risk, particularly high blood pressure and diabetes, in this population. Reference: Kruger HS, Puoane T, Senekal M, van derMerwe MT. Obesity in South Africa: challenges for government and health professionals. *Public Health Nutr* 2005; 8:491–500.

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MATERNAL PLASMA BETA-CAROTENE, ICAM AND VCAM LEVELS IN NORMAL AND PREECLAMPTIC PREGNANCIES. *Shu-Qin Wei, Pierre Julien, Zhong-Cheng Luo, François Audibert, William Fraser, and MIROS study group (*Department of Obstetrics and Gynecology, University of Montreal, Montreal, Canada)

Objective: To examine whether lower maternal beta-carotene levels may increase the risk of preeclampsia through altered endothelial function. Study design: A nested case-control study using a prospective pregnancy cohort from a trial of antioxidant supplementation for the prevention of preeclampsia (INTAPP). Plasma beta-carotene, intercellular adhesion molecule (ICAM) and vascular cell adhesion molecule (VCAM) levels were measured at 24-26 weeks of gestation. A total of 116 women with preeclampsia and 228 matched controls were included. We used logistic regression to calculate odds ratios (ORs) and 95% confidence intervals (95% CI). Results: Compared preeclamptic to normotensive pregnancies, plasma beta-carotene concentrations were significantly lower (mean \pm SD: 0.6 \pm 0.6 vs. 0.9 \pm 0.6 $\mu\text{g/ml}$, $p=0.0003$), while VCAM levels were higher (609.9 \pm 248.4 vs. 500.9 \pm 134.5 $\mu\text{g/ml}$, $p=0.03$) at 24-26 weeks of gestation, while ICAM levels were not significantly different. Beta-carotene and VCAM concentrations were negatively correlated ($r=-0.22, p=0.03$). After multivariate adjustment, women with beta-carotene concentrations at 24-26 weeks in the lowest quartile experienced a 6-fold increased risk of preeclampsia as compared to those in the highest quartile (OR 6.03, 95% CI 3.07 -11.85). Conclusion: Lower maternal beta-carotene levels may increase the risk of preeclampsia through altered vascular endothelial function.

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FREQUENCY OF CONSUMPTION OF SOUTH AND NORTH INDIAN FOOD PREPARATIONS: A PRELIMINARY RESEARCH TO ASSESS FOLATE INTAKE OF SELECTED POPULATION. Lalitha.A*, K.Kanjana, Sheela Ramachandran (Department of Foods and Nutrition; Clinical Nutrition, PSG College of Arts and Science, Bharathiar University, Coimbatore 641014)

Folate deficiency is implicated in a wide variety of diseases. Neural tube defects top the list of birth defect in India; its prevalence is 6.57-8.21/1000 live births being highest in the world. The recommendation for Indians on folate are based on assay procedure which are proven to underestimate the folate content present in foods and till date no data exist in India on cooked foods. Hence the present study was undertaken to know the common recipes consumed frequently in order to further estimate the total folate content of selected food preparations using the most updated technique and also to plan a bioavailability study. South (n=450) and North (n=450) Indian Women (18 – 45 years) belonging to different income groups and residing at Coimbatore were assessed for the frequency of consumption of food preparations and identification of frequently consumed common south and north Indian recipes using Food frequency questionnaire. Univariate design was considered for ex-post-facto approach with variables of income status, Low (n=100), Middle (n=150) and High income (n=150) as predictor variables and variables of frequency of consumption of selected South and North Indian recipes as ultimate criterion variables. Mint, coconut and tomato chutneys were the common recipes frequently consumed by both South and North Indian population. All the income groups of south Indian population opted for parboiled rice, dosa, idli, sambar, rasam, carrot, potato, beetroot poriyal, snakegourd poriyal, beans poriyal, ladies finger poriyal, green plantain poriyal, brinjal poriyal and onion chutney. North population preferred Roti, paratha, kitchedi, fried rice, mixed vegetables, green gram dhal, puff, milk, fruit juice and health drink. These recipes will be subjected to total folate estimation and food exchange list can be generated for folate deficient subjects.

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VITAMIN D RECEPTOR GENE POLYMORPHISMS AND RISK OF PREECLAMPSIA. *Shu-Qin Wei, Pierre Julien, Zhong-Cheng Luo, François Audibert, William Fraser, and MIROS study group (*Department of Obstetrics and Gynecology, University of Montreal, Montreal, Canada)

Objective: To investigate the relationship between vitamin D receptor gene polymorphisms and preeclampsia (PE). Study Design: A prospective cohort study (n=697) from a trial of antioxidant supplementation for the prevention of preeclampsia (INTAPP). Polymerase chain reaction/restriction fragment length polymorphism (PCR-RFLP) was used to test the genotype and allele frequency of vitamin D receptor gene polymorphisms [ApaI (rs7975232), BsmI (rs1544410), Cdx2 (rs11568820), FokI (rs2228570), TaqI (rs731236) and Tru91 (rs757343)] Results: We found that (1) Tru91AA genotype were significant higher in women who developed PE compared with those who did not ($P = 0.005$); (2) while the ApaI, BsmI, Cdx2, FokI and TaqI polymorphisms did not show any difference in patients who developed PE compared with those who did not ($P > 0.05$); (3) logistic regression analysis showed that Tru91AA genotype was associated with increased risk preeclampsia (OR 5.46, 95% CI 1.46 -20.50; OR 8.03, 95% CI 1.94 -33.31, respectively). Conclusion: Tru91AA genotype in vitamin D receptor gene is associated with increased risk of preeclampsia.

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DURATION AND DISRUPTION OF SLEEP IN PREGNANCY AND RISK OF STILLBIRTH AND PRETERM BIRTH. *K. Strandberg-Larsen and L.H. Mortensen (University of Copenhagen, Copenhagen, DK-1014)

It has recently been reported that a short duration of sleep in late pregnancy was associated with increased risk of stillbirth and preterm birth, but this literature may be subject to publication bias and the findings needs confirmation. We used data from the Danish National Birth Cohort to examine if sleep duration and frequency of sleep disruptions in late pregnancy were associated with stillbirth and preterm delivery. Participants were 79,339 singletons pregnancies enrolled in 1996-2002. Data was analyzed using Cox regression and we performed a subjective Bayesian analysis with two informative priors: A “skeptical prior” reflecting publication bias, and an “associational prior” reflecting the published associations. In the Danish National Birth Cohort the hazard ratio of stillbirth was 0.71 (95% confidence interval: 0.51-0.99) for sleeping 6-7 hours compared to sleeping 8-9 hours. The hazard ratio for preterm birth was 1.26 (0.99-1.59) for sleeping less than 6 hours a day and 1.13 (1.03-1.23) for sleeping 10+ hours a day, again compared to sleeping 8-9 hours. Experiencing sleep disruptions several times a week was associated with a lower rate of stillbirth, but was not associated with preterm birth. Both posterior estimates suggested lower rate of stillbirth among women with frequent disruptions of sleep and higher rate of preterm birth among women sleeping less than 6 or more than 9 hours a day. From these findings we cannot tell whether sleep disruptions and short/long sleep duration is a risk factor or a risk marker for these outcomes.

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PERIODONTAL DISEASE AS A POTENTIAL RISK FACTOR FOR THE DEVELOPMENT OF DIABETES IN WOMEN WITH A PRIOR HISTORY OF GESTATIONAL DIABETES MELLITUS. *Xu Xiong, Karen E. Elkind-Hirsch, Yiqiong Xie, Robert L. Delarosa, Pooja Maney, Gabriella Pridjian, and Pierre Buekens (Tulane University School of Public Health and Tropical Medicine, New Orleans, LA 70122)

Objective: To determine if periodontal disease contributes to the development of impaired glucose regulation and progression to type 2 diabetes in women with prior Gestational Diabetes Mellitus (p-GDM). **Methods:** Women with (n=19) and without (n=20) p-GDM were prospectively followed until 22 months' postpartum. All subjects underwent 1) a 75-gram oral glucose tolerance test (OGTT) and 2) an oral examination for measuring periodontal disease. Insulin sensitivity and pancreatic β -cell secretory capacity derived from fasting (HOMA-IR) and glucose-stimulated measures (SIOGTT and IGI/HOMA-IR) were determined. Periodontitis was defined as the presence of any site with a probing depth ≥ 4 mm or a clinical attachment loss ≥ 4 mm. **Results:** Compared to women without p-GDM, women with p-GDM had significantly higher fasting glucose and insulin concentrations, increased insulin resistance and decreased β -cell function. Women with both p-GDM and periodontal disease had the most impaired glucose metabolism; the mean insulin secretion-sensitivity index was significantly lower in women with both p-GDM and periodontal disease (208.20 ± 2.60) than in women without p-GDM and periodontal disease (742.93 ± 1.78) ($P < 0.05$). **Conclusions:** Women with p-GDM show reduced insulin sensitivity and inadequate pancreatic β -cell secretory function at 2 years postpartum. Periodontal disease may contribute to impaired glucose metabolism and future risk of developing diabetes in this high-risk population.

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WEIGHT LOSS AFTER DIAGNOSIS WITH GESTATIONAL DIABETES AND BIRTH WEIGHT AMONG OVERWEIGHT AND OBESE WOMEN. *J. Katon, G. Reiber, M. A. Williams, N. D. Yanez, E. Miller. (University of Washington, Seattle, WA, 98195)

Objective: To determine if, among overweight or obese women with gestational diabetes (GDM), weight loss after GDM diagnosis is associated with lower infant birth weight within levels of overweight or obesity class. **Methods:** Overweight and obese women with singleton pregnancies managed for GDM at a large diabetes and pregnancy program located in Charlotte, North Carolina between November 2000, and April 2011, were eligible for this retrospective cohort study. All were managed using a rigorous standardized clinical protocol. Clinical information including maternal pre-pregnancy body mass index, gestational weight gain, treatment, infant birth weight and sex, and medical and obstetric history was abstracted from medical records. The association of weight loss after GDM diagnosis and infant birth weight was analyzed using linear regression stratified by maternal pre-pregnancy overweight or obesity class (I, II/III). **Results:** Of the 322 women in this study 19% lost weight between diagnosis of GDM and delivery. After adjustment for maternal age, parity, race/ethnicity, gestational week at first hemoglobin A1c (A1C), A1C at diagnosis, weight gain prior to GDM, treatment with insulin or oral hypoglycemic agents, gestational age at delivery, and infant sex, weight loss was associated with 238.3 g lower mean infant birth weight among overweight women (95% confidence interval (CI) -393.72, -82.95 g), but was not associated with lower mean infant birth weight among obese class II/III women (95% CI -275.61, 315.38 g). **Conclusion:** Weight loss, after diagnosis of GDM, is associated with lower mean infant birth weight among overweight women, but not among obese class II/III women.

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RACE AND ETHNIC DISPARITIES IN PRETERM BIRTHS IN INFANTS CONCEIVED BY IN VITRO FERTILIZATION IN THE UNITED STATES. *Xu Xiong, Gabriella Pridjian, and Richard P. Dickey (Tulane University School of Public Health and Tropical Medicine, New Orleans, LA 70112)

To examine racial and ethnic differences in preterm births in infants conceived by in vitro fertilization (IVF), the authors conducted a retrospective cohort study of 56,465 singleton and 23,748 twin pregnancies resulting from fresh non-donor IVF cycles using 2006-2008 data from the Society for Assisted Reproductive Technology Clinic Outcome Reporting System (SART CORS). Rates of very early preterm, early preterm, and preterm birth varied across the racial and ethnic groups in both singleton and twin pregnancies. In singletons, with white women as referent, after adjustment of confounding variables, the adjusted odds ratios (ORs) and 95% confidence interval (CIs) of very early preterm birth, early preterm birth, and preterm birth in black women were 4.5 (3.3-6.0), 3.7 (2.9-4.6), and 2.0 (1.8-2.4). Hispanic women had a significantly lower rate of preterm births as compared to black women and similar or slightly higher rates as compared to white women. Native American women were not at an increased risk of any types of preterm births; and Asian women were at a reduced risk of preterm twin births [adjusted OR: 0.8 (0.7-0.9)]. The authors concluded that there exist notable racial and ethnic disparities in preterm births in infants conceived by IVF, with the highest rate in black women.

EARLY PREGNANCY HEPATOCYTE GROWTH FACTOR AND RISK OF GESTATIONAL DIABETES. *M Dishi, K Hevner, C Qiu, N Fida, DF Abetew, DA Enquobahrie, MA Williams (Center for Perinatal Studies, Swedish Medical Center, Seattle, WA, 98101).

Background: While hepatocyte growth factor (HGF), a pleotropic hormone, has been related to glucose metabolism, its association with gestational diabetes (GDM) is unknown. **Methods:** In a case-control study (173 GDM cases and 187 controls) nested within a prospective cohort of pregnant women in Seattle, WA, we measured serum HGF in early pregnancy (16 weeks gestation, on average). Data were collected during interviews and medical records abstraction. Logistic regression was used to calculate adjusted odd ratios (aOR) and 95% confidence intervals (95% CI). **Result:** Mean serum HGF were 2.02ng/ml and 1.95ng/ml among GDM cases and controls, respectively. We did not find associations of HGF with GDM risk (trend p-value=0.28). However, there were statistically significant interactions between HGF levels and physical activity (PA) during pregnancy (interaction p-value=0.05) and family history of hypertension (interaction p-value<0.001). Women with high HGF levels (≥ 2.29 ng/ml) and who were physically inactive during the pregnancy had a 2.7-fold higher risk of GDM compared with women who had low HGF levels and were physically active (aOR: 2.70, 95% CI: 1.05-6.90). Similarly, women with high HGF levels and family history of hypertension had a 3.21-fold higher risk of GDM compared with women with low HGF levels and no family history of hypertension (aOR: 3.21, 95% CI: 1.51-6.81). **Conclusion:** PA and family history of hypertension may modify association of HGF with GDM risk. Investigators have previously reported associations of HGF with PA and HGF gene variations with high blood pressure. Further investigations of mechanisms for observed interactions in GDM are needed.

PRETERM BIRTH AS A PREDICTOR OF FUTURE BLOOD PRESSURE, INFLAMMATION AND INTIMAL MEDIAL THICKNESS: THE CARDIA STUDY. JM Catov,* C Lewis, M Lee, MF Wellons, EP Gunderson. (University of Pittsburgh, Pittsburgh PA 15213)

Preterm birth (PTB <37 weeks) may be a marker of endothelial dysfunction and a pro-inflammatory phenotype associated with coronary artery disease. We studied 916 women (46% Black) with 1,181 live births between enrollment in the Coronary Artery Risk Development in Young Adults (CARDIA) study (age 18-30 years) and 20 years later (age 38-50 years). C-reactive protein (CRP) was measured at years 7, 15 and 20; Interleukin-6 (IL-6) and common carotid intimal medial thickness (IMT) were measured at year 20 using standardized methods. Blood pressure, lipids, and anthropometrics were measured at all visits and change according to PTB history was evaluated. IMT and inflammatory markers were also compared. Women with PTBs (n=226) had higher systolic blood pressures (SBP) after pregnancy (p=0.03), and SBP increased more rapidly over 20 years compared to women with term births (p<0.01 for group*time interaction). Results remained significant after removal of women with hypertension in pregnancy. Women with PTB vs. term births had borderline higher mean IMT at year 20 adjusted for age and BMI (difference=0.016 mm, p=0.06), and results were more robust when limited to women with no hypertension in pregnancy (difference=0.021mm, p=0.04). Adjustment for race significantly attenuated these differences. CRP, IL-6 and lipids did not differ after pregnancy according to PTB history, and were unrelated to IMT differences. Women with PTBs, regardless of hypertension during pregnancy, had higher blood pressure after pregnancy that increased over time more rapidly compared to women with term births. They also higher mean IMTs, explained in part by race but not explained by hypertension during pregnancy.

SEX OF THE FIRST BORN IN RELATION TO THE RISK OF STILLBIRTH, PRETERM BIRTH, POST-TERM BIRTH, PLACENTAL ABRUPTION, PREECLAMPSIA AND ECLAMPSIA IN THE SUBSEQUENT BIRTH. A STUDY OF 2.3 MILLION SECOND BIRTHS FROM DENMARK, FINLAND, NORWAY AND SWEDEN. *LH Mortensen, S Cnattingius, M Gissler, AN Iliadou, KK Melve, R Skjærven, AMN Andersen, HS Nielsen (University of Copenhagen, Copenhagen, DK-1014, Denmark)

Several studies have shown associations between a first born boy and subsequent risk of recurrent miscarriage, still birth, decreased birth weight and preterm birth. This study examines the association between sex of the first born and second born child in relation to the risk of stillbirth, preterm birth, post-term birth, placental abruption and preeclampsia/eclampsia in the subsequent birth in a sample of approximately 2.3 million second births and 0.7 million third births from the Medical Birth Registries of Denmark, Finland, Norway and Sweden 1980-2008. In second births following a first boy rather than a girl the risk was 9 % higher (95% confidence interval (95% CI): 4%-14%) for stillbirth, 8% higher (95% CI: 7%-9%) for preterm birth, 9% lower (95% CI: 8%-10%) for post term birth, 4% higher (95% CI: 2%-6%) for preeclampsia/eclampsia, and 9% higher (95% CI: 5%-13%) for placental abruption. We examined if a dose-response relationship between the number of boys in the two first pregnancies and adverse outcomes of the third pregnancy, and found mixed results. Even though the excess risks are small sex of the first born still explains a moderate part of the risk at the level of the population because the exposure is common. Further research should aim to identify biological pathways, which may increase the understanding of the onset of labor or the pathological processes involved in the studied outcomes.

SMOKING STATUS BY SELF REPORTS MAY DISTORT THE ASSOCIATIONS OF MATERNAL SMOKING WITH FETAL GROWTH AND PREECLAMPSIA. ZC Luo*, SQ Wei, P Julien, WD Fraser, and MIROS study group (*Department of Obstetrics and Gynecology, University of Montreal, Montreal, Canada)

Maternal smoking has been associated with impaired fetal growth but a decreased risk of preeclampsia in many studies, mostly based on self reports of smoking status. Misclassifications of smoking exposure may be common in self reports, and may potentially distort the true effects of smoking exposure. We assessed the associations of maternal smoking with fetal growth and preeclampsia in 605 women without chronic hypertension in the prospective pregnancy cohort from the International Trials of Antioxidants for the Prevention of Preeclampsia. Women were classified as smokers or non-smokers by self-reports and plasma cotinine levels (smokers, ≥ 0.5 ng/mL). The proportion of subjects with inconsistent smoking status by the two methods was 19.2%. Based on self reports, smoking was not associated with birth weight z score (mean difference -0.05, p=0.65) or the risk of preeclampsia (OR=0.74, p=0.54). In contrast, based on plasma levels of cotinine, smoking was associated with a much greater and significant reduction in birth weight z score (mean difference -0.40, p<0.01), and a marginally significantly increased risk of preeclampsia (OR=2.39, p=0.05). The results indicate that self reported smoking status may substantially underestimate the negative impact of maternal smoking on fetal growth. There is a need of biomarker-based approach in reassessing the association between smoking and preeclampsia in large cohort studies.

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RECURRENCE OF POSTPARTUM HEMORRHAGE - A STUDY OF 538,244 SWEDISH WOMEN. Oberg AS, Palmsten K*, Bateman B, Frisell T, Langstrom N, Hernandez-Diaz S (Harvard School of Public Health, Boston, MA, 02115).

Postpartum hemorrhage (PPH) is a major cause of maternal morbidity and the incidence of PPH has been increasing in developed countries. While prior PPH is a recognized risk factor for subsequent PPH, little is known about how the risk changes with multiple affected pregnancies, or by severity and subtype of prior PPHs. We report risks of PPH according to women's PPH history in the Swedish population. The cohort consisted of 538,244 primiparous women included in the Medical Birth Register between 1997-2009. PPH was defined using ICD-10 diagnostic codes, and was classified as severe if a procedure code for blood transfusion was also present. We estimated relative risks (RR) and 95% confidence intervals (CI) for PPH comparing women with and without a history of PPH. Risk of PPH was 5.5% in first pregnancies and 4% in later pregnancies. Compared to women without any previous PPH, women with PPH in one pregnancy had a greatly increased risk of PPH in subsequent pregnancies. PPH risk was 12.9% in the second pregnancy among women with PPH in their first pregnancy compared to 3.8% among women without PPH in their first pregnancy (RR 3.4; CI 3.2-3.5). In women with severe PPH in their first pregnancy, this RR was 4.2 (CI: 3.9-4.6). For third pregnancies, the risk was 24.2% when both prior pregnancies were affected compared to 3.4% among women without PPH in their first two pregnancies (RR 7.2; CI: 5.9-8.8). Similar patterns of risk were observed when PPH due to uterine atony was specifically considered. PPH risk is highest among women with >1 consecutive affected deliveries and in women with prior severe PPH; consideration should be given to triaging these women to centers with appropriate resources to manage PPH.

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MATERNAL BIRTH WEIGHT IS ASSOCIATED WITH SUBSEQUENT EARLY PREGNANCY VITAMIN D. *Huang JY, Qiu C, Miller R, Williams MA, Enquobahrie DA (University of Washington, Seattle, WA, 98195)

Objective: Early life experience has been associated with adulthood characteristics. Vitamin D levels during pregnancy have significant implications in the course and outcomes of pregnancy. We investigated whether maternal birth weight is associated with subsequent early pregnancy vitamin D. **Methods:** This study was conducted among 676 participants of the Omega study, a prospective cohort of women attending prenatal care clinics. Early pregnancy serum Vitamin D levels were measured. Maternal birth weight was collected using interviewer administered questionnaires and medical record review. We used logistic regression to model associations between maternal birth weight and risk of Vitamin D deficiency (serum vitamin D < 12 ng/mL). We also evaluated whether pre-pregnancy body mass index (BMI) or BMI trajectory modified this relationship. **Results:** A 100 gram higher maternal birth weight was associated with a 25% lower risk of Vitamin D deficiency during subsequent pregnancy (Odds Ratio = 0.76; [95% Confidence Interval: 0.65-0.89], $p < 0.0005$). This relationship was not modified by pre-pregnancy BMI or BMI at age 18 (p -interaction = 0.632 and 0.975, respectively). However, there was a different risk in mothers whose BMI increased from age 18 (OR = 0.54; [95% CI: 0.34-0.84], $p < 0.0005$) compared to women whose BMI decreased or stayed the same (OR = 0.81; [95% CI: 0.72- 0.91], $p < 0.0005$; p -interaction = 0.048). **Conclusions:** Higher maternal birth weight is associated with a lower risk of vitamin D deficiency during early pregnancy in a low-risk pregnancy cohort. This effect was stronger among those whose BMIs increased from age 18 to pre-pregnancy. Future research to replicate findings and assess mechanisms is warranted.

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COTININE IN NEWBORN DRIED BLOOD SPOTS AS A BIOMARKER TO MEASURE IN UTERO TOBACCO SMOKE EXPOSURE AT DELIVERY. J Yang, M Pearl, P Jacob, GN DeLorenze, N Benowitz, L Yu, C Havel, *M Kharrazi (Sequoia Foundation, Richmond, CA 94804)

Precise quantitation of in utero tobacco exposure is a major concern in retrospective epidemiologic studies. Newborn dried blood spots (NDBS), routinely and universally collected and stored by many states in the United States and elsewhere, are a valuable resource for retrospective studies. We evaluated NDBS cotinine as a biomarker to objectively measure in utero tobacco exposure using cotinine in umbilical cord blood as the criterion standard. A total of 335 subjects were identified from two previous studies with cord blood cotinine tested by liquid chromatography-tandem mass spectrometry (LC-MS/MS). Linked NDBS were obtained from the California Research-Ready Biospecimen Bank. Cotinine was measured in a single 6.35mm NDBS punch using the same LC-MS/MS method (quantification limit=3.1ng/ml). A second punch was tested in 70 with detectable levels of cotinine in the first punch to minimize false positive findings. Cotinine was consistently quantitated in 56 NDBS. NDBS cotinine predicted cord blood cotinine well (correlation coefficient=0.89). At a cut point of 10 ng/ml, NDBS cotinine had a sensitivity of 93.8% and a specificity of 99.7% in prediction of active smoking defined by cord blood cotinine ≥ 10 ng/ml. With the two punches from a single dried blood spot, we concluded that NDBS cotinine is an accurate biomarker of active levels of tobacco smoking around the time of delivery.

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OUTCOMES OF TEENAGE PREGNANCY AMONG ARAB-AMERICAN MOTHERS. *Imran Mahmud, BM BCh; Abdulrahman M. El-Sayed, DPH11; John J. Walbillich, MD; and Sandro Galea, MD, DrPH (Oxford University, Oxford, UK)

Background: The incidence of adverse birth outcomes including pre-term birth (PTB), low birth weight (LBW) and very low birth weight (VLBW) are higher among teenage mothers than mothers aged 20-35, and vary between ethnic groups. Moreover, Arab-American (AA) mothers have been shown to have lower risk for adverse birth outcomes relative to non-Arab Whites (NAWs), despite higher-risk maternal demographic profiles. Little is known about teenage pregnancy rates or their outcomes among AAs. **Study Question:** How does ethnicity influence risk of teenage pregnancy and outcomes thereof among AA mothers relative to NAW mothers? **Methods:** Data about 1,293,568 live singleton births to mothers under the age of 35 between 1989-2006 were compiled in Michigan, the state with the largest per capita AA population in the US. Mothers were stratified by age (<20 vs. 20-35) and ethnicity (AA vs NAW). We calculated univariate statistics and used bivariate chi-square tests to assess relationships between explanatory covariates and PTB, LBW and VLBW by ethnicity. We fit adjusted multivariable logistic regression models of each outcome by age stratified by ethnicity, as well as models of each outcome by ethnicity stratified by age. **Results:** AAs had a significantly lower proportion of births to teenage mothers relative to those aged 20-35 years (7.1% of all AA births vs 9.2% of NAW births ($p < 0.05$)). In models adjusted for potential confounders, teenage AA mothers had significantly higher odds of PTB compared to their AA counterparts aged 20-35 years (PTB AOR=1.25, 95% CI 1.06 – 1.47; LBW AOR=1.31, 95% CI 1.10-1.56), and no significant difference in odds of PTB compared to teenage NAW mothers. **Conclusions:** Although they may have lower rates of teenage pregnancy, Arab ethnicity does not confer a protective advantage against PTB relative to NAWs among teenage pregnancies as it does among the general population.

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CORRELATES OF STRESS AMONG PREGNANT HISPANIC WOMEN. *M. Silveira, P. Pekow, N. Dole, G. Markenson, L. Chasan-Taber (University of Massachusetts, Amherst, MA, 01003.)

Prenatal psychosocial stress has been associated with adverse pregnancy outcomes, even after controlling for known risk factors. Evaluation of correlates of stress may be useful in identifying high risk women particularly Hispanic women, a group with elevated rates of stress during pregnancy. We conducted this analysis among 1426 pregnant Hispanic women using data from Proyecto Buena Salud, a prospective cohort study conducted in Western Massachusetts. Cohen's Perceived Stress Scale (PSS-14) validated in English and Spanish was administered in early (mean=12.4 wks gestation), mid (mean=21.3 wks gestation) and late (mean=30.8 wks) pregnancy at which time bilingual interviewers collected data on sociodemographic, acculturation, behavioral, and psychosocial factors. High perceived stress was defined as a PSS score >30. Young maternal age (odds ratio (OR)=0.6; 95% Confidence Interval (CI) 0.4-0.9 for <19 vs. 19-23yrs), pre-pregnancy consumption of alcohol (OR=2.2; 95% CI 1.4-3.5 for >12 drinks/mo vs. none) and smoking (OR=2.2; 95% CI 1.3-3.7 for >10 cigarettes/day vs. none) were associated with high perceived stress during early pregnancy. Furthermore, higher annual household income (OR=0.4; 95% CI 0.1-0.9 for >\$30,000 vs. <\$15,000), greater number of adults in the household (OR=1.8; 95% CI 1.1-3.0 for ≥3 vs. 1) and language preference (OR=0.6; 95% CI 0.4-1.0 for Spanish vs. English) were associated with high stress during mid-pregnancy. Likewise, annual household income was inversely associated with stress during late pregnancy. Our results have important implications for incorporation of routine screening for psychosocial stress during prenatal visits and implementation of psychosocial counseling services for women at high risk.

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GEOGRAPHIC DISPARITY IN CHILDREN'S HOUSEHOLD SECONDHAND SMOKE EXPOSURE IN TAIWAN: A MULTI-LEVEL ANALYSIS. *FY Li, YL Liu, YC Lin and HL Huang (Kaohsiung Medical University, Kaohsiung, Taiwan 807)

Exposure to household Secondhand Smoke (SHS) poses a major health threat to children after an indoor smoking ban was imposed in 2009 in Taiwan. While new act protects non-smokers from SHS exposure in public spaces, it does not protect children from SHS exposure within the home environment. There is a disparity in geography and smoking in Taiwan; the highest prevalence of adult smoking was found in rural and mountain area. We therefore aimed to assess the geographic disparity in household SHS exposure in children and factors associated with SHS exposure using multilevel analysis. Data on household SHS exposure and related variables was obtained from Control of School-aged Children Smoking Study surveys of 2008-2009. Multistage cluster sampling was used to obtain a representative sample (n=5,276) among 3rd to 6th graders from 65 elementary schools, in southern Taiwan. Over 60% of children lived with a family member who smoked in front of them, and 37% of them were exposed to household SHS more than 4 days a week. SHS exposure was significantly associated with children attending rural and mountainous schools [adjusted odds ratio (aOR) =1.83 and 1.64, respectively] as compared to those in urban schools. The specific school students attended had a positive significant effect on the risk of SHS exposure. Individual-level characteristics having a significant relationship to SHS exposure were individual smoking behavior (aOR=2.07) and perceived not confidence to avoid SHS exposure while being with an elderly smoker(s) at home (aOR=1.89). The intervention program should enhance children do actively avoid exposure to SHS in home settings, and should be considered for implementation in rural and mountainous schools.

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GEOGRAPHIC VARIATIONS IN ALL-CAUSE MORTALITY IN JAPAN: COMPOSITIONAL OR CONTEXTUAL? *E. Suzuki, S. Kashima, I. Kawachi, and S. V. Subramanian (Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama, Japan)

While Japan has the lowest mortality in developed world, the magnitude and patterning of geographic inequalities within Japan remains less understood. Using the 2005 vital statistics and census data among those aged 25 or older, we examined the social and geographic inequalities in all-cause mortality in Japan. We estimated gender-specific two-level logistic regression to model mortality risk as a function of age, occupation, and residence in 47 prefectures. There were substantial differences in mortality risk by occupational categories when we adjusted for age such that, compared with production process and related workers, odds ratios (ORs) ranged from 0.96 (95% confidence interval (CI): 0.93-0.99) among clerical workers to 4.05 (95% CI: 3.95-4.16) among service workers in men, whereas they ranged from 0.97 (95% CI: 0.92-1.02) among clerical workers to 16.27 (95% CI: 14.17-18.86) among security workers in women. Adjusting for age and occupation, there were substantial differences in mortality risk across prefectures with the ORs ranging from 0.87 (Okinawa prefecture) to 1.19 (Aomori prefecture) for men and from 0.86 (Shimane prefecture) to 1.13 (Aichi prefecture) for women. To explore the possible contextual effects by area-level deprivation, three prefecture-level socioeconomic status variables (i.e., Gini's coefficient of yearly income, average yearly income, and average savings) were entered into the models. There was a suggestion of an inverse association between average savings and mortality among those aged less than 65 (primarily in men). The present findings demonstrate the presence of the geographic inequalities in the risk of dying in Japan.

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DEPRESSION AND DISTRESS IN ADULTS WITH TYPE 2 DIABETES: DOES THE NEIGHBOURHOOD ENVIRONMENT MATTER? *G. Garipey, N. Schmitz (McGill University, Montreal, Quebec, Canada)

Depression and distress are frequent in people with diabetes and have detrimental effects on disease outcomes. The neighbourhood environment is thought to affect mental health and may be particularly relevant for people with diabetes, who rely more on their local area for resources. Our objective was to investigate if neighbourhood characteristics are associated with depression and disease-specific distress in adults with diabetes. We used data from a community sample of 600 adults with type 2 diabetes from Quebec. We collected information on perceived neighbourhood environment from phone interviews. We conducted a factorial analysis to combine the neighbourhood items into meaningful constructs. We assessed high depressive symptoms from the Patient Health Questionnaire and high distress from the Diabetes Distress Scale. We performed logistic regressions, adjusting for socioeconomic and lifestyle variables. Factorial analysis uncovered 3 important neighbourhood constructs: order (social and physical order), culture (social and cultural environment) and access (access to services and facilities), with higher score indicating better neighbourhood qualities. All 3 constructs were significantly associated with high depressive symptoms; order and culture were associated with high distress [high depressive symptoms adjusted OR (AOR) 0.8 (95% confidence interval 0.7-0.9), 0.8 (0.6-0.9) and 0.8 (0.7-1.0) and high distress AOR 0.8 (0.7-0.9), 0.8 (0.7-0.9) and 0.9 (0.8-1.1), for order, culture and access scores, respectively]. Neighbourhood characteristics are associated with high depressive symptoms and diabetes distress in people with type 2 diabetes. Clinicians may want to consider the neighbourhood environment of their diabetic patients when assessing and addressing mental health.

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SOCIAL CAPITAL AND INSOMNIA: AFTER THE 3.11 EARTHQUAKE AND TSUNAMI IN JAPAN. *Toru Tsuboya, Takashi Watanabe, Yusuke Tsugawa, Ichiro Kawachi and Ichiro Tsuji (Tohoku University, Sendai, Miyagi, Japan)

Mental health problems are becoming more and more crucial among the survivors living in the area affected by earthquake and tsunami. The Ministry of Health, Labour and Welfare reported that about 40% of survivors were suffering from insomnia. Social capital (SC) is reported to associate with mental health. We generated the hypothesis that SC in community is related with and could alleviate insomnia in survivors. To investigate the association between SC and insomnia, we used a cross-sectional data of 997 survivors who lived in shelters/temporary housings, located in giant-tsunami-affected area. In May 2011, we delivered a self-reported questionnaire to the survivors. The Athens Insomnia Scale (AIS) was used to evaluate insomnia. SC was measured by trust, reciprocity and communication frequency. Each SC score was rated on a scale of 1 (Strongly disagree) to 5 (Strongly agree) and was aggregated within each community. Community was defined by the postal code of shelters/temporary housings (21 communities) and divided into tertiles by SC in community. The logistic regression model was used to estimate odds ratio (OR) and 95% confidence intervals (CIs) for insomnia according to SC tertile and to adjust for potential confounding variables; age, sex, subjective economic status, and social support. Among 997 survivors, the OR for insomnia of those living in fair SC community was 1.6 (1.2-2.3), and that of in poor SC was 1.8 (1.2-2.7), compared those in rich SC community. The P value of trend test was 0.0015. SC was significantly related with incidence of insomnia. Sustaining community and keeping SC is important, as well as personal intervention, to improve the survivors' mental health.

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DISPARITIES IN HEALTH STATUS AND CARE ACCESS FOR YOUNG ADULT SEXUAL MINORITIES IN THE UNITED STATES. *KL Strutz, AH Herring, and CT Halpern (University of North Carolina, Chapel Hill, NC, 27516)

Concerned about the paucity of information on health and health care inequities for sexual minorities (including individuals identifying as lesbian/gay/bisexual and those with same-sex attractions/partnerships), the Institute of Medicine called for greater understanding of sexual minority health at every age. To address this call, we analyzed data from 14,582 young adults in the National Longitudinal Study of Adolescent Health to compare health status and access measures between sexual minorities (endorsing an indicator of same-sex attraction, same-sex romantic or sexual partners, or non-exclusively heterosexual identity) and the majority population, stratified by sex. After controlling for age, race/ethnicity, current education, and household income in binary or multinomial logistic models, sexual minority women and men were more likely to report diagnoses of sexually transmitted infections, migraines, depression, and anxiety; meeting depression criteria; and anti-anxiety medication use. They were also more likely to have received psychological counseling but more likely to be uninsured or to have foregone health care in the past year. The largest disparities by sex were in psychological counseling (odds ratio[OR]=2.57, 95% confidence interval[CI]=2.08-3.18) among minority women and anti-anxiety medication use (OR=3.16, 95%CI=1.79-5.55) among minority men. Disparities in other health measures were seen among minority women only. These results were consistent across sensitivity analyses with alternative definitions of sexual minority status. Additional confounders will be evaluated for inclusion in further analyses. This study suggests that health disparities among sexual minorities are evident in young adulthood.

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EFFECTS OF DIETARY PATTERN AND FOOD SUPPLY ENVIRONMENT AROUND THE SCHOOL ON BLOOD LIPIDS AMONG ADOLESCENTS IN TAIWAN. *CJ Yu, YJ Hung, WT Lin, CH Lee (Kaohsiung Medical University, Taiwan)

Blood lipids including triglyceride (TG), high- (HDL-C), low-density (LDL-C) and total cholesterol (TC) are vital components of metabolic syndrome. Fast-food restaurants and correlates are concentrated within a short walking distance from schools, exposing students to poor-quality foods. Factors that affect blood lipids may be linked to individual dietary intake, family socioeconomic status (SES) and food supply environment around the school. We conducted a multilevel-level study to clarify such concerns for adolescents in Taiwan. A total of 3784 junior-high school students from 36 different urbanization-level of schools participated in this study and offered blood samples (response rate, 72.4%). Individual factors including dietary habits and anthropometry examinations were collected. Food-related providers/shops around the schools within 300 and 600m were video-taped and counted. Multilevel regression models were used to evaluate multilevel effects on the level of blood lipids. Higher intakes of sweetened beverages and higher levels of family SES were significantly associated with higher levels of TG, HDL-C, LDL-C and TC. Such relationship was clearly evident among adolescents living in areas with high urbanization. Approximately 6-31% of blood lipids discrepancies between adolescents were related to school-level variations. The density of sugar drink shops around the school was a key contributor to the difference in blood lipids. 66.7% and 86.7% of schools in urban areas had 1 or more sugar drink shops within 300m and 600m of the school, respectively. In addition to individual dietary intake, our findings stress the effect of food supply environment around the school on blood lipids of adolescents.

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INDIVIDUAL AND COMMUNITY SOCIOECONOMIC DIFFERENCES IN MODERN CONTRACEPTIVE USE IN 10 NEWLY INDEPENDENT STATES. *T. Janevic T, S. Pallas, L. Ismayalova, E. Bradley (UMDNJ School of Public Health, Piscataway, NJ 08854)

Little is known regarding the association between socioeconomic factors and contraceptive use in the Newly Independent States (NIS). Using 2005-2006 data from Demographic Health Surveys (Armenia, Azerbaijan, and Moldova) and Multiple Indicator Cluster Surveys (Belarus, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Ukraine, and Uzbekistan), we examined associations between individual and community socioeconomic status with modern contraceptive use (MCU) among n=55,204 women. Individual socioeconomic status was measured using quintiles of wealth index and woman's education level (higher than secondary school, secondary school or less). Community socioeconomic status was measured as the percentage of households in the poorest quintile of the national household wealth index (0%, 0-25%, or greater than 25%). We used multilevel logistic regression to estimate associations adjusted for age, number of children, urban/rural, and socioeconomic variables, using appropriate sampling weights. We found that MCU varied from 14% (in Azerbaijan) to 58% (in Uzbekistan). Women with lower education had lower odds of MCU in all countries except in Ukraine and Uzbekistan, with odds ratios ranging from 0.6 (95% Confidence Interval=0.4, 0.7) in Azerbaijan to 1.2 (95%CI=1.0, 1.4) in Uzbekistan. Similarly, women in the lowest household wealth quintile had lower odds of MCU in all countries except Ukraine and Uzbekistan. Associations for community socioeconomic status were mixed; in Kyrgyzstan women in the poorest community wealth category had higher odds of MCU (aOR=1.7, 95%CI=1.2, 2.3), whereas in Kazakhstan and Uzbekistan they (aOR=0.6, 95%CI=0.5, 0.8; aOR=0.8, 95%CI=0.6, 1.0). Associations for community wealth and MCU in other countries were not significant. Individual socioeconomic status is a more important correlate of MCU than community socioeconomic status in most countries of the NIS, although community socioeconomic status is additionally associated with MCU in several Central Asian countries.

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NEIGHBORHOOD PSYCHOSOCIAL HAZARDS AND BINGE DRINKING AMONG OLDER ADULTS. *KE Rudolph, TA Glass, BS Schwartz. (Johns Hopkins, Baltimore, MD, 21205)

Older adults may become more vulnerable to negative health effects from alcohol as they age due, in part, to interactions with prescription medications and less efficient metabolism of alcohol. Stress may be a risk factor for problem drinking in late life. Several studies have linked neighborhood psychosocial hazards—neighborhood disadvantage, deterioration of the built environment, and disorder—with problem drinking in adults, but this relationship has not been examined in older adults. Using baseline data from the Baltimore Memory Study, a cohort study of adults aged 50-70 years living in 65 contiguous Baltimore City neighborhoods, we investigated the association between neighborhood psychosocial hazards (NPH) and the number of binge drinking days in the past month among non-abstainers (N=645). We used negative binomial regression with generalized estimating equations to estimate the relative number of binge-drinking days per month associated with a one-unit increase in neighborhood psychosocial hazards score. The association was estimated separately for males and females and was adjusted for age, disability, and household wealth. Residing in neighborhoods with higher psychosocial hazards scores was independently associated with more binge drinking for older females, but no association was observed for males in the adjusted model. For females, each one-standard deviation increase in NPH score was associated with 0.69% more binge drinking days per month (95% confidence interval: 1.24, 2.32; $p=0.001$). The findings were robust to a sensitivity analysis in which we used an alternative outcome: the average number of drinks per drinking occasion.

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DO HEALTH BENEFITS OF SCHOOLING ACCRUE IN CHILDHOOD AND ADOLESCENCE? *F. Lê and A. Diez Roux (University of Michigan, Ann Arbor, MI 48109)

The persistence of educational disparities in adult health after adjustment for adult financial circumstances suggests the presence of additional mechanisms through which schooling affects health. Unlike income, these cognitive and psychosocial mechanisms may already operate during the school years rather than appearing only in adulthood. Higher academic achievement may serve as a marker for accrual of the benefits of schooling. We used longitudinal data with rich individual, household, and area information for a national cohort of 2,546 children aged 3–14 at baseline to estimate the effects of academic achievement on general health status. We used individual fixed effects logistic regression to examine associations between improvement in academic achievement and changes in health status over a 5-year period. We then used marginal structural models to estimate the effect of higher 5-year academic achievement on health status 10 years after baseline while accounting for mutual influence of academic achievement and health on each other. In adjusted fixed effects models, a 1-standard-deviation improvement in academic achievement was associated with 0.84 ([95% confidence interval] 0.56–1.26) times lower odds of poor health status. In marginal structural models, 1-standard-deviation-higher average academic achievement was associated with a lower probability of poor health status 5 years later among girls (prevalence ratio [PR] = 0.75 [0.64–0.87]) but not boys (PR = 0.98 [0.79–1.21]). Our results suggest that non-income benefits of schooling for health may begin accruing early in life but reflect the complexity of the links between education and health. In particular, gender may play an important role in how academic achievement contributes to self-perceived health.

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EFFECTS OF CHILD AND ADOLESCENT HEALTH ON EDUCATIONAL PROGRESS. *F. Lê and A. Diez Roux (University of Michigan, Ann Arbor, MI 48109)

A better understanding of how childhood and adolescent health may affect schooling is important for understanding both the socioeconomic ramifications of poor early-life health and the well-documented relations between schooling and adult health. Using three waves of longitudinal data with rich covariate information on a national sample of 2,368 children aged 5–14 at baseline, we investigated how different patterns of health throughout early life were related to educational progress. In adjusted linear regression models, poorer general health status over a 10-year period was associated with fewer years of completed schooling at the end of follow-up. These associations were cumulative but not pattern-dependent ($p = 0.75$ for joint test of interaction terms between health status at different waves), and were stronger among children who were older at baseline: among participants aged 5–7, 8–10, and 11–14 at baseline, the average differences in years of completed schooling between participants with poor health status in all 3 waves and those with good health status in all 3 waves were -0.26 ([95% confidence interval] -0.73, 0.20), -0.48 (-0.83, -0.14), and -1.28 (-1.78, -0.78), respectively. Results were very similar from a sensitivity analysis on a subsample of sibling pairs using fixed effects models to control for differences stemming from familial characteristics. Our results document the emergence and compounding over time of health-related disparities in schooling at young ages, suggesting the presence of a vicious cycle between poor health and educational outcomes. Future research better characterizing how early-life health affects educational progress will ultimately be necessary for developing more effective interventions to reduce educational and health disparities.

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SOCIODEMOGRAPHIC VARIATION IN MEASURED SLEEP CHARACTERISTICS OF OLDER AMERICANS. *L. M. Kurina, J. -H. Chen, L. P. Schumm, R. A. Thisted, M. McClintock, L. Waite, D. Lauderdale (University of Chicago, Chicago, IL)

Sleep is emerging as a novel risk factor for chronic diseases, but the extent to which reported sleep-health associations may be confounded by sociodemographic factors is not known. Here we examine the distribution and correlates of 3-night averages of actigraph-measured sleep duration and fragmentation (an indicator of sleep quality) in a nationally representative multistage probability sample of adults aged 60-90 (National Social Life, Health and Aging Project). Actigraphy data were collected from a subsample of 796 individuals in 2010-11. Mean sleep duration was 6.6 hours, and its correlation with self-reported habitual sleep was 0.28. In multivariable regression models, older age was significantly associated with greater fragmentation ($p<0.001$) but not with duration. Women had longer duration (0.36 hours, $p=0.02$) and less fragmentation. Race/ethnicity was not related to duration, but there was a trend toward greater fragmentation among blacks ($p=0.06$). Greater household assets (in 5 levels) were very strongly associated with both longer duration (.24 hours per level, $p<0.001$) and lower fragmentation ($p<0.001$). Current marital status was not related to duration, but both the widowed and never married had greater fragmentation compared to married individuals ($p<0.01$); interestingly, marital status reduced the age effect on fragmentation. Wealth, which is not routinely ascertained, is very strongly associated with objective sleep duration and fragmentation among older adults. Other demographic risk factors for worse health in aging (race, age, marital status) were associated with greater sleep fragmentation, an indicator of worse sleep quality.

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EDUCATION AND HEALTH REVISITED: IS THE RELATIONSHIP CAUSAL? *Ross Macmillan (Policy Analysis and Public Management, Università Bocconi); Naomi Duke (Department of Sociology and Minnesota Population Center, University of Minnesota)

Previous research has consistently found a negative relationship between educational attainment and poorer health and mortality risk. There are two general explanations for this finding. The prevailing explanation is that the relationship is causal. Here a variety of mechanisms have been offered and explored. A second explanation maintains that the relationship is spurious – that one or more unmeasured or undetermined factors correlated with education are the real causes of better health. Using data from the National Longitudinal Survey of Youth – 1997, we re-examine the issue using a series of models that increasingly exert better controls for unmeasured heterogeneity, including family genetic heritage, pre- and neonatal exposures, and family-based health related norms and values, as well as community characteristics in early life, and enduring aspects of personality. We begin by replicating in these data the negative statistical relationship between two aspects of education, overall attainment and time-specific enrolment, and two measures of health, self-rated health and obesity. We then try to replicate the findings using random-effects and fixed-effects approaches. By considering education and health as individual traits that change over time, we control for factors that are persistent across time and have been typically outside the realm of much prior research. When these effects are controlled, the negative relationship between education and poorer health disappears, casting doubt on the causal interpretation of the negative relationship conventionally found. Implications for theory, research and public policy are discussed.

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SOCIAL NETWORKS OF HIV-POSITIVE WOMEN OF COLOR, SOCIAL SUPPORT AND MEDICATION ADHERENCE. *Lynne C. Messer, E. Byrd Quinlivan, Heather Parnell, Katya Roytburd (US EPA, Research Triangle Park, NC 27711)

Women of color (WoC) are disproportionately affected by HIV epidemic, in their infection rate, mortality, and loss to care. We explore the social networks of HIV+ WoC, their role in social support provision, and how network characteristics are associated with medical adherence among WoC in HIV care. Network data were collected from ~150 HIV-positive WoC patients at the University of North Carolina's Infectious Disease clinic (July 2011-January 2012). General Social Survey questions were modified to elicit egocentric network membership and member characteristics. Interviewers also asked validated social support, medication adherence, demographic, and other questions. Measures of network exposure, size, tie strength, density and support provision were constructed. Fixed-slope random-intercept multilevel linear regression models will result in beta coefficients and 95% confidence intervals for the relationship between network characteristics (level-two), social support (level-one) and self-reported treatment adherence (level-one). Women were equally distributed across education categories (less than high school (HS), HS, more than HS) and 65 percent (%) were under 50 years old. About 10% were in non-permanent housing and the majority (72%) were unemployed. Correlations among social support scales were moderate ($r=0.5$). In models containing sociodemographic variables only, unemployment and low education were significantly associated with lower levels of social support. Network data are being cleaned so network model results will be presented at the meeting. Social support may be important to HIV care adherence and social network structure and characteristics are important elements of support provision.

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SCHOOL INCOME INEQUALITY AND SEXUALLY TRANSMITTED INFECTIONS IN THE UNITED STATES. *G Harling, T Bärnighausen, SV Subramanian, I Kawachi (Harvard School of Public Health, Boston, MA 02115)

Despite considerable work on the health impact of income inequality, research on its links to sexually transmitted infections (STI) has been limited. Further, past work has not considered schools as a locus of inequality, despite both social comparisons and risky sexual behavior being common in this setting. We analyzed the association between school-level income inequality (Gini coefficient) and STI acquisition in the Add Health dataset. The study sample comprised 11,183 individuals with information on family income and adolescent/young adult STI diagnosis (self-reported or laboratory-confirmed Chlamydia, Gonorrhea or Trichomoniasis). Analysis using hierarchical models of individuals nested in schools found a threshold relationship, such that respondents from the two most unequal quintiles had similar, increased risk of STIs relative to others (Odds Ratio (OR): 1.90; 95% confidence interval (CI): 1.50-2.41). Adjusting for respondents' age, sex, race/ethnicity, parental education and school racial composition attenuated the relationship (OR: 1.16; 95% CI: 0.99-1.36). We considered whether this relationship could be accounted for by absolute or relative deprivation: inclusion of family income and a Yitzhaki index had little impact on the association; both measures independently predicted STI risk. Analyses stratified by race/ethnicity suggested that inequality effects might be stronger for Hispanics, absolute and relative deprivation effects stronger for Black non-Hispanics and all economic effects weaker for White non-Hispanics. It appears that school income inequality and relative deprivation, as well as own absolute income, each play a role in predicting STI acquisition in young adults in the United States.

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DIFFERENCE IN DIFFERENCE ESTIMATES OF THE EFFECT OF AN INCOME BENEFIT POLICY ON FOOD INSECURITY IN FAMILIES WITH YOUNG CHILDREN. R. Ionescu-Ittu*, M.M. Glymour, J.S. Kaufman (Harvard University, Boston, MA, 02115)

The universal child benefit (UCCB) is a 2006 Canadian policy that offers to families \$1200 per year for each child under age 6. Using data from cross-sectional Canadian health surveys from 2000-2009 (before and after the implementation of the UCCB), we assess the impact of the UCCB on self-reported food insecurity. We used a multivariable least squares difference-in-difference (DID) model with fixed effects for years. Eligible families were those with children aged 0-5; control families were defined as those with children aged 6-12, but no children aged 0-5. Data were analyzed at the individual level, with one respondent being randomly chosen from the eligible and control households. Each respondent assessed his perceived level of food insecurity on a 4-category scale, which was subsequently dichotomized (14% of the 32,500 respondents interviewed from year 2000 to 2009 experienced some level of food insecurity) As compliance with the policy exceeds 95%, the estimate yielded by the DID model is also interpreted as the effect on food insecurity of increasing family income by \$1200/year. Over the study period, food insecurity decreased and income increased in both eligible and controls. However, eligible families reported higher food insecurity and lower household income than controls in all years. With adjustment for secular trends and covariates, DID estimates suggest the UCCB policy caused a +930\$ (95% CI -87, +1946) increase in average household income of eligible families and a 1.5 percentage point (95% CI -3.5, +0.5) decrease in the prevalence of food insecurity among respondents living in eligible families. Our study suggests that income based interventions can reduce food insecurity.

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RECENT INJURY AND ALCOHOL USE BEHAVIOR AMONG ADOLESCENT ATHLETES: ANALYSIS OF 2007 YOUTH RISK BEHAVIOR SURVEY DATA. *GA Stringer, BK Lee (Drexel University, Philadelphia, PA 19102)

Purpose: Due to the adverse health outcomes of negative drinking behavior, predictors of alcohol use in high school athletes are important to identify. We investigated whether athletic injuries are associated with increased negative drinking behavior in the high school athlete population. **Methods:** Data from the 2007 Youth Risk Behavior Survey were examined to describe the association between recent athletic injury and recent alcohol use behavior in adolescent athletes in the United States ($n=7,333$). Propensity score weighted regression models were constructed to produce covariate-adjusted odds ratios. **Results:** After controlling for demographic variables and balancing risk behavior using propensity scores, recent alcohol use behavior was more frequently reported in adolescent male athletes with athletic injuries than in non-injured male athletes (recent drinking Odds Ratio=1.9, 95% Confidence Interval 1.5-2.4; binge drinking Odds Ratio=1.6, 95% Confidence Interval 1.3-2.0). This association was strongest in male athletes aged 15-16 years (recent drinking Odds Ratio=2.8, 95% Confidence Interval 1.2-3.6). Female athletes also show a slight increase in negative drinking behavior with recent injury. No relationship was found between athletic injury and drinking behavior in non-athletes. **Conclusions:** Among male adolescent athletes, recent athletic injury is associated with higher rates of risky drinking behavior. In addition to the general health concerns associated with adolescent drinking, increased alcohol consumption following injury could have negative consequences for rehabilitation. Further study is warranted to clearly describe alcohol use behavior in adolescent athletes with injury.

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CHARACTERISTICS OF SMOKERS WHO QUIT FOLLOWING COMPREHENSIVE TOBACCO CONTROL EFFORTS IN NEW YORK CITY. M. Johns*, M. H. Coady (New York City Department of Health and Mental Hygiene, Queens, NY, 11101)

In 2002 the New York City (NYC) Department of Health and Mental Hygiene implemented a comprehensive tobacco control policy involving taxation, smoke-free air legislation, large-scale nicotine replacement medication giveaways and anti-tobacco media campaigns. The adult smoking prevalence fell significantly between 2002 and 2010, from 21.5% to 14.0%. To study the impact of these population-based interventions, we examined the characteristics of “recent” former smokers – adults who quit since the tobacco control plan went into effect. Data from the 2010 NYC Community Health Survey, an annual cross-sectional survey of about 9,000 adults, were used to examine the characteristics of smokers who quit smoking since 2002. The prevalence of recent former smokers was estimated for various socio-demographics, including: age, race/ethnicity, sex, borough of residence, nativity, language, income level and health insurance status. Estimates were age standardized to 2000 United States population of adults 25 years and older. Among former smokers surveyed in 2010 41% (95% Confidence Interval: 38-45%) had quit since 2002. Recent former smokers were more likely to be between the ages of 25 and 44, non-white, low income, live in the Bronx, have less than a college degree and lack private insurance. These bivariate predictors were entered simultaneously into a regression model predicting the prevalence of recent former smokers. Age, race/ethnicity, income level and education remained significant predictors, explaining 22% of the variance. The results suggest that members of economically and socially disadvantaged groups were more likely to have quit smoking since 2002. Taxes and interventions that differentially affect members of these groups might be driving the recent decline in smoking in NYC.

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TRENDS IN LIGHT SMOKING IN NEW YORK CITY. *I.G. Mbamalu, S.M. Farley, M.H. Coady, and J. Mandel-Ricci (New York City Department of Health and Mental Hygiene, Queens, NY, 11101)

Smoking prevalence declined nationally from 21% to 19% between 2005 and 2010; yet during the same period ‘light’ smoking (≤ 10 cigarettes per day), increased from 16% to 22%. In 2002, New York City (NYC) launched a comprehensive tobacco control plan which included taxation, legislation, cessation, education, and evaluation. After implementing this plan, the adult smoking prevalence declined by 35% during 2002-2010. We assess changes in the characteristics of light daily smokers (< 11 CPD) from 2002 to 2010 and identify correlates of light versus heavy daily smoker (> 11 CPD) in 2010. We analyzed data from the NYC Community Health Survey (CHS), an annual cross-sectional population-based phone survey of 9,000 NYC adults aged ≥ 18 years. Descriptive statistics of light smokers were calculated per year. A multivariable logistic regression identified correlates of light vs. heavy smoking in 2010. From 2002 to 2010, light smoking increased from 31% to 37% ($p=.03$). Light smoking increased among Hispanics (26% to 37%, $p=.02$) and decreased among blacks (30% to 23%, $p=.05$). In 2010, compared to heavy smokers, light smokers were more likely to be minorities (black: Adjusted Odds Ratio=7.2, 95% Confidence Interval=3.4-15.0; Hispanic: AOR=5.9, 95%CI=3.0-11.6; other: AOR=3.8, 95%CI=1.4-10.4), female (AOR=2.7, 95%CI=1.6-4.6), smoke ≥ 1 hour after waking up (AOR=4.9, 95%CI=2.5-9.7), and to have purchased their last cigarette from a pack (AOR=2.6, 95%CI=1.3-5.3). Light smokers were less likely to allow smoking inside their home (AOR=0.5, 95%CI=0.3-0.8) and to have purchased their last cigarette outside of NYC (AOR=0.5, 95%CI=0.2-1.0). Tobacco control efforts should target light smokers, a growing subgroup that differ from heavy smokers.

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DISCRETE PATTERNS OF SUBSTANCE USE DURING SEX IN MEN WHO HAVE SEX WITH MEN: RESULTS FROM THE SILAS STUDY. *Meyer C, Smolenski DJ, Rosser BRS. (Univ. of Minnesota, Minneapolis, MN)

Men who have sex with men (MSM) comprise the largest proportion of Americans living with and at risk for HIV and AIDS. Drug use, particularly poly-drug use, has been associated with sexual risk behavior. Definitions of poly-drug use do not consider discrete patterns of drug use that may contribute differentially to behavioral risk. The aim of this study was to model and compare joint manifestations of drug use between episodes of protected anal intercourse (PAI) and unprotected anal intercourse (UAI). Adult MSM ($n=1,995$) were recruited from an MSM Internet site in 2010 to complete a survey. Men self-reported their sexual behavior (frequencies of PAI and UAI partners) and substance use during sex (collected for both PAI and UAI) in the past 90 days. This analysis focuses on the MSM ($n = 798$) who reported both PAI and UAI male sexual partners. Multi-group latent class analysis was used to model drug-use profiles. Three classes similar in structure were found for both UAI and PAI, including a poly-drug class, a nitrites-only class, and a non-using class. Classification distributions were as follows for (UAI/PAI), respectively: (12%/11%) in the poly-drug class, (26%/22%) in the nitrites-only class, and (62%/67%) in the non-using class. The poly-drug use risk difference for UAI compared to PAI was 0.01 (95%CI: 0.00, 0.03). The nitrites-only use risk difference for UAI compared to PAI was 0.05 (95% CI: 0.02, 0.07). Overall, the largest class for both UAI and PAI was the non-drug-use class. Contrary to expectations, poly-drug use was found during both PAI and UAI in MSM with little difference in prevalence between contexts. Although minimal, nitrites were more prevalent in the context of UAI as compared to PAI.

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IMPACT OF WORK STRESS AND JOB SATISFACTION ON ALCOHOL CONSUMPTION IN HIGH SCHOOL SENIORS: MODERATING EFFECTS OF ACADEMICS, PARENTS, PEERS, AND WORK ASPIRATIONS. *X. Liu, G. Li, and K. Keyes (Columbia University, New York, NY, 10032)

Background: Excessive alcohol use in youth can be detrimental to their health and academic performance. While parental and peer influence is robustly associated with alcohol use, few studies consider these effects within the context of adolescent work stress outside of the school environment. The purpose of this study is to determine the degree of interaction from these key exposure variables on work stress and the association with alcohol use and drunkenness. Methods: A cross-sectional sample of 74,169 grade 12 students surveyed annually for Monitoring the Future from 2005 to 2009 were included. Exposure variables were defined by self-reported perceptions towards school and work, and influences from parents and peers. Frequency of alcohol use and drunkenness were measured for the last 30 days and 12 months. Multivariate logistic regression analyses were performed and multiplicative interactions tested. Results: There was statistically significant interaction between peer influences and work stress on past-30 day alcohol use and drunkenness (p -value <0.05). Compared to those with high job satisfaction and peer influences, those who were low on both were 2.84 times more likely to drink in the past 30 days and 5.26 times more likely to be drunk. Academics and parent influence had a protective effect on frequency of alcohol use and drunkenness when job satisfaction was high, while work aspiration was protective when satisfaction was low. Conclusion: Results suggest that job satisfaction and work stress are important contexts for adolescent alcohol use, and that parent and peer influence on alcohol use should be considered within the framework of adolescent's job situation.

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INFLUENCE OF PERCEIVED EXPOSURE TO SMOKING IN MOVIES ON SMOKING CESSATION BEHAVIORS IN YOUNG ADULTS. *K. Choi, and J. Forster (University of Minnesota, Minneapolis, MN, 55454)

Perceived exposure to smoking in movies is shown to predict progression of smoking in teenagers; however, its influence on young adult smoking behaviors is unknown. We assessed the association between perceived exposure to smoking in movies and smoking cessation behaviors among young adult smokers (aged 18-23) participating in a population-based cohort study. With eight waves of data (six months apart), participants had seven inter-survey periods to change their smoking behaviors. Participants who reported smoking in the past 30 days at the beginning of each period were included in the analysis ($n=1475$). Smoking behavior was assessed at the beginning and the end of each period, and smoking cessation behaviors were defined as cessation (abstained from smoking in the past 30 days at the end of each period) and reduction in smoking frequency during each period. Perceived exposure to smoking in movies was assessed at the end of each period by asking how often participants saw actors and actresses smoking in movies (4-point Likert scale, from 1=never to 4=almost all the time), overlapped the time when smoking behaviors changed. We pooled data across periods using generalized linear models to account for clustering of responses by participants. We found that higher perceived exposure to smoking in movies was associated with lower likelihood of reduction in smoking after adjusting for demographics and peer smoking (odds ratio=0.87, $p=0.04$). Higher perceived exposure to smoking in movies also appeared to be associated with lower likelihood of cessation but the finding was not significant (odds ratio=0.91, $p=0.23$). Results suggested that perceived exposure to smoking in movies may influence young adult smoking cessation behaviors.

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PSYCHIATRIC PREDICTORS OF MARIJUANA USE ONSET: IDENTIFYING SENSITIVE PERIODS OF INFLUENCE. M Cerdá*, PM Bordelois, KM Keyes, D Pardini, KC Koenen (Columbia University, New York, NY 10032)

Psychiatric problems have been repeatedly identified as robust predictors of marijuana use onset; however our understanding of the developmental timing of influence remains limited. We examined the relation between symptoms of depression and conduct problems in early childhood (ages 6-7), middle childhood (ages 8-10), early adolescence (11-13), and late adolescence (14-17), and onset of marijuana use at each subsequent age. Analyses were carried out using data from the youngest cohort of the Pittsburgh Youth Study, a school-based sample of 500 boys followed yearly from ages 6-20. Marijuana use onset at ages 8-20 was estimated using discrete-time hazard models. Depression only at ages 6-7 was marginally or significantly associated with marijuana use onset at ages 9 (hazard ratio (HR): 4.97; 95% confidence interval (CI): 0.99-24.76), 13 (HR: 1.53; 95% CI: 1.00-2.34) and 15 (HR: 1.58; 95% CI: 0.94-2.66). In contrast, conduct problems were associated with marijuana use onset across a range of developmental periods, including age 6-7 conduct problems predicting age 10 (HR: 2.32; 95% CI: 1.95-2.76) and age 13 marijuana use (HR: 1.51; 95% CI: 1.02-2.22), age 8-10 conduct problems predicting age 12 use (HR: 1.73; 95% CI: 1.03-2.88) and 16 (HR: 1.93; 95% CI: 1.08-3.43) use, and age 11-13 conduct problems predicting age 14 (HR: 2.07; 95% CI: 1.28-3.36) use. This study illustrates the distinct developmental periods at which different psychiatric problems may increase the risk for marijuana use onset. While signs of depression in early childhood may increase risk for marijuana use across childhood and adolescence, conduct problems across childhood and adolescence produce a generalized vulnerability to marijuana use.

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INCORPORATING DYNAMIC MODELS INTO EPIDEMIOLOGIC STUDIES OF SUBSTANCE USE: AN EXAMPLE RELATING DAILY DRINKING MEASURES TO DEPRESSION. C. Mair* and P. Gruenewald (University of California Berkeley, Berkeley, CA, 94704)

The identification of dynamic systems is essential to our understanding of complex behavioral processes in epidemiology. Researchers frequently aggregate time ordered data and compare summaries across large groups of individuals, masking the important underlying dynamics (e.g., trajectory analyses). Expected dynamic associations between alcohol use and depression are complicated, and can serve as an illustration of the benefits derived from investigating these dynamics using autocorrelation functions and power spectra. Methods: We examined data from Project MATCH, a randomized clinical trial conducted to study the effectiveness of three types of 12-week treatment programs. All individuals ($n=1,553$) gave daily reports of the number of standard drinking units of alcohol consumed throughout the 12-week treatment period and in post-treatment for a total of 400 days. We examined the autocorrelation functions, partial autocorrelation functions, and averaged the power spectra for patients who were depressed vs. not depressed upon entry to treatment. Results: There are clear periodicities in drinking behaviors, and heterogeneities in drinking dynamics between individuals. The dynamics are autoregressive, and the average power spectrums are significantly different between depressed and non-depressed individuals. Conclusions: Aggregating time ordered data may hide significant dynamic processes. A careful examination of drinking dynamics and the differences in these dynamics based on depression status will greatly benefit theoretical and empirical analyses of these complicated dynamic processes.

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URINARY BISPHENOL A (BPA) CONCENTRATIONS AND EARLY REPRODUCTIVE HEALTH OUTCOMES IN WOMEN UNDERGOING IN VITRO FERTILIZATION (IVF). *S Ehrlich¹, P Williams¹, S Missmer¹, J Flaws², D Wright³, J Petrozza³, R Hauser^{1,3} (¹- Harvard School of Public Health, Boston MA; ²- University of Illinois at Urbana-Champaign, Urbana IL; ³- Massachusetts General Hospital, Boston MA)

BACKGROUND: BPA is widely used in the production of polycarbonate plastic and numerous other consumer products. Animal studies have demonstrated an association between BPA and poor reproductive outcomes, but few epidemiologic studies have been reported. **METHODS:** We evaluated the association between urinary BPA concentrations and early reproductive outcomes in 174 women who underwent 237 IVF cycles. Urinary BPA concentrations were measured by on-line solid phase extraction-HPLC-isotope dilution tandem mass spectrometry. Poisson and logistic regression models were used to evaluate the association of urinary BPA concentrations with measures of early reproductive outcomes, accounting for correlation among multiple IVF cycles in the same woman. **RESULTS:** Urinary BPA concentrations had a geometric mean (SD) of 1.53 (2.22) µg/L. We found significant trends of decreased number of oocytes, and normally fertilized eggs, and decreased estradiol levels (mean decreases of 101, 287 and 504 pg/ml for BPA quartiles 2, 3 and 4 compared to the lowest quartile, respectively; p-trend=0.003). The mean number of oocytes and normally fertilized eggs decreased by 28% and 30%, respectively, for the highest vs. the lowest quartile of BPA (p-trend <0.001). No significant associations were observed between BPA and embryo cleavage rate or blastocyst formation. **CONCLUSION:** Higher BPA levels are associated with significantly decreased ovarian response, oocyte maturation and normal fertilization. BPA may act as an endocrine disruptor in women undergoing fertility treatment.

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PREGNANCY AFTER TREATMENT FOR CERVICAL CANCER PRECURSOR LESIONS. S. Weinmann*, A. Naleway, E. Masterson, M. Vandermeer, T. Dodge (Center for Health Research, Portland, OR, 97227), B. Arondekar, J. Fernandez, G. Krishnarajah (GlaxoSmithKline, Philadelphia, PA, 19102), G. Swamy, E. Myers (Duke University, Durham, NC, 27708)

The objective of our study was to determine if undergoing surgical treatments for cervical cancer precursor lesions affected women's time to pregnancy. This was a retrospective matched cohort study conducted among women 14-53 years of age at Kaiser Permanente Northwest from 1998 to 2009. The exposed group consisted of women who had an excisional (e.g., cold-knife conization or large-loop excision), or ablative (e.g., laser or cryotherapy) cervical procedure. The unexposed were women with no cervical procedures frequency-matched on age and year of procedure date. Women whose electronic medical records contained evidence of a previous hysterectomy, oophorectomy, or a diagnosis of genetic infertility and women with <6 months in the health plan before the reference date were excluded. We compared pregnancy rates between the two groups. We used Cox proportional hazards regression modeling to calculate hazard ratios (HRs), adjusting for propensity to receive surgical treatment and other demographic and clinical covariates. We identified 4,138 women with a history of one of the above cervical procedures and 82,760 age-matched unexposed women. The pregnancy rate among exposed women was 138 per 1,000 compared to 91 per 1,000 among unexposed women. The crude HR was 1.4 (95% CI 1.3-1.5). After adjusting for time-varying contraceptive use, age, race/ethnicity, and propensity score, the HR was 1.1 (95% CI 1.0-1.2). These results suggest that, in this population, women who underwent surgical treatments for cervical cancer precursor lesions did not have subsequent reductions in time to pregnancy.

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IMPACT OF VAGINAL LUBRICANTS ON FECUNDABILITY. *AZ Steiner, DL Long, C Tanner, AH Herring (University of North Carolina, Chapel Hill, NC 27599).

Over-the-counter vaginal lubricants have been shown to negatively affect in vitro sperm motility. To determine the impact of vaginal lubricant use during procreative intercourse on natural fertility, we conducted a prospective, time-to-pregnancy cohort study of 296 women, 30-44 years old, with no history of infertility, who had been trying to conceive for less than 3 months. Women completed a baseline questionnaire on vaginal lubricant use. They subsequently kept a daily diary for 3 months to record menstrual bleeding, intercourse, and vaginal lubricant use and conducted standardized pregnancy testing. Diary data were used to determine the fertile window and delineate lubricant use during the fertile window. A proportional hazards model was created to calculate fecundability ratios (FR) with any lubricant use in the fertile window considered as the time-varying exposure. Overall, 75 (25%) women stated in their baseline questionnaire that they use vaginal lubricants while attempting to conceive. Based on their prospective daily diary data, 57% of women never used a lubricant, 29% occasionally used a lubricant, and 14% used a lubricant frequently. Women, who used lubricants during the fertile window had similar fecundability to those women who did not use lubricants in unadjusted analyses (FR 1.37, 95% Confidence Interval (CI): 0.80, 2.36) and after adjusting for age, partner race, and intercourse frequency in the fertile window (FR 1.05, 95% CI: 0.59, 1.85). Lubricants are commonly used by couples during procreative intercourse. Lubricant use during procreative intercourse does not appear to reduce the probability of conceiving.

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BODY SIZE AND TIME-TO-PREGNANCY IN THE BLACK WOMEN'S HEALTH STUDY. *L.A. Wise, J.R. Palmer, L. Rosenberg (Slope Epidemiology Center, Boston, MA 02215)

Little is known about predictors of infertility in black women. High body mass index (BMI; kg/m²) has been consistently associated with reduced fertility in studies of white women, while studies of central obesity have been inconclusive. We assessed the association between selected anthropometric factors and time-to-pregnancy (TTP) in participants aged 21-45 years from the Black Women's Health Study. Data on BMI, waist circumference, and hip circumference were reported in 1995. In 2011, women reported their TTP (in months) for each planned pregnancy resulting in a birth, the calendar year of each birth, and whether they used fertility medications to conceive. Discrete-time Cox frailty models were used to estimate fecundability ratios (FRs) and 95% confidence intervals (CI), controlling for covariates and accounting for multiple pregnancies per woman. Those who did not conceive within 12 months were censored at that time, as were nulliparous women who reported having tried to conceive for ≥12 months without success. During 1995-2010, there were 2,470 planned pregnancy attempts reported by 1,840 women; 1,916 (78%) of attempted pregnancies occurred within 12 cycles. High BMI was associated with a delay in TTP. Relative to BMI 18.5-24.9, FRs corresponding to BMI categories of <18.5, 25.0-29.9, 30.0-34.9, and ≥35.0 were 1.11 (95% CI=0.79-1.58), 0.89 (95% CI=0.75-1.05), 0.75 (95% CI=0.60-0.94) and 0.68 (95% CI=0.52-0.89), respectively. Large waist-to-hip ratio (≥0.86 vs. <0.71) was also associated with delayed TTP (FR=0.73, 95% CI=0.55-0.98), after controlling for BMI. These data suggest that both overall and central obesity are associated with reduced fertility in black women.

INFERTILITY AND RISK OF GESTATIONAL DIABETES MELLITUS: A PROSPECTIVE ANALYSIS OF 37,265 BIRTHS. *Deirdre K. Tobias, Jorge Chavarro, Michelle A. Williams, Germaine Louis, Frank B. Hu, Cuilin Zhang (Harvard School of Public Health, Boston, MA)

Background: Delayed conception and infertility have been related to a greater risk of pregnancy loss and adverse perinatal outcomes. Whether a history of infertility is associated with common pregnancy complications such as gestational diabetes mellitus (GDM) has not been evaluated. Methods: We prospectively assessed the association between history of infertility and its primary causes with GDM risk among 37,265 single live births reported among 25,360 women in the Nurses' Health Study II cohort. Questionnaires were distributed every 2 years (1989-2001) to update fertility status, lifestyle, and health-related outcomes. Multivariable logistic regressions with generalized estimating equations were used to estimate the risk ratio (RR) and 95% confidence intervals [95% CI]. Results: GDM occurred in 1,348 (3.6%) pregnancies. History of infertility was reported by 5,720 (23%) participants and was significantly associated with a 39% greater risk of GDM (RR=1.39 [1.23, 1.57], $p<0.0001$) after adjustment for age, BMI, weight gain, diet score, smoking, physical activity, alcohol, family history of diabetes, and ethnicity. Primary reasons for infertility associated with GDM risk included ovulation disorder (RR=1.48 [1.22, 1.80], $p<0.0001$) and tubal disease (RR=1.77 [1.10, 2.83], $p=0.018$). Endometriosis (RR=0.95 [0.62, 1.45], $p=0.80$), and male factor (RR=1.31 [0.90, 1.92], $p=0.17$) were not associated with GDM risk. Conclusions: These novel findings suggest infertility, particularly with origins of ovulation disorders and tubal blockage, is significantly associated with GDM risk. Further research is needed to identify mechanisms or the common underlying metabolic dysfunction between delayed conception and GDM.

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SPATIAL DYNAMICS OF HIV-1 INFECTION IN RAKAI, UGANDA. Grabowski M*, Lessler J, Redd A, Bwanika J, Lutalo T, Nalugoda F, Kagaayi, J, Serwadda D, Laeyendecker O, Wawer M, Gray R. (Johns Hopkins University, Baltimore, MD 21205)

There is little empirical data on small scale spatial dynamics of HIV-1 transmission. We used spatial point pattern data from 8,105 households to study spread of HIV infection over one year in a rural African setting. Data were from 13,395 sexually active adults in 43 communities between 2007-08 enrolled in a longitudinal cohort study in Rakai District, Uganda. We examined the tendency of HIV-incident cases to cluster with other incident cases and HIV-negative and HIV-prevalent positive persons using spatial K-functions. We also derive a likelihood to estimate the risk of infection due to within and outside household transmission, and factors associated with extra-household acquisition of HIV including distance to new and long-term infected individuals. Our results suggest strong spatial clustering of new HIV infections within households, such that new cases were 17 and 4 times more likely cluster together than with HIV-negative or prevalent positive persons, respectively ($p<0.01$). This clustering was associated with increased HIV risk; susceptible persons living with a prevalent HIV+ person had an 8.3% chance (95% CI: 5.9-11.5%) of seroconverting, while a susceptible person living with an incident case had a 14.2% chance of seroconverting (95% CI: 7.4-25.3%) in one year. There was also spatial clustering among prevalent HIV-positive persons outside of households up to 3 kilometers ($p<0.05$). In conclusion, we find strong spatial clustering of HIV-incident cases with one another within and outside the household at local spatial scales. These findings have important implications for design of targeted HIV interventions.

CONCURRENT SEXUAL PARTNERSHIPS AND HIV TRANSMISSION – A CASE-ONLY APPROACH FOR A SEEMINGLY INTRACTABLE PROBLEM. *K.E. Wirth, E.J. Tchetgen Tchetgen (Harvard School of Public Health, Boston, MA, 02115)

Concurrent sexual partnerships have been proposed as an explanation for the HIV hyper-epidemics observed in Sub-Saharan Africa. However, empirical tests of the concurrency hypothesis have been fraught with methodological missteps. Principal among these has been identifying and estimating the correct causal effect of interest. Concurrent sexual partnerships are postulated to increase the risk of HIV transmission to the partners, not HIV acquisition in the index case effectively violating the no interference assumption typically made for causal inference. Thus, any analysis that correlates exposure to concurrent sexual partnerships and HIV infection within the same individual will fail to identify any potential effect of concurrency. The presence of interference has led some to suggest that “traditional epidemiological study designs and methods cannot be used to identify the effects of concurrency” (PLoS ONE, 5(11), 2010, doi:10.1371/journal.pone.0014092). We demonstrate how causal inference ideas can be combined with a case-only design to identify the causal effect of concurrency by the male partner on the female partner's HIV status in heterosexual couples. Specifically, under an assumption of no unmeasured confounding we identify the total effect of concurrency by regressing the male partner's concurrency on his HIV status in couples where the female partner is HIV positive. The proposed design leverages the assumption of no direct effect of concurrency on HIV status within the male partner inherent to the concurrency hypothesis while reducing uncertainty.

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SEQUENTIAL COX MODELS TO ESTIMATE THE EFFECT OF ANTIRETROVIRAL THERAPY ON TIME TO AIDS OR DEATH. *D Westreich, SR Cole, PC Tien, L Kingsley, F Palella, SJ Gange (Duke University, NC)

While marginal structural models have been increasingly adopted in epidemiologic studies with time-dependent confounding, Robins' nested structural models remain underused, perhaps due to conceptual and technical difficulties encountered with implementing g-estimation. Hernán et al. have observed that parameter inferences from a specific structural model coincide with the summary estimate from a set of Cox proportional hazards models fit to a derived from accumulating data nested in time. Each of the time-nested Cox models mimics trials comparing those persons newly exposed to unexposed persons. We apply and illustrate this sequential Cox model approach to estimate the effect of antiretroviral therapy initiation on time to incident clinical AIDS or death in 1498 HIV+ adults (median age 39; 66% female; 39% Caucasian) followed for approximately 7300 person-years, with 323 incident AIDS cases and 39 deaths. We conducted 3 analyses: (1) an intent-to-treat analysis (where exposure is fixed at baseline), which yielded a hazard ratio (HR) of 0.70 (95% confidence limits [CL], 0.59, 0.85); (2) an analytically naïve per-protocol analysis (where we censored at non-adherence to exposure), which yielded a HR=0.55 (95% CL 0.42, 0.72); (3) and a modified per-protocol analysis (where we censored as above, then accounted for informative censoring due to measured variables using inverse probability weights), which yielded a HR=0.37 (95% CL 0.23, 0.61). In all analyses, we adjusted for baseline-confounders; including age, race, sex, CD4 cell count, plasma HIV RNA level, and calendar date. A sequential Cox approach to estimating a nested structural models is intuitive, feasible and under assumptions (i.e. exchangeability, positivity, consistency) illuminates the analysis of observational data with complex time-dependent confounding.

IMMUNOLOGIC EFFECTS OF MEASLES INFECTION AMONG HIV-POSITIVE CHILDREN AND ADOLESCENTS IN BOTSWANA. *K.E. Wirth, E.R. Wolf, A. Ho-Foster, D. Goldfarb, M.A. Tolle, I. Makone, C. Jacovides, M. Chise, A.P. Steenhoff (Harvard School of Public Health, Boston, MA, 02115)

Botswana, with an HIV epidemic second only to Swaziland, was one of several countries in Southern Africa affected by a widespread measles outbreak between 2009 and 2010. We retrospectively examined the medical records of 2,011 pediatric (0-18 years) HIV patients receiving care at the Botswana-Baylor Children's Clinical Center of Excellence to investigate the effect of measles on changes in CD4%. Measles cases were classified as patients who had a positive measles IgM or met World Health Organization criteria for clinical measles. We conducted multivariable linear regression with generalized estimating equations to adjust for age, gender, nutritional status, viral load, HIV disease stage, and exposure to and duration of antiretroviral therapy (ART). We identified 195 measles cases with a baseline median CD4% of 29% (inter-quartile range: 23%-35%); 85% were on ART of whom 97% had undetectable viral load at baseline. Median age at measles diagnosis was 13.2 years. In the first month following measles infection, CD4% declined by 5.5 percentage points (95% confidence interval: 0.1-11.0). Subsequent recovery was observed; we found no significant differences in CD4% 6 months post-diagnosis compared to baseline ($P=0.44$). In contrast, CD4% remained stable throughout follow-up in a random subsample of 585 patients who did not acquire measles. Measles infection was associated with temporary clinically significant immunosuppression among HIV-infected children in Botswana. This decline in immune function may have implications for morbidity and mortality in HIV-measles co-infected children, including those virologically suppressed on effective ART.

FROM OCEANOGRAPHY TO EPIDEMIOLOGY—THE MANY CAREERS OF ANCEL KEYS. *Sarah Tracy (University of Oklahoma, Norman, OK)

Physiologist Ancel Keys played a pioneering role in the study of cardiovascular disease (CVD) and was one of the founders of the field of CVD epidemiology. His comparative, ecological study of diet and heart disease, the Seven Countries Study, is a milestone in the history of population-based attempts to understand the role of risk factors in shaping disease outcome. Keys' efforts to promote a diet low in saturated fat within medical and public health circles, as well as in the world-at-large, are likewise well-known. Since 1990, the American Heart Association Council on Epidemiology and Prevention has honored Keys with an eponymously titled lecture. Yet, if Keys' work as a CVD researcher is widely recognized, few are aware of his evolution as a scientist prior to this point. This presentation explores the "many careers" of Ancel Keys by examining his life as a biological oceanographer studying tidal pool fish (his Ph.D. research at Scripps Institution of Oceanography); a respiratory physiologist developing laboratory methods that could be applied to a variety of field situations (his leadership of the Harvard Fatigue Laboratory-based International High Altitude Expedition of 1935); and a nutritional physiologist investigating the relationships among diet and human behavior, metabolism, and performance (his work on the K Ration and his starvation and rehabilitation research during World War II). This paper will demonstrate the ways in which these early research experiences shaped Keys' interests and methodologies as a scientist and intellectual entrepreneur. In examining the "logic" of Keys' life, it will link the history of CVD epidemiology to both the development of the field sciences and the ambitious holistic agenda of "human biology" advanced by biometrician Raymond Pearl and biochemist and philosopher Lawrence J. Henderson. In short, the paper attempts not only to understand Keys, but also to offer CVD epidemiologists a new perspective on the 20th-c. history of their discipline.

A COMPARISON OF TRADITIONAL AND COMPETING RISKS APPROACHES TO ASSESS PROGRAMMATIC OUTCOMES IN AN OBSERVATIONAL HIV TREATMENT COHORT IN SOUTH AFRICA. K Shearer, M Maskew, *M Fox (HE²RO, University of the Witwatersrand, Johannesburg, South Africa and Boston University, Boston, MA, USA)

Introduction: Success of HIV treatment programs is typically judged through long-term assessment of mortality and program attrition, yet competing risks are often overlooked. Ignoring competing risks may result in overestimation of outcomes and standard survival analysis methods (e.g. Kaplan-Meier curves (KMC) and proportional hazards (PH)) may be biased. **Methods:** We used data from an observational clinical cohort of HIV-infected patients initiating antiretroviral therapy (ART) at Themba Lethu Clinic in South Africa. KMC for mortality, loss to follow-up (LTF defined as ≥ 3 months since last scheduled visit), and transfer were compared to crude cumulative incidence curves (CIC) accounting for competing risks while Cox PH models assessing the association between outcomes and median CD4 were compared to competing risk regression (CRR) models. **Results:** Between April 1, 2004 and March 31, 2010, 13,339 patients initiated ART. At dataset closure (August 2011), 11.0% had died, 27.1% were LTF, and 9.0% had transferred to another facility. Over 88 months, the KMC overestimated mortality by 14.9% (KMC 13.9% vs CIC 11.8%), LTF by 18.1% (KMC 46.8% vs CIC 38.3%), and transfer by 30.6% (KMC 17.2% vs CIC 12.0%) compared to corresponding CICs. The hazard ratio (HR) from a Cox PH model overestimated the hazard of mortality by 1.6% (HR 2.51 vs 2.47), LTF by 10.4% (HR 1.04 vs 0.94), and transfer by 9.1% (HR 1.05 vs 0.97) compared to CRR models. **Discussion:** KMCs and Cox PH models consistently overestimated outcomes compared to CICs and CRR models. Failing to use a competing risks approach may misrepresent measures of programmatic effectiveness.

MATERNAL PREGNANCY GLUCOSE LEVELS AND ADIPOSITY IN 11 Y-OLD GIRLS: THE CYGNET STUDY. A. Kubo*, A. Ferrara, C. Laurent, A.S. Mirabedi, L.C. Greenspan, J. Deardorff, G.C. Windham, C.P. Quesenberry, R.A. Hiatt, L.H. Kushi (Division of Research, Kaiser Permanente, Oakland, CA 94612)

The prevalence and severity of childhood obesity have increased in recent years. It has been hypothesized that exposure to high levels of maternal blood glucose in utero increases the risk of obesity later in life, though the evidence is sparse. We evaluated this association in 224 mother-daughter pairs who participated in the Cohort study of Young Girls' Nutrition, Environment, and Transitions (CYGNET), based in Kaiser Permanente Northern California. Exposure variables included: 1) first quartile (Q) of maternal pregnancy glucose levels at 1 hr after 50g glucose challenge test (GCT) among those with normal GCT result (referent); 2) 2nd-4th Q of glucose level among those with normal GCT result; and 3) gestational diabetes (GDM) defined by the ADA plasma glucose cut-offs. Outcomes included 4 measures of girls' adiposity at age 11y: 1) ≥ 85 th age-specific percentile for body mass index (BMI); 2) percent body fat (%BF); 3) waist-height ratio (WHR); and, 4) waist circumference (WC). After adjusting for race/ethnicity and maternal pre-pregnancy BMI, having a mother with GDM significantly increased the girls' risk of being in the 4th quartile of %BF, WHR and WC at age 11 y compared to the referent (Q1 glucose level) [OR=4.3, 95% CI 1.1-17.2; OR=7.8, 95%CI 1.5-40.4; OR=5.3, 95%CI 1.4-20.9, respectively]. The risk of girls' obesity was also increased for those who have mothers without GDM but with higher (2-4th Q) pregnancy glucose levels, particularly when the mother was also overweight or obese before pregnancy. Maternal pregnancy glucose level appears associated with increased risk of offspring adiposity.

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ASSOCIATIONS BETWEEN KIDNEY DISEASE AND LOW VITAMIN D ARE MODIFIED BY RACE AND INCOME. *L. Plantinga, W. McClellan (Emory University, Atlanta, GA 30033)

Low vitamin D (LVD) is common, particularly in the poor and black U.S. populations. We examined whether the associations between kidney disease severity and LVD differ by both race and income. Among 3,005 adult participants (>20 years) of black or white race in the 2005-2006 National Health and Nutrition Examination Survey, reduced kidney function was categorized by estimated glomerular filtration rate (>60, >45-<60, and >15-<45 ml/min/1.73 m²); albuminuria was defined as no, micro-, and macroalbuminuria (<30, >30-<300, and >300 mg/g albumin:creatinine); and high/low income was defined by poverty index ratios of >4/<4. Adjusted (age, sex, race) prevalence of LVD (25-OH vitamin D<30 ng/ml) was calculated within subgroups using logistic regression and predictive margins, with U.S. population-based weighting. We found that, regardless of disease severity, black race and lower income were associated with higher prevalence of LVD. *E.g.*, among those with macroalbuminuria, LVD prevalence was: white/high income, 61.1%; white/low income, 89.5%; black/high income, 91.8%; and black/low income, 94.0%. The association between LVD and kidney function was modified by both race (*P*_{int}=0.038) and income (*P*_{int}=0.030); similarly for the association with albuminuria (*P*_{int}=0.058 and 0.124). Three-way interaction testing suggested that both race and income modified the association between LVD prevalence and albuminuria (*P*_{int}=0.115) but not kidney function (*P*_{int}=0.467). In summary, our results suggest that not only black but also low-income white persons with kidney disease may be at greater risk of LVD and its consequences, relative to their white, higher-income counterparts.

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IMPACT OF DURATION AND AGE AT ONSET OF HYPERTENSION ON COGNITION IN OLDER MEN. *M.C. Power, E.J. Tchetgen Tchetgen, J. Schwartz, and M.G. Weisskopf. (Harvard School of Public Health, Boston, MA, 02115.)

The apparent age-dependent association between hypertension and cognition suggests that hypertension may differently impact cognition depending on age at onset and duration. Our objective was to illustrate the impact of hypertension on cognition in older adults as a function of duration and age at onset of hypertension after inverse-probability weighting to mitigate the influence of dependent censoring. Our study sample includes 1284 participants from the Normative Aging Study, which began in 1963, who were under 45 and free of hypertension at baseline. Participants underwent medical examination, including assessment of hypertension, roughly every 4 years. 758 completed cognitive testing between 1993 and 2005. Using linear marginal structural models with inverse probability weighting for censoring and confounding, we estimated the independent associations of age at onset and duration of hypertension on mean age-standardized cognitive test z-score at the first cognitive assessment. Converting to hypertension at any point during follow-up was associated with a 0.14 point lower mean cognitive test z-score (95% confidence interval (CI): -0.26, -0.02). Within the range of our data, the contribution of duration was twice as strong (Beta: -0.02 per year of duration, 95%CI: -0.04, -0.003) as the contribution of age at onset (Beta: -0.01 per year of age, 95%CI: -0.03, 0.01). After inverse probability weighting for dependent censoring, increasing duration of hypertension is a strong predictor of lower cognition. While we cannot conclusively rule out a possible independent effect of age at onset, especially at ages beyond the range of our data, we found little support for one.

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OXIDATIVE BALANCE SCORE AND THE RISK OF INCIDENT PROSTATE CANCER IN A PROSPECTIVE U.S. COHORT STUDY. Sindhu Lakkur*, Michael Goodman, Roberd Bostick (Emory University, Atlanta, GA, 30322) and Victoria L. Stevens (American Cancer Society, Atlanta, GA, 30303)

Oxidative stress is defined as an imbalance between pro-oxidants and anti-oxidants. Although experimental biology evidence demonstrates that antioxidants reduce cell proliferation and oxidative DNA damage, epidemiological studies relating modifiable factors that affect oxidative stress to prostate cancer risk have been inconsistent. By summing individual pro- and anti-oxidant exposures, we developed a comprehensive Oxidative Balance Score (OBS) and examined its association with prostate cancer risk among 43,325 participants in the Cancer Prevention Study-II Nutrition Cohort. During follow-up from 1992-2007, 3,386 men were diagnosed with prostate cancer. Twenty different components, used in two ways (equally weighted or weighted based on literature reviews), were incorporated in the OBS and the resulting score was then expressed as three types of variables (continuous, quartiles, or six equal interval categories). Multivariate-adjusted relative risks were calculated using Cox proportional hazards models. None of the analyses demonstrated an inverse association between OBS and prostate cancer. Hazard ratios (95% confidence intervals) comparing highest to lowest OBS categories ranged from 1.15 (1.03-1.30) to 1.41 (0.90-2.21) for all cases, and from 1.12 (0.85-1.47) to 1.86 (0.74-4.67) for aggressive disease. Our findings do not support the hypothesis that a favorable balance of pro- and anti-oxidant exposures protects against prostate cancer development or progression.

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LEPTIN, CENTRAL OBESITY AND COGNITIVE DECLINE AMONG OLDER MEXICAN AMERICANS: LONGITUDINAL RESULTS FROM THE SACRAMENTO AREA LATINO STUDY ON AGING. * A. Zeki Al Hazzouri, M.N. Haan, R.A. Whitmer, K. Yaffe, and J. Neuhaus (University of California, San Francisco, CA 94118; Kaiser Permanente, Oakland, CA 94612).

Central obesity is a risk factor for cognitive decline. While higher leptin, secreted by adipose tissue, has been associated with better cognitive function; obese subjects are often leptin resistant. Aging Mexican-Americans are burdened with obesity but no investigations have examined the relationship between central obesity and cognitive decline among them or the role of leptin in this association. This analysis examines this relationship in a cohort of 1480 initially dementia-free older Mexican-Americans followed over a ten-year period. Cognitive function was assessed using the Modified Mini Mental State Exam (3MSE) and the Spanish and English Verbal Learning Test (SEVLT). Linear mixed models were fitted and analyses were stratified by gender and waist circumference. For females with small waist (≤35inches), one standard deviation (SD) difference in leptin was associated with 16% decrease in 3MSE points in cognitive decline and 9% increase in SEVLT score over 10 years. For males with small waist (≤40inches), 1SD difference in leptin was associated with 6.8% decrease in 3MSE points in cognitive decline and 5% increase in SEVLT score over 10 years. There was no association between leptin and change in cognitive function for males and females with large waist. Our results constitute another reason for preventing central obesity among Mexican-Americans.

CYSTATIN-C PREDICTS RISK OF DEMENTIA AND COGNITIVE DECLINE IN OLDER MEXICAN AMERICANS. *Mary N Haan, Carmen Peralta, ER Mayeda, John Neuhaus (University of California, San Francisco, CA 94118)

Cystatin C, a novel measure of kidney function, is linked to cognitive decline, Alzheimer's pathology, ischemic stroke, and cerebrovascular small vessel disease. SALSA is a cohort study of 1,789 Mexican Americans residing in California aged 60-101 years in 1998-1999. Data were collected at home visits every 12 to 15 months for seven follow-up visits through 2008. A panel of neurologists diagnosed dementia using standard criteria. Non-demented participants who scored <10th percentile ?1 on cognitive tests were cognitively impaired (CIND). Cystatin-C (CYS) was analyzed from fasting samples at baseline. Stroke was derived from a report of physician diagnosis. Participants without dementia/CIND at baseline were included (n=1314). There were 121 dementia/CIND cases and 171 strokes. We categorized CYS as ≤ 1.0 (referent) (62.9%), $>1.0 \leq 1.25$ (21%) and >1.25 mg/L (16%). We used multivariable proportional hazards models to examine the association between CYS and time to dementia/CIND that included age, education, diabetes and stroke. Multiplicative interaction terms tested effect modification by time dependent (TD) stroke. In an unadjusted model, compared to CYS <1.0 , risk of dementia/CIND was significantly higher for CYS $\geq 1.0 \leq 1.25$ (HR: 1.50, 95% CI:1.02-2.51) and CYS >1.25 (HR:3.13, 95% CI:2.06-4.77). Adjustment for age, education, and type 2 diabetes attenuated the dementia risk in CYS $\geq 1.0 \leq 1.25$ (HR: 1.12, 95% CI:0.75-1.77) and reduced the risk by 47% in CYS >1.25 (HR:1.65, 95% CI:1.05-2.61). Among those with TD stroke, higher CYS was associated with higher risk of dementia/CIND. In this older ethnic group at high risk for diabetes and stroke, higher CYS increases the risk of dementia/CIND. Stroke combined with high CYS nearly triples the risk of dementia/CIND (p for stroke*CYS interaction = 0.03). Underlying cerebrovascular disease may potentiate the effects of kidney disease on cognitive performance.

PERCEIVED DISCRIMINATION AND DIURNAL CORTISOL PATTERNS AMONG BLACKS AND HISPANICS: THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS. *Anjum Hajat, Ana Diez-Roux, Sandra Albrecht, Linda Gallo, Carlos Rodriguez, Sandi Shrager, Teresa Seeman (University of Washington, Seattle, Washington 98105)

Few studies have examined the association between perceived discrimination (PD), a potential source of chronic stress, and cortisol, a stress biomarker. We examined associations of PD with chronic stress in a sample of 258 black and 494 Hispanic adults' enrolled in the Multi-Ethnic Study of Atherosclerosis. Lifetime PD was measured using questions about unfair treatment in 6 domains (promotions, hiring, law enforcement, education, new and existing housing). It was explored as continuous and binary. Salivary cortisol samples were collected 6 times per day over 3 days: at awakening, 30 minutes later, at 1000h, noon, 1800h and at bedtime. We used piecewise linear mixed models with knots at 30 and 120 minutes after wake-up to model cortisol, resulting in estimates of 4 pieces of the daily curve (wake-up, cortisol awakening response (CAR), early and late decline). We also modeled cortisol as area under the curve and wake-up to bedtime slope. Forty percent of Hispanics and 60% of Blacks reported at least one experience of discrimination. Among Hispanics, the CAR was steeper for those who experienced more PD (11.8% steeper for each additional experience of discrimination, 95% confidence interval (CI): 1.9, 22.7), after controlling for demographic and behavioral risk factors. Although not statistically significant, our results suggest that black participants who ever experienced PD had higher wake up cortisol (12.3% higher, 95% CI: -1.7, 28.2) and steeper early declines (-12.7% steeper, 95% CI: -27.6, 0.4) compared to those who did not. When modeled as wake-to-bed slope a 0.11 nmol/l higher mean wake up cortisol was found among blacks who had versus those who had not experienced PD (95% CI: 0.007, 0.21). Our study suggests alterations in the cortisol profile particularly among Hispanics who have experienced discrimination, which may have deleterious consequences for health.

ASSOCIATION OF MIDLIFE OCCUPATION AND COGNITIVE PERFORMANCE: THE ATHEROSCLEROSIS RISK IN COMMUNITIES STUDY. *MD Patel, R Gottesman, T Mosley, ALC Schneider, O Selnes, J Coresh, AR Sharrett (University of North Carolina, Chapel Hill, NC 27514)

Cognitive performance is strongly associated with education level, while its association with occupation is not clear. Among 11,956 participants from the Atherosclerosis Risk in Communities cohort who underwent cognitive testing, we estimated the association between occupation assessed at baseline (1987-1989) and cognitive performance tested at the second study visit (1990-1992). Participants' current or most recent occupations were coded to Nam-Powers occupational socioeconomic status scores and categorized by tertiles. Scores on two cognitive tests (digit symbol substitution (DSS) and word fluency (WF)) were analyzed. We used linear regression to estimate the association of occupation level with cognitive test score, adjusting for age and education and stratifying by race-sex group. The mean \pm standard deviation score on DSS was 45 ± 14 symbols and on WF was 34 ± 12 words. High and intermediate occupation levels, compared to low, were associated with higher DSS and WF test scores. These associations were significantly modified by race-sex group. For DSS scores, the differences between high and low occupation level were greatest in black females ($\beta=8.6$; 95% confidence interval (CI) 7.4, 9.9) and smallest in white females ($\beta=2.1$; 95% CI 1.3, 2.9). While for WF scores, black males had the greatest ($\beta=8.3$; 95% CI 6.3, 9.4), and white females had the smallest difference ($\beta=2.7$; 95% CI 1.8, 3.6). These findings suggest a modest positive association between occupation and cognitive performance, after accounting for education and demographic factors. Future analyses will evaluate the 17-year change in cognitive performance in this large population-based study.

STRESS, ENDOGENOUS SEX STEROID HORMONES, AND BREAST CANCER RISK IN THE WOMEN'S HEALTH INITIATIVE (WHI). *CH Kroenke, KM Rexrode, Y Michael, R Chlebowski, BJ Caan (Kaiser Permanente Division of Research, Oakland, CA 94612)

Background: Previous research on stress and breast cancer has employed nonspecific measures of stress and failed to consider the impact on endogenous estrogens, the predominant mechanism in breast cancer etiology. We examined associations between well-characterized measures of psychological stress, estrogens, and risk of breast cancer. Methods: We included 153,768 postmenopausal women from the WHI who provided data on caregiving and adverse life events (Rahe, 1979). Of these, 5,121 were diagnosed with breast cancer during follow-up from 1993-2009. We used Cox proportional hazards regression to evaluate associations between high levels of caregiving, high adverse life events, and time to breast cancer. Using linear regression, we evaluated associations with estrogens, available in a subsample of 386 women. Results: In multivariate-adjusted analyses, including adjustment for body size, providing caregiving, particularly five or more (vs. 0) times per week, was associated with a lower risk of breast cancer (hazard ratio (HR)=0.90, 95% confidence interval (CI):0.82-1.00, p=0.04, p-continuous=0.06). Women with 5-7 (HR=0.82, 95% CI:0.70-96) and 8 or more (HR=0.31, 95% CI:0.12-0.83) adverse life events had a lower risk of breast cancer than those who reported 0-4 life events (p-continuous=0.05). Caregiving was associated with lower levels of total, free, and bioavailable estradiol (continuous, p<0.01, all associations). Both caregiving (p=0.05) and adverse life events (p=0.02) were associated with lower estrone sulfate. Conclusions: High levels of psychological stress were associated both with lower sex steroid hormone levels and with a lower breast cancer risk in postmenopausal women.

SHORTENED AVERAGE TELOMERE LENGTH IN CHILDREN AND NEIGHBORHOOD DISORDER: CONNECTING COMMUNITY LEVEL STRESS AND CELLULAR RESPONSE. *KP Theall, MPH, PhD; S Drury, MD, PhD; EA Shirtcliff, PhD (Tulane University School of Public Health, Department of Global Community Health and Behavioral Sciences (KPT) and School of Medicine, Department of Psychiatry and Neurology (SD); University of New Orleans, Department of Psychology (EAS))

Objective: To examine the impact of neighborhood level social environmental risk on average telomere length (ATL) in children. ATL is an established biomarker of cellular aging, altered by cellular stress pathways, and has been associated with psychosocial stress, adverse health outcomes, and health disparities in adults. This mechanistic pathway from stress exposure to poor health may begin early in the life course. Therefore, we tested the hypothesis that ATL would be associated with social stress exposure in at-risk children. **Study Design:** Children age 4-14, from 87 neighborhoods were recruited through 5 inner-city schools in New Orleans, Louisiana. Data were collected at the level of the child, family/household, and neighborhood. ATL was determined from DNA extracted from Oragene salivary kits using quantitative PCR and available for 109 children. **Results:** ATL was 7.4 T/S ratio units (\pm 2.4, range=2.5-18.0), and 4.7% of the variance in was attributed to differences across neighborhoods. Children living in neighborhoods characterized by high disorder had an ATL 3.2 units lower than children not living in high disordered environments ($p < 0.05$) and were more than three times as likely to have low relative ATL compared to children not living in high stress environments (adjusted OR=3.43, 95% CI=1.22, 9.62). **Conclusion:** ATL may be a feasible, early biomarker which reflects social stress exposure (i.e., neighborhood disorder) in children. These findings offer support for the early biological roots of health disparities at the cellular level, and provide insight into a potential mechanism linking early adversity and adverse health outcomes.

ABUSE IN CHILDHOOD AND ADOLESCENCE AND INFLAMMATION IN ADULT WOMEN. *E Bertone-Johnson, B Whitcomb, S Missmer, E Karlson, J Rich-Edwards (University of Massachusetts, Amherst, MA, 01003; Harvard Medical School, Boston, MA, 02115).

Abuse in childhood and adolescence may impact risks of diabetes and cardiovascular disease later in life. While mechanisms underlying these relations are unclear, chronic stress may lead to dysregulation of immune function and chronic inflammation. We evaluated associations between early life physical and sexual abuse and blood levels of inflammatory markers in adulthood (mean age = 43.9 years) among 702 members of the Nurses' Health Study II. History of abuse in childhood (before age 11) and adolescence (ages 11-17) was self-reported in 2001. Plasma samples collected in 1996-1999 were assayed for C-reactive protein (CRP), interleukin (IL)-6 and the soluble fractions of tumor necrosis factor α receptor 2. Moderate or severe physical abuse was reported by 35.3% of participants, 22.7% reported unwanted sexual touching and 9.8% reported forced sex. Plasma levels of CRP and IL-6 were higher in women reporting sexual abuse in adolescence compared to those reporting no abuse ($P = 0.04$ and 0.03 , respectively) in analyses adjusted for confounders including age and childhood body type. Inflammatory marker levels were similarly elevated in women reporting sexual abuse during childhood, but results were not statistically significant. Relations largely persisted after further adjustment for potential mediators such as adult body mass index and smoking. In contrast, physical abuse during childhood and adolescence were not consistently associated with levels of inflammatory markers. These results suggest that chronic inflammation is one mechanism through which sexual abuse may impact future risk of physical and psychological disorders.

MEASURING ALLOSTATIC LOAD IN A NATIONALLY REPRESENTATIVE SAMPLE OF PREGNANT WOMEN. S. Selmer, *E. Shenassa, K. Schoendorf, P. Mendola (University of Maryland, College Park, MD, 20742)

Objective: Allostatic load (AL) is a measure of "wear and tear" on the body that results from exposure to chronic psychosocial stress. Recently, a link between AL and poor birth outcomes was proposed, although this relationship has been challenging to investigate because it is unknown whether traditional AL scores are meaningful during pregnancy. **Methods:** We examined a sample of 1,138 pregnant women and 4,993 non-pregnant women aged 15-44 from the National Health and Nutrition Examination Survey, 1999-2006. AL scores were calculated using 10 biomarkers with available laboratory data. We first established mean levels of each biomarker separately for pregnant and non-pregnant women. We then calculated AL scores using empirical cutoff points based on the highest risk quartile for each biomarker (high = 1; else/low = 0). The sum formed an AL index with a possible range from 0 to 10. Within the sample of pregnant women, AL was also calculated by trimester. **Results:** Mean AL scores were 2.75 (standard error [se] = 0.09) in pregnant women and 2.79 (se=0.04) in non-pregnant women. Mean AL scores for the 1st, 2nd, and 3rd trimesters were 2.52 (se=0.15), 2.73 (se=0.14), and 2.83 (se=0.14), respectively. Although these differences were statistically significant ($P < .01$), AL scores were similar in all groups. **Conclusions:** This study represents an initial attempt to measure AL during pregnancy in a nationally representative sample of women. We found that mean AL scores were similar in pregnant and non-pregnant women and during different trimesters of pregnancy. These findings provide a basis for future studies of AL in pregnancy, particularly examining AL as a risk factor for poor birth outcomes.

ABUSE VICTIMIZATION AND RISK OF UTERINE LEIOMYOMATA IN BLACK WOMEN. *L.A. Wise, J.R. Palmer, R.G. Radin, L. Rosenberg (Slone Epidemiology Center, Boston, MA 02215)

Uterine leiomyomata (UL) are a major source of gynecologic morbidity and are 2-3 times more prevalent in black women than white women. Emerging research suggests that exposure to psychosocial stress increases UL risk. We assessed the relation between abuse victimization and UL risk among 15,706 premenopausal participants in the Black Women's Health Study, an ongoing prospective cohort study. In 2005, women reported their experiences of physical and sexual abuse within each life stage (childhood, adolescence, adulthood). Biennial follow-up questionnaires from 1997 through 2009 ascertained UL diagnoses. Incidence rate ratios (RR) and 95% confidence intervals (CI) were estimated using Cox regression models. During 1997-2009, there were 5,433 incident cases of UL confirmed by ultrasound or surgery. UL incidence was highest among women who reported child abuse, particularly sexual abuse. Relative to no abuse across the life span, RRs were 1.06 (95% CI=0.99-1.13) for physical abuse only, 1.19 (95% CI=1.06-1.32) for sexual abuse only, and 1.18 (95% CI=1.08-1.29) for both physical and sexual abuse in childhood. RRs for 1-3 and ≥ 4 incidents of child sexual abuse were 1.18 (95% CI=1.05-1.32) and 1.18 (95% CI=1.02-1.37), respectively, while RRs for low, intermediate, and high frequencies of child physical abuse were 1.07 (95% CI=0.99-1.15), 1.00 (95% CI=0.90-1.10), and 1.09 (95% CI=0.99-1.19), respectively. Results were stronger when the analysis was confined to follow-up that occurred after abuse victimization was assessed (2005-2009): RRs for 1-3 and ≥ 4 incidents of child sexual abuse vs. no abuse were 1.43 (95% CI=1.12-1.81) and 1.68 (95% CI=1.25-2.27). Our data indicate a positive association between child abuse and UL risk.

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NEGATIVE PSYCHOSOCIAL EXPERIENCES, CHILDHOOD VICTIMIZATION, AND RISK OF ADULT-ONSET VULVODYNIA. *M Khandker, SS Brady, A Ablorh, BL Harlow.(U of MN, Minneapolis, MN, 55454)

In earlier analyses, we demonstrated separate associations between any childhood victimization (physical and/or sexual abuse), negative psychosocial experiences (fear of abuse, perceived danger, low family support, and mood/anxiety disorder), and risk of adult-onset vulvodynia. Our present work examines the associations between negative psychosocial experiences and vulvodynia within subsets of women who experienced no childhood abuse, moderate abuse, or severe abuse. We identified a population-based sample of 215 women with symptoms of vulvar pain consistent with a clinical diagnosis of vulvodynia and 215 age-matched controls from the Boston area. Self-reported childhood exposures (age<12) of any abuse, fear of any abuse, perceived danger, and family support were obtained. Structured Clinical Interviews for DSM-IV Axis I Disorders (SCID) were administered and diagnosis of antecedent mood/anxiety was established. Women who lived in fear of abuse were more likely to experience vulvar pain regardless of reported abuse. The strength of this association was the same for women who experienced a period of pain free intercourse during their lifetime and those who did not (secondary versus primary vulvodynia). Women with no childhood abuse history had a 6-fold higher odds of vulvodynia as a consequence of antecedent mood/anxiety disorder (95% CI: 1.9-19.6) whereas those with history of severe abuse showed little added risk. Our findings suggest: (1) In the absence of childhood abuse, living in fear of abuse and mood/anxiety disorders may be sufficient to trigger vulvar pain onset;(2) Consistent with a diathesis-stress model, severe childhood abuse may trigger a predisposition to develop vulvodynia, but subsequent negative psychosocial experiences may confer little added risk.

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DO ECONOMIC RECESSIONS DURING EARLY ADULTHOOD HAVE A LONG-LASTING EFFECT ON LATE LIFE HEALTH? *P. Hessel, M. Avendano (London School of Economics, London, Houghton Street, WC2A 2AE, UK).

Recent evidence suggests that there is a link between economic recessions and health, but little is known about the long-term impact of economic downturns at crucial periods early in the life-course on late-life health. We examined the impact of economic conditions at the year of completing full-time education on physical functioning and disability at old age. Data came from 10,337 participants in the Survey of Health, Ageing and Retirement in Europe (SHARE) aged 50 to 74 years in 11 European countries. The sample included participants who completed full-time education between 1956 and 1986. Disability was measured based on the number of limitations with activities of daily living (ADL), instrumental activities of daily living (IADL) and mobility. We used Poisson regression to model disability as a function of national unemployment rates at the time of completing full-time education. Models incorporated country and year fixed effects, and controlled for age, educational level, childhood health and childhood socioeconomic circumstances. Experiencing an economic downturn at the year of completing full-time education was associated with a significantly reduced risk of limitations with ADL (Rate ratio (RR)=0.79, 95% CI=0.68-0.91) and IADL (RR=0.85, 95% CI=0.74-0.98) at old age. In stratified analyses, lower educated participants who were exposed to an economic downturn had a significantly reduced risk of limitations with ADL (RR=0.63, 95% CI=0.43-0.94) and IADL (RR). In contrast, among those with higher education, economic downturns were associated with an increased risk of IADL and mobility limitations. Effects were particularly strong and consistent among males. Our findings question current assumptions on the health impact of early life economic conditions and suggest that exposure to macro-economic circumstances at the time of completing full-time education have complex effects on health, potentially induced both health-preserving as well as health-damaging effects on different sub-groups of the population.

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CHILD ABUSE HISTORY AND FOOD ADDICTION IN WOMEN. *S Mason, A Flint, A Field, J Rich-Edwards (Harvard Medical School, Boston, MA, 02120)

Background: Emerging animal and clinical evidence suggests that chronic stress may provoke consumption of high-calorie foods, triggering dopaminergic reward systems that counteract feelings of distress. Over the long term, this eating pattern is associated with addiction-like behaviors and brain adaptations in rats, thus some stress-related over-eating may constitute 'food addiction.' We investigated the association between history of child physical and sexual abuse and a measure of food addiction among women in the Nurses' Health Study II (NHSII). Methods: In 2001, NHSII participants were asked about experiences of physical and sexual abuse in childhood. Food addiction was ascertained in 2009 with the Yale Food Addiction Scale, which mirrors diagnostic criteria for drug and alcohol addiction. We used Poisson regression with a log link and robust variance to estimate risk ratios (RRs) and 95% confidence intervals (CIs) for food addiction as a function of child abuse severity and covariates. Results: Among 40,321 women with complete child abuse and food addiction information, 8.4% reported severe physical abuse and 5.3% reported severe sexual abuse in childhood. Approximately 8.2% of women met the criteria for food addiction. A history of physical or sexual abuse was associated with an 80% increase in the risk of food addiction. The increase in risk was similar for severe physical (RR=1.89, 95% CI: 1.71, 2.09) and severe sexual (RR=1.79, 95% CI: 1.59, 2.01) abuse. Parental history of depression was the most important confounder in models, but attenuated results only slightly. Adjustment for race and childhood socioeconomic status did not influence effect estimates. Conclusion: History of Child abuse is strongly related to food addiction among adult women.

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INEQUALITIES IN PROSTATE CANCER SURVIVAL: HOW MUCH DOES SES SCALE MATTER? *GD Datta, TL Osypuk, JT Chen, NJ Johnson, S Altekruse (CRCHUM, Université de Montréal, Montreal, QC H2W 1V1)

PURPOSE: Many studies of cancer inequalities in the United States use Surveillance Epidemiology and End Results (SEER) data. Although high quality, SEER does not include individual-level socioeconomic status (SES) data. Therefore, researchers use area-based measures (e.g. county or census tract (CT) level) as proxies for individual SES. The current study uses linked SEER-National Longitudinal Mortality Study (NLMS) data, which contains individual- and area-level SES, to assess the effect of SES scale on estimated inequalities in prostate cancer survival. **METHODS:** Data from SEER-NLMS (1992-2003) comprised of 2785 men with prostate cancer were used. Cox models were fit for 5-year survival adjusted by age, race and extent of disease with 3 SES measures, used in the literature, modeled separately (household income, CT-level % poverty, and county-level % poverty). **RESULTS:** The scale at which SES was operationalized influenced the association with survival. Lower household income was associated with increased mortality ($\leq \$12,500$ vs $\geq \$50,000$ Hazard Ratio[HR]=2.8, 95% Confidence Interval[CI]=1.4-5.7). Results at the CT-level were not significant but in the same direction as those at the household-level ($\geq 20\%$ vs $< 5\%$ poverty HR =1.4, 95% CI=0.7-2.6). Results at the county-level were also null but with an inverse association ($\geq 20\%$ vs $< 5\%$ poverty HR =0.8, 95% CI=0.2-2.4). **CONCLUSION:** Our results suggest that county-level SES measures may not represent the SES inequalities at the individual level in prostate cancer survival. While the direction of results for CT-level measures was consistent with individual level family income, CT-level measures did not reflect statistically significant SES inequalities seen at the individual level.

RELATIVE INCOME DEPRIVATION AND CAUSE-SPECIFIC MORTALITY AMONG ELDERLY JAPANESE: ROLES OF PSYCHOSOCIAL STRAIN AND HEALTH BEHAVIOR IN ITS PATHWAYS. *N Kondo, T Ojima, Z Yamagata, and K Kondo (University of Yamanashi, Chuo-shi, Japan)

Relative deprivation in income (RD) may increase mortality risks independent of absolute income, but the risk could vary across causes of death. To test this hypothesis, we used a cohort of 21,031 non-disabled men and women aged 65+ years in the Aichi Gerontological Evaluation Study (AGES). The baseline mail-in survey was conducted in 2003. Information on cause-specific mortalities, coded according to ICD-10, was obtained from national death certificate data. Missing values were multiple imputed using MCMC. Our RD measure was the Yitzhaki index, which calculates the deprivation suffered by each individual as a function of the aggregate income shortfall for each person relative to everyone else with higher incomes in that person's reference group. Reference group was determined as others with same sex, age group, and municipality of residence. We identified 1,426 deaths during the 4.5 years of follow up. Cox regression demonstrated that, after controlling for age, marital status, absolute income, educational attainment, and medical care need, hazard ratio (95% confidence intervals) for death by cardiovascular diseases (CVD) per 1 standard deviation increase in RD was 1.34 (1.05-1.71) in men and 1.21 (0.87-1.68) in women, whereas hazard ratios for deaths by cancer and respiratory diseases were less than 1.1 and not statistically significant. Additional adjustment for mental illness (geriatric depression scale) and lifestyle (smoking, alcohol consumption, and preventive care utilization) attenuated excess risks for CVD death by 25%. Negative interpersonal comparisons due to the sense of RD may increase CVD risks directly and indirectly (through poor mental health and health behavior).

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TARGETED MAXIMUM LIKELIHOOD ESTIMATION FOR DIRECT AND INDIRECT EFFECT ANALYSIS IN THE COMBINE (COMBINING MEDICATIONS AND BEHAVIORAL INTERVENTIONS FOR ALCOHOLISM) STUDY. *M. Subbaraman, S. Lendle, M. van der Laan (UC Berkeley, Berkeley, CA, 94720)

COMBINE investigators aimed to determine whether naltrexone, a drug alleged to reduce cravings for alcohol, combined with a behavioral intervention (CBI) alleged to change stress and coping behaviors, improves drinking outcomes more than either alone. After 16 weeks, only naltrexone alone and CBI alone significantly increased percent days abstinent (PDA) in models controlling for baseline PDA and site of treatment administration. Unexpectedly, the naltrexone + CBI combination did not offer any advantage over either naltrexone alone or CBI alone. To understand moderating and mediating factors, and to help explain the combination's lack of improvement over each monotherapy, controlled and natural direct effect analyses were performed using targeted maximum likelihood estimation (TMLE). TMLE offers several advantages over traditional direct effect analytic approaches such as double-robustness and allowance of treatment moderation by potential mediators. Cravings and stress were examined as theoretically informed mediators/moderators. Controlled direct effect results show that naltrexone, CBI, and the combination all work best when cravings are high, while none work when cravings are low. Similarly, naltrexone and the combination work better when stress is high. Natural direct/indirect effect results show that all three treatments' effects are at least partially mediated by cravings, and that craving reduction explains 50-67% of treatment effects. Furthermore, naltrexone appears to affect cravings earlier while CBI works later. Taken together, the set of results suggests the possibility of a threshold effect; if naltrexone reduces cravings early on and CBI is not effective when cravings are low, then the combination's lack of improvement over either monotherapy should not be surprising.

EARLY LIFE SOCIOECONOMIC STATUS AND COGNITION IN OLD AGE. *Bryan D. James, Robert S. Wilson, Lisa L. Barnes, David A. Bennett (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21201)

We examined whether early life socioeconomic status (SES) was associated with cognitive function in old age independent of educational attainment, midlife SES, and late life SES. Participants were 1,237 persons without dementia at baseline from the Rush Memory and Aging Project with a mean age of 79.3 (SD=7.6) who were followed for up to 14 years (mean=4.5, SD=3.3). Three measures of household SES (parental education, parental occupation, and number of children in family) were z-transformed and averaged for a summary score of early life SES. Educational attainment was measured in years. Household income at age 40 and at baseline were measured using the "show-card" method. Cognition was assessed using a battery of 19 neuropsychological tests, which were summarized with a global cognition score, as well as scores for five separate cognitive domains. Using mixed models with terms for time from baseline, age, sex, race, early life SES, education, midlife income, late life income, and the interaction of each variable with time, early life SES was independently associated with a higher level of global cognition in later life (estimate=0.06, SE=0.02, p=0.005), but not with change in cognitive function (p for interaction=0.23). This relationship was found in the individual cognitive domains of episodic memory, working memory, semantic memory, and visuospatial memory, but not in perceptual speed. These results indicate that household SES in childhood independently contributes to cognitive function in late life independently of educational attainment or income in midlife or late life adulthood.

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MULTIPLY ROBUST MODELS FOR DISAGREEING COLLABORATORS. *DerSarkissian, Maral and Arah, Onyebuchi

Introduction: In assessing the relationship between chronic disease and self-rated health, researchers may disagree about which variables to control for from the following set: marital status, age, gender, employment, and education. The aim of this study is to extend the modern doubly robust estimation technique to multiply robust settings in which three estimators are combined allowing collaborators with competing confounding adjustments to build one final model. Methods: We used WHS data on 146,561 persons from 51 countries to assess the effect of the presence of chronic disease (diabetes, depression, or heart disease) on health. Three competing confounding adjustment schemes were considered and combined using an outcome regression, propensity score covariate adjustment, and a marginal structural model. Inverse probability weights were created for our exposure of interest, chronic disease, adjusting for all hypothesized confounders except employment in order to use a marginal structural model. A propensity score was also created adjusting for all hypothesized confounders except education. The inverse probability weight and propensity score were then used in a linear mixed regression of self-rated health scores on chronic disease and the confounders marital status, age, and gender. Results: The final estimate for the regression coefficient of chronic disease using our multiply robust model was 7.40. This can be compared to the estimated coefficient from the MSM of 7.39, that from the regression using propensity score adjustment of 7.69, or that from the outcome model of 7.90. Conclusions: Doubly robust estimation can be extended to multiply robust settings using more than two estimators. This allows investigators to obtain one set of results without being forced to agree on one model. Provided there is no further uncontrolled confounding and no bias is introduced, the estimated effect will be unbiased.

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PROSPECTIVE STUDY OF ULTRAVIOLET RADIATION EXPOSURE AND RISK OF CANCER IN THE U.S. *S Lin, D Wheeler, C Abnet (NCI, Bethesda, MD 20850)

Ecologic studies have reported that solar ultraviolet radiation (UVR) exposure is associated with cancer, but little evidence is available from prospective studies. We aimed to assess the association between an objective measure of ambient UVR exposure and risk of total and site-specific cancer in a large, regionally diverse cohort (450,934 white, non-Hispanic subjects (50-71 years old) in the prospective NIH-AARP Diet and Health Study) after accounting for individual-level confounding risk factors. Estimated erythemal UVR exposure from satellite Total Ozone Mapping Spectrometer (TOMS) data from NASA was linked to the U.S. Census Bureau 2000 census tract (centroid) of baseline residence for each subject. We used Cox proportional hazards models adjusted for multiple potential confounders to estimate hazard ratios (HR) and 95% confidence intervals (CI) for quartiles of UVR exposure. Restricted cubic splines examined non-linear relationships. Over 9 years of follow-up, UVR exposure was inversely associated with total cancer risk (N=75,917; highest vs. lowest quartile, HR=0.97 (0.95, 0.99), p-trend<0.001). In site-specific cancer analyses, UVR exposure was associated with increased melanoma risk (highest vs. lowest quartile, HR=1.22 (1.13, 1.32), p-trend<0.001) and decreased risk of Non-Hodgkin's lymphoma (HR=0.82 (0.74, 0.92)) and colon (HR=0.88 (0.82, 0.96)), squamous cell lung (HR=0.86 (0.75, 0.98)), pleural (HR=0.57 (0.38, 0.84)), prostate (HR=0.91 (0.88, 0.95)), kidney (HR=0.83 (0.73, 0.94)), and bladder (HR=0.88 (0.81, 0.96)) cancers (all p-trend<0.05). We also found non-linear associations for some cancer sites, including the thyroid and pancreas. Our results add to mounting evidence for the influential role of UVR exposure on cancer.

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LONG-TERM STATIN USE AND BREAST CANCER RISK. *Jean A. McDougall, Kathleen E. Malone, Janet R. Daling, Kara L. Haugen, Peggy L. Porter, Christopher I. Li (Fred Hutchinson Cancer Research Center, Seattle, WA, 98109)

Experimental evidence suggests that statin drugs, which are commonly used to manage hypercholesterolemia, have carcinogenic properties. Existing studies of statin use in relation to breast cancer risk are inconsistent, though they have been limited in their sample sizes, had low frequencies of long-term statin use, and/or had limitations in their exposure assessment. We examined data from a population-based case-control study to investigate possible associations between various aspects of statin use and risk of the most common histologic types of breast cancer. This study consisted of 891 ductal and 1,036 lobular invasive breast cancer cases diagnosed from 2000-2008 among women age 55-74 and 877 controls identified via random digit dialing. Data on statin use and potential confounders were collected from in-person interviews. Odds ratios (OR) and 95% confidence intervals (CI) were estimated using logistic regression. Current use of hydrophilic statins for 10 years or longer was associated with more than two-fold increases in risks of both ductal (OR=2.2, 95% CI: 1.1-4.3) and lobular breast cancers (OR=2.1, 95% CI: 1.1-4.2). In contrast, current use of lipophilic statins for 10 years or longer was only modestly associated with the risks of ductal (OR=1.4, 95% CI 1.01-1.9) and lobular breast cancers (OR=1.3, 95% CI 0.97-1.8). Our findings suggest that long-term recent use of hydrophilic statins may be associated with breast cancer risk. If confirmed by additional studies that also have sufficient numbers of long-term current users of these medications, these results could influence the choice between treatment with hydrophilic vs. lipophilic statins as both of these commonly used medications are effective in lowering cholesterol levels among patients with hypercholesterolemia.

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TYPE 2 DIABETES, RISK OF DEMENTIA AND COGNITIVE IMPAIRMENT WITHOUT DEMENTIA, AND THE COMPETING RISK OF MORTALITY IN OLDER MEXICAN AMERICANS. * E.R. Mayeda, M.N. Haan, A.M. Kanaya, K. Yaffe, and J. Neuhaus (University of California San Francisco, CA 94118)

Previous studies of type 2 diabetes mellitus (T2DM) and cognitive impairment in old age have not accounted for the competing risk of mortality. We evaluated the association of T2DM with risk of dementia/cognitive impairment without dementia (CIND) among older Mexican Americans using competing risk models, which account for the competing risk of mortality, and traditional Cox models, which treat death as noninformative censoring. We studied 1,617 Mexican Americans (ages 60-98 years) from the Sacramento Area Latino Study on Aging. Participants were dementia/CIND-free at baseline and followed for a mean of 6.5 years. Time-dependent T2DM was based on fasting glucose, medication use, or self-report. Dementia/CIND diagnoses were based on standard diagnostic criteria. We fit Fine and Gray competing risk models to obtain sub-distribution hazard ratios (sHR) and 95% confidence intervals (CI) for dementia/CIND accounting for the competing risk of mortality. A sHR has an interpretation similar to a hazard ratio (HR) from a traditional Cox model. We also fit traditional Cox models. There were a total of 677 T2DM cases, 159 incident dementia/CIND cases, and 298 deaths prior to dementia/CIND. Although the fully-adjusted Cox model effect estimate (HR=2.22; 95% CI=1.58, 3.11) was larger than the competing risk model effect estimate (sHR=1.88; 95% CI=1.32, 2.67), the association between T2DM and dementia/CIND remained strong in the competing risk model. These findings suggest that the association between T2DM and dementia/CIND is robust and not explained by higher mortality among T2DM patients.

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DOES PROGESTIN ATTENUATE THE INCREASED RISK OF OVARIAN CANCER ASSOCIATED WITH UNOPPOSED ESTROGEN MENOPAUSAL HORMONE THERAPY? *Trabert B, Wentzsen N, Yang HP, Sherman ME, Hollenbeck A, Danforth KN, Park Y, Brinton LA (National Cancer Institute, Rockville, MD 20852)

Menopausal women who are current or long-term users of unopposed estrogens are at increased risk of ovarian cancer. It is uncertain whether estrogen plus progestin therapy exerts similar effects. Reduced ovarian cancer risks associated with multiparity and extended oral contraceptive use have led to the suggestion that progestins are protective and could mitigate some of the risks associated with unopposed estrogens. We evaluated menopausal hormone use and incident ovarian cancer (n=425) in 92,598 postmenopausal women enrolled in the NIH-AARP Diet and Health Study. Participants were administered questionnaires in 1996-1997 and followed through 2006. Hazard rate ratios (RR) and 95% confidence intervals (CI) were estimated using Cox regression. Increased risks were associated with use of unopposed estrogen [RR 1.73, 95% CI 1.08-2.78 among women with a hysterectomy] and estrogen plus progestin [RR 1.43, 95% CI 1.10-1.87 among women with intact uteri] therapy. Similar risks were associated with progestins that were used sequentially (<15 days/month) [RR 1.60, 95% CI 1.10-2.33] or continuously (>25 days/month) [RR 1.44, 95% CI 1.03-2.02; p-value for heterogeneity=0.63]. Risk did not vary by days per month progestins were prescribed, nor did we observe effect modification of the associations by parity, prior oral contraceptive use or other ovarian cancer risk factors. Our findings support that unopposed estrogen and estrogen plus progestin menopausal hormone use increases ovarian cancer risk; suggesting that the relationship between estrogens and ovarian cancer risk is not attenuated by the addition of progestins, even when prescribed continuously.

PREECLAMPSIA AND PREGNANCY-RELATED HYPERTENSION AND THE RISK OF BREAST CANCER. *L.A. DeRoo, C. Fei, D.P. Sandler, and C.R. Weinberg. (Epidemiology Branch, National Institute of Environmental Health Sciences/NIH, Durham, NC 27709)

Preeclampsia and pregnancy-related hypertension have been associated with decreased risk of breast cancer in several epidemiologic studies. It is unclear whether this inverse association is due to the effects of particular pregnancies or to underlying genetic or biological traits that are related to these conditions but also protect against breast cancer. We studied these conditions and the risk of young-onset (under 50) breast cancer in the Two Sister Study, a matched case-control study of 1,422 cases and 1,669 breast cancer-free sisters. For each of their pregnancies, women reported whether they had been diagnosed with preeclampsia (including eclampsia) or pregnancy-related hypertension. Multivariable conditional logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) for breast cancer among women who had these conditions compared to sisters who did not, adjusting for confounders. Ever having preeclampsia or eclampsia (OR=0.8; 95% CI 0.6, 1.1) or pregnancy-related hypertension (OR=0.8; 95% CI 0.6, 1.2) was associated with reduced risk of breast cancer. Risk was further reduced among women who had 2 or more affected pregnancies (OR=0.6; 95% CI 0.3, 1.0). Using matched sister controls controlled for confounding by family history of breast cancer and helped control for genetic factors, suggesting the association may be due to the pregnancy conditions rather than underlying traits. Discovery of the relevant biochemical and molecular characteristics associated with pregnancy-induced hypertension could improve understanding of the mechanisms of breast cancer prevention.

ADVANCES IN NUTRITION AND CHRONIC DISEASE: INTERACTIONS AMONG DIET, LIFESTYLE AND GENETIC FACTORS. *Mark A Pereira (University of Minnesota, Minneapolis, MN)

In recent years, the field of nutrition and chronic disease has evolved beyond a focus on isolating single nutrients and single foods towards a richer perspective of the full spectrum of dietary behavior. Nutritional epidemiology has arrived at a consistent and robust conclusion that certain types of dietary patterns are related favorably or unfavorably to chronic disease. When considering an 'optimal' diet, it is important to use modern epidemiologic methods to consider interactions at many phenotypic and genetic levels, including demographic factors, modifiable lifestyle factors, and genetic polymorphisms. This symposium describes recent advances towards more fully characterizing the ways through which dietary intake may impact chronic diseases through complicated synergy and interactions within complex dietary behaviors and across other lifestyle and genetic components. The studies presented will include a variety of methodological approaches to modeling dietary patterns and how they may synergistically impact human physiology and health risk factors and outcomes. The data are primarily derived from ongoing large, ethnically and geographically diverse prospective studies. Diseases covered in these presentations include type 2 diabetes, cardiovascular disease, and colorectal cancer, as well as some of the intermediate biomarkers that may shed light on etiology.

Speakers:

Mark Pereira, University of Minnesota
 Simin Liu, University of Southern California at Los Angeles
 David Jacobs, University of Minnesota
 Andrew Odegaard, University of Minnesota

MICROCHIMERISM AND CANCER OF THE BREAST AND COLON. *Mads Kamper-Jørgensen, Robert J. Biggar, Anne Tjønneland, Henrik Hjalgrim, Niels Kroman, Klaus Rostgaard, Casey L. Stampler, Anja Olsen, Anne-Marie N. Andersen, Vijayakrishna K. Gadi (University of Copenhagen, DK-1014 Copenhagen, Denmark).

Detection of Y chromosome, thought to originate from previous pregnancies with a male fetus, is common in women. Lower concentrations have been reported in women with breast cancer than cancer-free women. Data in women with other types of cancer are sparse. The purpose of the study was to determine whether the lower concentrations predate cancer diagnosis, and whether a possible beneficial effect was specific to breast cancer. We conducted a prospective case-cohort study of 50-64-year-old Danish women enrolled in the Diet, Cancer and Health cohort. Blood samples and questionnaire data were obtained during 1993-1997 when all women were cancer-free. In 2006 all women were followed up for incident breast and colon cancer in national registers. In blinded analyses, we analyzed buffy coat DNA for Y chromosome (DYS14) as a marker of male microchimerism. We detected male microchimerism in 69.9% of 272 cancer-free women, 40.5% of 89 women who later developed breast cancer, and 89.6% of 67 women who later developed colon cancer. The corresponding odds ratios were 0.29 (95% confidence interval 0.17-0.50) for breast, and 3.93 (95% CI 1.63-9.52) for colon cancer. Detection of male microchimerism was strongly associated with reduced risk of developing breast cancer and also increased risk of developing colon cancer. Confirmatory findings based on an improved study design, failure to identify confounders, and the strength of the associations lead us to believe that microchimerism may be highly relevant to later cancer development. However, the present study does not allow us to identify the underlying biological mechanisms.

EFFECT DECOMPOSITION: THE LOST EPIDEMIOLOGIC ANALYSIS. *Chanelle J. Howe¹ and Whitney R. Robinson² (¹Department of Epidemiology, Brown University Program in Public Health, Providence, RI, USA; ²Department of Epidemiology, UNC Gillings School of Global Public Health, Chapel Hill, NC, USA)

The focus of many epidemiologic analyses is confounding control, which is essential for the unbiased estimation of the causal relationship between an exposure and outcome. Another important, but less frequently utilized, analytic technique is effect decomposition, or mediation analysis. Effect decomposition identifies intermediates on the causal pathway between an exposure and outcome. Elucidating causal pathways of action has great public health relevance. Nevertheless, effect decomposition is not a standard component of epidemiology training. As a consequence, epidemiologists often perform effect decomposition in a self-taught manner, largely using methods borrowed from the social sciences. Recent work in causal inference has articulated the limitations of these borrowed methods for mediation analysis and offered alternative approaches. The three presentations of this symposium will (1) define effect decomposition, (2) use an application from the perinatal mortality literature to describe commonly used methods for effect decomposition and discuss newer alternatives, and (3) discuss the limitations of effect decomposition given that necessary assumptions may be unmet in many real-world research settings. We expect this symposium to communicate two points. First, effect decomposition addresses many research questions of public health importance. Second, a variety of recently developed techniques are available to improve inference from effect decomposition.

Speakers:

Rationale: why perform effect decomposition?
 Chanelle J. Howe
Methods for effect decomposition: application to perinatal mortality
 Tyler J. VanderWeele
Caveats and considerations
 Jay S. Kaufman

MEASURING CHALLENGING POPULATIONS: IS THERE A NEED FOR METHODOLOGICAL INNOVATION? *Justin Lessler and Sufia Dadabhai (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD)

Even the best epidemiologic methods are inadequate if there is poor measurement of the underlying population. While measurement is challenging in any situation, the challenges in some contexts go beyond the scope of traditional epidemiologic methods. In humanitarian crises, for example, rapidly changing condition may make it difficult to define the population at risk; in the exotic dance clubs of inner city Baltimore, the risk environment may be complex to measure as a risk factor for health outcomes; and along the US/Mexico border, recruiting a representative cohort with long-term follow-up over both space and time may be compromised by high mobility, policing practices, and violence. Individuals and groups at the highest risk may be the hardest to find and their population size estimates are likely known only qualitatively or through crude proxy measures. In this symposium, speakers who have conducted research in challenging settings will explain the practical issues they face in the field and in the design of their studies. They will describe methodological innovations that allow them to successfully measure the populations they study. Finally, speakers and participants will discuss continuing methodological gaps, whether further innovation is needed, and whether the epidemiologic research community is doing enough to address these measurement issues in order to best characterize epidemics and improve population health.

Speakers:

At the Border: Challenges in Conducting Epidemiological Studies in Tijuana, Mexico

Dr. Kimberly Brouwer, University of California San Diego School of Medicine
Methods for Measuring Populations in Humanitarian Crises
Dr. Gregg Greenough, Harvard School of Public Health and Harvard Medical School

More than a Dance: The Measurement of the HIV Risk Environment of Exotic Dance Clubs

Dr. Susan Sherman, Johns Hopkins Bloomberg School of Public Health

THE USE OF A COMPLEX SYSTEMS APPROACH IN EPIDEMIOLOGIC RESEARCH: IF AND WHEN IT'S WORTH IT. *GD Datta (Research Center of CHUM, Université de Montréal, Montreal, QC, Canada) and *M Cerdá (Department of Epidemiology, Columbia University Mailman School of Public Health, New York, NY)

In recent years, an increasing number of researchers have become proponents of using a complex systems approach to address questions in population health. Because this approach usually involves a different set of assumptions than traditional approaches, it requires some training in mathematics or computer science and can necessitate large-scale computing resources, it is natural to question how much return can come from such an investment. This symposium seeks to illustrate the differences between the complex systems approach and more traditional epidemiological approaches. By way of example, the symposium will focus on models designed to address issues related to obesity. Speakers will present on the types of questions their models can address, how these questions are different from those addressed using traditional methods, and the results from the models. Additionally, speakers will describe the process used to build their models and how they came to the conclusion that these methods were worth the investment. The presentation of multiple models on the same topic will help illustrate variation in how questions can be conceptualized and models built.

Speakers:

An agent-based model to explore why restaurant nutrition labeling falls short of its intended effects

Amy H. Auchincloss, PhD, MPH (Drexel University)

A complex systems approach to health behavior

Mark G Orr, Ph.D. (Columbia University)

Agent-based and actor-based models of social networks and peer influence: worth the trouble?

David A. Shoham, PhD, MSPH (Loyola University)

Discussant: Sandro Galea, Columbia University

FROM "BIG EPIDEMIOLOGY" TO "COLOSSAL EPIDEMIOLOGY": WHEN ALL EGGS ARE IN ONE BASKET. *Miguel Hernán (Harvard School of Public Health, Boston, MA) and David Savitz (Brown University, Providence, RI)

There is a movement towards consolidation of epidemiologic resources into increasingly large clusters, culminating in new (and sometimes never-to-be-replicated) collections of databases, cohorts, and case populations. These colossal projects offer unprecedented opportunities, but at the same time complicate the landscape in which epidemiologists carry out their work. Furthermore, this trend is occurring with little comment, and remains under the radar of many epidemiologists. We will consider three such programs: the Sentinel Initiative, an assemblage of electronic data-bases mandated by the US Congress to monitor medical-product safety among 100 million people; the CHARGE consortium, which coordinates more than a dozen population-based cohorts for genome-wide meta-analyses of various phenotypes; and the IeDEA network, a collection of the main HIV cohorts. Speakers will assess both the strengths of having large numbers and collaborative teams of leading researchers, and the challenges of coordinating data collection and analysis, fostering career development of junior investigators, and providing access to researchers outside the consortium.

Speakers:

Richard Platt (SENTINEL), Harvard Medical School
Bruce Psaty (CHARGE), University of Washington
Carlie Williams (IeDEA), National Institute of Allergy and Infectious Diseases

The Changing Face of Epidemiology"- A Symposium for 2012 SER from the Editors of EPIDEMIOLOGY

HEMATOLOGICAL PARAMETERS AND METABOLIC SYNDROME: FINDINGS FROM AN OCCUPATIONAL COHORT IN ETHIOPIA. K Nebeck*, B Gelaye, S Lemma, Y Berhane, T Bekele, A Khali, Y Haddis, MA Williams (University of Washington School of Public Health, Seattle, Washington, USA)

Objective: To examine associations between hematological parameters (i.e., hemoglobin, hematocrit, platelet counts, red blood cell (RBC), and white blood cell (WBC) counts) and components of metabolic syndrome (MetS) among 1,868 working adults in Addis Ababa, Ethiopia. Methods: MetS was classified according to the International Diabetes Federation criterion. Odds ratios (OR) and 95% confidence intervals (95% CI) of MetS were calculated using logistic regression procedures. Results: Hematologic parameters were positively associated with MetS components (Ptrend<0.05). In both men and women, white blood cell (WBC) counts were positively associated with BMI and waist circumference (P<0.05). RBC counts were associated with diastolic blood pressure in men (P<0.05) and women (P<0.001). Men in the third quartile of hemoglobin concentrations had 2-fold increased odds (OR=1.99; 95% CI) of MetS compared with the lowest reference quartile (Ptrend = 0.031) while women in the fourth hemoglobin quartile had 2.37-fold increased odds of having MetS compared with the reference group (p trend = 0.003). Both men and women in the fourth quartiles of RBC counts had 2.26-fold and 3.44-fold increased odds of MetS (P=0.002 in men, P<0.001 in women). Among women, those in the fourth quartiles of hematocrit and platelet counts had 2.53-fold and 2.01-fold increased odds of MetS as compared with those in the reference group (Ptrend = 0.004 and 0.065 respectively). Conclusions: Our study findings provide evidence in support of using hematological markers for early detection of individuals at risk for cardiovascular disease.

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VALIDATION OF A CAFFEINE QUESTIONNAIRE WITH SALIVARY BIOMARKERS. *CA Porucznik, KC Schliep, KJ Cox, SL Willardson, WB Fang, DG Wilkins, JB Stanford (University of Utah, Salt Lake City, UT 84108)

Caffeine, a common exposure among women of reproductive age, is challenging to measure since it occurs in varying levels from multiple sources. Additionally, inter- and intra-woman caffeine metabolism is known to vary, influencing correlations between reported intake and biomarker concentrations. The effects of caffeine in the body are transient and may vary depending on timing within the menstrual cycle. We recruited 24 women to complete our novel caffeine questionnaire by recalling exposures the previous day and provide five saliva specimens corresponding to the same day over two menstrual cycles. Caffeine exposures were estimated from the questionnaire using USDA National Nutrient Database equivalents. Soda, coffee, and tea were the primary exposures. We limited analysis to days with reported and measured exposure. The mean daily questionnaire exposure estimate was not normally distributed (mean= 189.2mg [standard deviation (SD)=178.0mg], median=124.0mg [range 0–969.5mg]). Saliva was analyzed by high performance liquid chromatography-tandem mass spectrometry. Daily biomarker concentration was also not normally distributed (mean=1238.5ng/mL [SD=1006.5ng/mL], median=968.9ng/mL]). Values were log transformed for analysis. Categorical agreement between the questionnaire and individual daily biomarker median was fair (kappa= 0.34 95% CI [-0.0323, 0.7082] for caffeine and moderate (kappa= 0.454 95% CI [0.0823, 0.8267]) for paraxanthine. Work is ongoing to refine the caffeine estimates from the questionnaire, and determine the relationship between temporally distal recall data and biomarkers. Our questionnaire can provide reasonable estimation of biomarker levels for caffeine when reported concurrently.

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ASSOCIATION BETWEEN LIFESTYLE FACTORS AND SERUM C-REACTION PROTEIN CONCENTRATIONS BY BODY MASS INDEX. *ED Kantor, JW Lampe, M Kratz, E White (Fred Hutchinson Cancer Research Center, Seattle, WA, 98109)

Chronic inflammation, which is most common among obese individuals, has been implicated in the etiology of several diseases; thus, reducing inflammation may offer a feasible disease prevention strategy. Several modifiable exposures have been associated with inflammation, including dietary fiber intake, saturated fat intake, physical activity, smoking, and use of certain supplements and medications (glucosamine, chondroitin, fish oil, vitamin E, statins and aspirin), yet it is unclear whether these associations differ by body mass index (BMI). To study this question, we used data on 9,895 adults from the 1999-2004 cycles of the National Health and Nutrition Examination Survey. Survey-weighted linear regression was used to assess the association between these factors and serum high-sensitivity C-reactive protein (CRP) concentrations across the following groups: underweight/normal weight (BMI<25), overweight (BMI 25–<30), and obese (BMI≥30). A significant interaction was observed between smoking and BMI: among the underweight/normal weight group, former smokers had 16% lower CRP than current smokers (95% CI: 1%–29%), among the overweight, former smokers had 22% lower CRP (95% CI: 11%–32%), and no significant difference was observed among the obese. Interactions between other factors and BMI were not statistically significant. While several factors were associated with CRP among the non-obese (fiber intake, saturated fat intake, physical activity, chondroitin, fish oil and statins), only dietary fiber intake was significantly associated with CRP among the obese (p-trend=0.01). These results suggest that chronic inflammation may be less modifiable among the obese than among normal weight and overweight persons.

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TROPONIN T, B TYPE NATRIURETIC PEPTIDE, C- REACTIVE PROTEIN AND CAUSE-SPECIFIC MORTALITY: ARIC STUDY. O. Oluleye *, MD; A.Folsom, MD,MPH; V. Nambi, MD;C. Ballantyne, MD;P. Lutsey, MPH, PHD (University of Minnesota, Minneapolis MN 55454)

Objective: To evaluate the associations of high sensitivity Troponin T (Hs-TnT), N-terminal pro-brain natriuretic peptide (NT-proBNP) and high sensitivity C-reactive protein (Hs-CRP) with total, all cardiovascular disease (CVD), coronary heart disease (CHD), stroke, cancer and respiratory disease mortality in the Atherosclerosis Risk in Communities (ARIC) cohort. Methods:11193 participants aged 54-74 years, initially free of the conditions being studied, had biomarkers measured and were followed for a mean of 9.9 years. Results: Theadjusted hazard ratios (HR) forparticipants in the highest Hs-TnT category compared to those with undetectable levels were: total mortality 3.64 (95% Confidence Interval: 2.93-4.51), all CVD mortality 7.34 (4.64-11.59), CHD mortality 6.06(2.91-12.59), stroke mortality 3.31 (1.26-8.66), cancer mortality 1.60 (1.08-2.38) and respiratory mortality 3.85 (1.39-10.65). Comparing the highest NT-proBNP quintile to those in the lowest quintile, theadjusted HRs were: total mortality 3.43 (2.79-4.23), all CVD mortality 7.48 (4.67-11.96), CHD mortality 4.07 (2.07-7.98) and stroke mortality 10.39 (2.26-47.7). For extreme Hs-CRP quintiles, theadjusted HRs were total mortality 1.73 (1.43-2.12), all CVD mortality 1.76 (1.19 -2.62) and respiratory disease mortality 3.36 (1.34-8.45). Having multiple markers elevated greatly increased cause-specific mortality risks. Conclusions: Greater levels of Hs-TnT, NT-proBNP and Hs-CRP are associated with increased risk of death, not just from cardiovascular disease but also from some non-cardiovascular causes. Keywords: biomarkers, troponin T, B type natriuretic peptide, C- reactive protein, mortality

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BIOMONITORING OF URINARY TOXIC HEAVY METALS FOR HOBBYIST OF HOT SPRINGS. *IF Mao (Chung-Shan Medical University, Taichung, Taiwan, 402); CL Li (National Yang-Ming University, Taipei, Taiwan, 112); CC Mao (National Yang-Ming University, Taipei, Taiwan, 112); CJ Tsai (Chung Hwa University of Medical Technology, Tainan, Taiwan, 703); ML Chen (National Yang-Ming University, Taipei, Taiwan, 112)

Some studies showed that there are higher toxic heavy metals in some hot springs, such as arsenic, cadmium, chromium, manganese and lead, and that may cause human health effects. The purpose of this study is to investigate whether hot springs will cause hobbyists exposure to toxic heavy metals or not, and heavy metals level of hot spring, and internal dose of heavy metals explored. Two hot springs were selected as the study site with high quantity metals and the control site with low quantity metals. Urine collection was conducted for the total of (study group 109 in study site and control group 90 in control site) who often come to these two hot springs. A questionnaire was given to investigate its basic data, the habit of having hot spring and daily diet intake. Arsenic, cadmium, chromium, manganese and lead in urine was determined by inductively coupled plasma mass spectrometry. The results showed that the toxic heavy metals concentrations of arsenic, cadmium, chromium, manganese and lead in high level metals spring were 4329.4, 19.9, 42.0, 8228.3 and 228.7 µg/L, respectively; and 3.7, 0.2, 5.0, 69.5 and 6.1 µg/L in low level metals spring, respectively. The geometric average concentration of manganese in urine in the study group was higher than the control group (p< 0.05). Moreover, the concentrations of manganese, arsenic and chromium in urine of these two groups were decreased significantly (p<0.05) after having hot spring bath, and daily diet intake of arsenic may be an important effect on urinary arsenic. This research suggest that having hot spring bath may contribute to internal metabolism on arsenic, cadmium, chromium, manganese and lead, may eccrine these metals from sweating due to hot spring bath. Key words: hot spring hobbyist, biomonitoring, urinary As, Cd, Cr, Mn, Pb

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HEALTH AND QUALITY OF LIFE (QOL) IN NEVER SMOKERS WITH LUNG ADENOCARCINOMA BY TUMOR ALK POSITIVITY. *P Yang, AL Cheville, J Wampfler, A Jatoti, JA Sloan, SD Cassivi, M de Andrade, ES Yi, RS Marks. (Mayo Clinic, Minnesota, USA.)

Background. Identifying genetic mutations in primary lung cancer has potential for significant treatment and survival implications. However, the impact on QOL of most mutation-targeted drugs is mostly unknown. Our objective was to evaluate the differences in multiple QOL domains between patients with ALK+ (EML4-anaplastic lymphoma kinase translocation) and ALK- tumors. Methods. A total of 177 never smokers with lung adenocarcinoma (all naïve for ALK inhibitor drug), 22 ALK+ and 155 ALK- were compared on the following patient-reported outcomes (collected via validated tools): overall QOL, five symptoms (cough, pain, dyspnea, fatigue, and appetite), mental/ physical/ emotional/ social/ spiritual QOL, and family/ friends/ financial/ legal concerns. A clinically important deficit was defined as <50 points on a 0-100 scale. Univariate analyses were used for initial data assessment. Results. ALK+ patients were 8 years younger but had more aggressive tumors (by tumor differentiation and stage) than ALK- patients. ALK+ patients reported a significantly better overall QOL and fewer symptoms compared to ALK- patients. The effects of patients' demographics, comorbid conditions, detailed treatment regimens and responses (and toxicities), disease progression and recurrence, and questionnaire response time are under thorough evaluation. Conclusions. Preliminary data indicate a better QOL in ALK+ patients although they had been previously shown to experience a shorter disease-free survival. These results need to be carefully corroborated in order to serve as a baseline for the era of newly available ALK targeted drugs, which should prolong patients' survival time and maintain or improve QOL.

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INTRA-INDIVIDUAL VARIABILITY OF ONE-CARBON METABOLISM BIOMARKERS. *E. Cope, M. Shrubsole, Q. Cai, J. Wu, W. Blot, and L. Signorello (International Epidemiology Institute, Rockville, MD 20850; Vanderbilt University, Nashville, TN 37203)

Interest in the relationship between one-carbon metabolism and carcinogenesis is intensifying, leading to increased use of related biomarkers as objective measures of diet exposure. Little is known about the within-person variability of these markers and if use of a single, baseline measure is appropriate for assessing exposure-disease relationships in prospective studies. Within-person variation in plasma concentrations of 19 one-carbon nutrient, metabolite, and related amino acid biomarkers was evaluated in a sample of 215 participants from the Southern Community Cohort Study who donated blood samples and responded to questionnaires at two points in time between 2005-2008. Weighted kappa coefficients (κ) were calculated to assess agreement between quartile assignments based on the repeated measures. Intra-class correlation coefficients (ICCs), adjusted for a number of potentially influential factors, were also used to assess the consistency of the two measurements. Most biomarkers showed moderate to substantial agreement (κ of $x-x$) for quartile assignment, with only methionine and methionine sulfoxide having $\kappa < 0.4$. The 19 biomarkers collectively yielded an average adjusted ICC of 0.56. Reliability was highest for flavin mononucleotide (ICC = 0.84, 95% CI: 0.79, 0.87) and methylmalonic acid (ICC = 0.82, 95% CI: 0.77, 0.86). The poorest reliability was observed for methionine (ICC = 0.29, 95% CI: 0.17, 0.41) and methionine sulfoxide (ICC = 0.20, 95% CI: 0.07, 0.32). Study results suggest that, with few exceptions, these biomarkers have good within-person reproducibility and are sufficiently reliable for use in epidemiologic studies.

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HIGH DIETARY INTAKE OF LONG-CHAIN N-3 FATTY ACIDS OF MARINE ORIGIN MAY LOWER CIRCULATING CONCENTRATIONS OF INFLAMMATORY BIOMARKER C-REACTIVE PROTEIN IN THE NUNAVIK INUIT ADULTS. *F. Proust, É. Dewailly (Axe Santé des populations & Environnement, CRCHUL-CHUQ, Québec, Canada)

Many epidemiologic studies have shown positive association between the C-reactive protein (CRP), a circulating inflammatory biomarker, and incident coronary heart disease (CHD). On the opposite, omega-3 polyunsaturated fatty acids (n-3 PUFA) EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid), found in large amount in fish and marine mammals which primarily compose the Inuit traditional diet, have been associated with lower risk of CHD. Objective: To investigate the relation between EPA+DHA intake and CRP concentration in Nunavik Inuit adults. Methods: A total of 299 Nunavik Inuit aged 40-74 y were included in the study. n-3 PUFA and CRP concentrations were measured in blood samples and subjects with CRP concentrations ≥ 10 mg/l were excluded. Analysis of covariance was used to examine differences in variables between EPA+DHA quartiles. Logistic regression was performed to examine the relation of EPA+DHA relative concentrations with elevated levels of CRP. Results: The mean relative concentration of EPA+DHA among Inuit adults was very high (9.21%, 95% CI: 8.90-9.52). Adjusted mean of CRP decreased from the lowest quartile of EPA+DHA (2.72mg/l) to the highest (2.50 mg/l). The crude odds ratio (OR) of high CRP (≥ 1.0 mg/l) for EPA+DHA was 1.13 (p=0.009) and remained significant after adjustment for potential confounders (OR=0.85, p=0.008). Adjusted OR for high CRP for increasing quartiles of EPA+DHA were 1.00, 0.56, 0.59 and 0.58. Conclusion: These results suggest that high dietary intakes of EPA+DHA derived from marine products may lower circulating concentrations of CRP. However, much higher intakes would not bring additional beneficial effect.

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BODY MASS INDEX AND ARSENIC METABOLISM BIOMARKERS IN THE STRONG HEART STUDY: AN APPLICATION OF GENERALIZED GAMMA REGRESSION. *Matthew O Gribble, Barbara V Howard, Jason G Umans, Kevin A Francesconi, Walter Goessler, Ciprian M Crainiceanu, Ellen K Silbergeld, Eliseo Guallar, and Ana Navas-Acien (Johns Hopkins University, Baltimore, MD, 21205)

Inorganic arsenic (iAs) is a known human carcinogen that is metabolized in the body to monomethylarsonate (MMA) and dimethylarsinate (DMA). The relative proportions of these species in urine (piAs, pMMA and pDMA) are biomarkers of arsenic metabolism. Differences in these biomarkers have been associated with cancer and cardiovascular disease risks, but their determinants remain poorly understood. Higher body mass index (BMI) was recently associated with lower pMMA and higher pDMA in women from Northwestern Mexico and the Southwestern United States. Our aim was to study the cross-sectional association between BMI and biomarkers of arsenic metabolism in 3,719 adults from Arizona, Oklahoma and North & South Dakota who participated in the Strong Heart Study. Distributions of piAs, pMMA and pDMA were skewed but not lognormal. We therefore used generalized gamma regression to model associations with BMI (<25, 25-29, 30-34, ≥ 35 kg/m²). BMI was linearly negatively associated with pMMA: 10.8 (95% CI 9.8, 11.8) percent lower levels of pMMA per increase in BMI category (ordinal). The association of BMI with pDMA was positive, but varied over the range of the pDMA distribution. As BMI increased, the median pDMA increased and the interquartile ratio (75th to 25th percentile) of the pDMA distribution decreased. Generalized gamma thus showed not only an association of increased BMI with increased pDMA levels but also with decreased pDMA variability. In a population affected by a high burden of obesity, BMI was associated with biomarkers of arsenic metabolism. To clarify if BMI is a determinant of arsenic metabolism, prospective studies should evaluate the role of body weight change in arsenic metabolism. If BMI affects arsenic metabolism, BMI may also be an important modifier of arsenic disease risk. Epidemiologic studies on the role of arsenic metabolism in arsenic toxicity should evaluate the possible role of BMI.

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CHRYBOTILE ASBESTOS EXPOSURE AND UPPER RESPIRATORY CANCERS: IS THERE AN ASSOCIATION? M. McKinley*, C. Ronk, M. Jacobsen, E. Williams and D. Galbraith (ChemRisk LLC, San Francisco, CA, 94105)

The International Agency for Research on Cancer (IARC) recently concluded that sufficient evidence exists to support a causative association between all commercial forms of asbestos and laryngeal cancer. A potential association between asbestos exposure and cancer of the pharynx and esophagus was also noted. Published toxicology and epidemiology studies have reported cancer potency differences for the various asbestos mineral types. For example, several recent analyses have suggested that chrysotile exposures have minimal, if any, potency for causing mesothelioma. We performed a systematic review of the epidemiology literature to evaluate the possible association between chrysotile-exposed subjects and cancers of the pharynx, larynx and esophagus and present a meta-relative risk. Over 100 studies were evaluated. Sixteen studies reported relative risk estimates (RR) for upper respiratory cancers in subjects exposed primarily to chrysotile asbestos. Seven studies provided RRs representing more than five cases of laryngeal, pharyngeal or esophageal cancer; RRs ranged from 0.74 to 1.87. Only two of these studies attempted to adjust for the effects of smoking or alcohol consumption. There were no statistically significant RRs for pharyngeal or laryngeal cancers and only one study reported a statistically significant RR for esophageal cancer. A meta-RR for the association between chrysotile exposure and these combined cancers was not statistically significant at 1.12 (95% CI: 0.93, 1.34). These results suggest that there is an insufficient basis for associating exposures to chrysotile asbestos with cancers of the larynx, pharynx, and esophagus.

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DISPARITIES IN CANCER SCREENING AND DEATH RATES. *D. T. Huang, R. Hines (National Center for Health Statistics, CDC, Hyattsville, MD 20782)

Research has shown that early detection can improve treatment for and reduce death rates from cervical cancer, colorectal cancer, and breast cancer. Screening and death rates for these cancers are tracked by several Healthy People 2020 (HP2020) objectives. Screening rates in HP2020 are based on compliance with the latest guidelines from the US Preventive Services Task Force (USPSTF), a panel of non-government experts in prevention and evidence-based medicine. The most recent national estimates for cancer screening (2010) and death (2009) rates were obtained using data from the National Health Interview Survey (NHIS) and National Vital Statistics System (NVSS), respectively. SUDAAN was used to control for complex sample design in NHIS, and all estimates were age-adjusted to the 2000 standard population. Our cross-sectional analysis looks at estimates for the total population and for demographic groups, where available, including race/ethnicity, education, income, marital status, country of birth, and insurance status. Those with the highest levels of education and income, private insurance, and the native born generally had the highest levels of cancer screening among subgroups by education and income, health insurance status, and country of birth, respectively. In contrast, the highest screening rates within race/ethnicity and marital status groups varied by type of screening. Demographic analyses for cancer death rates were more limited in scope than for screening rates but consistently found the lowest death rates for the Asian and Pacific Islander and married populations among racial/ethnic and marital status groups, respectively. This work highlights the need to continue exploration of the relationship between cancer screening and death rates.

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USE OF INTERACTIVE VOICE RESPONSE SYSTEMS TO IMPROVE COLORECTAL CANCER SCREENING. *H. Cohen-Cline, K.J. Wernli, M. Boles-Hall, S.C. Bradford, L. Bounds, D. Grossman (Group Health Research Institute, Seattle, WA, 98101).

Colorectal cancer (CRC) is one of the leading incident cancers in the United States, and CRC deaths are preventable by early identification and removal of colorectal adenomas and treatment of colorectal cancer. Despite this, among adults ages 50-85 years, adherence with CRC screening guidelines is below national targets. Automated reminders represent one strategy to improve uptake of screening, but little is known about the real world effectiveness of this approach. To investigate the effect of interactive voice response (IVR) systems, or automated telephone calls, on increasing adherence to CRC guidelines, 13,270 enrollees in a Washington State HMO health plan who were not current with the recommended screening guidelines were randomized in 2010 to either an IVR intervention (n=10,000) or usual care (n=3,270). The intervention consisted of a single call by a national IVR vendor that provided information about the health benefits of CRC screening. An enrollee could request that the a fecal occult blood test (FOBT) kit be sent to the patient's home. We used multivariate Cox proportional hazards model adjusting for age and gender to assess the effect of the intervention on receipt of any type of CRC screening (i.e., colonoscopy, FOBT, or flexible sigmoidoscopy) six months after the call. By six months, 9.7% in the intervention group and 7.9% in the control group had received CRC screening. Patients who received IVR calls were statistically significantly more likely to receive CRC screening (hazard ratio: 1.31, 95% confidence interval: 1.13, 1.51). Our results suggest that IVR calls may be a useful intervention for increasing CRC screening adherence in community practice.

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THE ASSOCIATION BETWEEN INVASIVE BREAST CANCER RISK AND INFLAMMATION GENE POLYMORPHISMS IN THE CALIFORNIA TEACHERS STUDY. *Leona Bessonova, CPH, M.S., Hannah Lui Park, Ph.D., Argyrios Ziogas, Ph.D., Hoda Anton-Culver, Ph.D. (University of California, Irvine, Irvine CA 92697)

There is evidence that the immune system influences cancer progression, and inflammatory processes may lead to negative cancer outcomes. It may be possible for clinicians to use inflammation gene polymorphisms to in predicting breast cancer risk. We analyzed 413 tagging single nucleotide polymorphisms (SNPs) in 29 inflammation genes in 2746 non-Hispanic white participants (1351 cases and 1395 controls) in the California Teachers Study. Odds ratios (OR) and 95% confidence intervals (CI) were estimated by fitting unconditional logistic regression models, adjusted for age at baseline, body mass index, family history of breast cancer, full-term pregnancies, & alcohol use, and stratified by geographic region, for breast cancer risk overall and within subgroups of women defined by menopausal status and hormone therapy (HT) use. In premenopausal women, statistically significant (95% CI excludes 1.0) increased risk for invasive breast cancer was observed for SNPs in IL1R2, IL2RB, IL8RA, IL8RB, IL10RA, & TNFRSF1A (OR 1.244-1.648), and decreased risk was observed for SNPs in TNFRSF1B, IL1R2, IL1RN, IL2, IL8RA, IL8RB, & TNF (OR 0.678-0.809). In postmenopausal women, statistically significant increased risk of breast cancer was observed for SNPs in IL1RN, IL4R, IL6ST, & IL12RB2 (OR 1.158-1.308), and decreased risk was observed for one SNP in IL6R (OR=0.790), after adjustment. At more stringent $\alpha < .01$, 4 SNPs were associated with breast cancer in premenopausal, but none in postmenopausal, women. Stratification by HT showed a number of significant SNPs in all postmenopausal HT groups. All HT groups had some SNPs associated with breast cancer risk. We found that variation in several inflammation genes is associated with invasive breast cancer risk, and observed evidence for effect modification of HT use on the association between risk and inflammation SNPs.

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COMPARISON OF SLEEP DURATION BETWEEN CANCER SURVIVORS AND CANCER-FREE INDIVIDUALS: FINDINGS FROM NHANES STUDY. Y. Ning, *A. Troeschel, K. Herrick, S. Taylor, M. Owens, K. Lapane (Virginia Commonwealth University, Richmond, VA 23298)

Accumulating evidence suggests that disrupted sleep is significantly associated with poor quality of life and faster progression to mortality among cancer patients. However, studies on sleep related issues in cancer survivors are sparse. Therefore, we conducted this analysis to address this gap using data from the National Health and Nutrition Examination Survey 2005-2008. Our analytical population was participants who provided sleep duration data at the time of survey. After the exclusion of those who were pregnant, less than 20 years old, or taking sleep medication, we identified 439 individuals with cancer and 7,518 cancer free individuals. Cases were self-reported diagnosis by their physicians or other health professionals. We limited cancer survivors to those who had been diagnosed with cancer more than 3 years prior to the survey. Multivariate logistic regressions were used to compare sleep duration of cancer survivors with comparison group. After adjusting for potential confounding variables (age, race/ethnicity, physical activity, body mass index, and survey time) cancer survivors had similar sleep duration as individuals without cancers. However, prostate cancer survivors were more likely to sleep less than 7 hours than cancer free individuals (Odds ratio (95% confidence interval): 1.56 (0.93, 2.56)), although the association was marginally significant. Post-hoc analyses including cancer survivors diagnosed within 3 years of the survey did not change the results appreciably. The new findings that prostate cancer survivors experience shorter sleep duration should be confirmed by other studies.

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ASSOCIATION BETWEEN MEAT AND FISH CONSUMPTION AND COOKING METHOD AND ESOPHAGEAL SQUAMOUS CELL CARCINOMA. *Golozar A, Etemadi A, Fazeltabar A, Kamanagar F, Islami F, Taylor P, Boffetta P, Abnet C, Dawsey S, Malekzadeh R (DDRI, Tehran, Iran; DCEG, NCI, MD, 20852)

High temperature cooking such as frying has been shown to be associated with increased risk of cancer in different organs, most likely due to the formation of carcinogenic particles such as heterocyclic amines. Using data from the Golestan case-control study, conducted between 2003 and 2007 in a high-risk region for esophageal squamous cell carcinoma (ESCC), we sought to investigate the association between meat consumption and preparation and ESCC. Information on food preparation methods and dietary habits were gathered from 300 cases and 571 controls individually matched for age, sex and neighborhood using a structured questionnaire and a semi-quantitative food frequency questionnaire, respectively. Multivariate conditional logistic regression was used to estimate odds ratios (OR) adjusted for potential confounders and other known risk factors such as socioeconomic status and smoking. More than 95% of the participants reported using meat, mostly red meat. Participants were 50% female, 26% percent urban and on average 64.4 (+10.2) years old. Among meat users, ORs (95% confidence interval) for frying meat (red or white) and fish were 2.47 (1.14-5.36) and 1.90 (1.14-3.18), respectively. Being in higher quartiles of red meat intake was associated with higher OR for ESCC (P value for trend < 0.001). The odds of ESCC increased by 3.35 (1.56-7.18) in those in the upper quartile of red meat intake. While consuming fish decreased the odds of ESCC (0.32 (0.18-0.58)), chicken use had a no significant association with ESCC. Our results may suggest a role for frying meat or fish and consuming red meat in ESCC carcinogenicity.

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PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN CANCER SURVIVORS: FINDINGS FROM NHANES. Y. Ning, *A. Phillips, K. Herrick, M. Helou, N. Lu, C. Rafie, K. Lapane (Virginia Commonwealth University, Richmond, VA 23298)

Increasing physical activity and reducing sedentary behavior are encouraged to improve quality of life and survival among cancer survivors. However, their behaviors are less studied. We investigated their behaviors using data from the National Health and Nutrition Examination Survey (NHANES) 2007-2010. Participants were those who provided physical activity and sedentary behavior data at the survey. After the exclusion of those who were pregnant, < 20 years old, or who had cancer diagnosis < 3 years, we identified 741 cancer survivors and 10,742 non-cancer participants. Cases were self-reported diagnosis by their physicians. Multivariate logistic regressions were used to compare these behaviors by cancer status. After adjustment for age, race, gender, body mass index, and survey cycle, cancer survivors were more likely to have moderate physical activity (Odds ratio (OR) (95% confidence interval(CI)) = 1.28 (1.03, 1.60)). The frequency, duration, and energy expenditure were similar by cancer status, but cases spent more time in sedentary activity (OR = 1.00, 1.21, and 1.33 for <5, 5-7, and 8+ hours of sedentary activity, p-trend < 0.05). Breast cancer survivors had more sedentary activity than other females (OR = 1.00, 1.47, and 1.98 for <5, 5-7, and 8+ hours, p-trend < 0.05). Prostate cancer survivors were more likely to have physical activity than other males (OR (95%CI) = 1.97 (1.05, 3.69)). Post-hoc analyses including cancer survivors diagnosed within 3 years did not change the results appreciably. Our findings suggest that these cancer survivors tend to be more active, but they also had longer time of sedentary behavior.

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ENVIRONMENTAL AND GENETIC RISK FACTORS FOR CHILDHOOD ACUTE LYMPHOBLASTIC LEUKEMIA IN EGYPT. *S. Ezzat^{1,2}, W. Rashed¹, S. Salem¹, M. El-Daly², M. Abdel-Hamid³, A. El-Hadad¹, I. Sedhom¹, S. Amr⁴, C. Loffredo⁵ (¹Children's Cancer Hospital 57357-Egypt, ²National Liver Institute, Menoufiya University, Egypt, ³Microbiology, Faculty of Medicine, Minia University, Egypt, ⁴University of Maryland, MD, United States, ⁵Lombardi Cancer Center, Georgetown University, Washington, DC, United States.)

This study aimed to study the associations between polymorphisms in MTHFR1 & 2, and NQO1 genes and environmental exposures on the risk of Acute Lymphoblastic Leukemia (ALL) risk in Egyptian children using a case-control design. Cases (N=295) were recruited from the Children's Cancer Hospital, Egypt in the period from 2009 to 2012. Controls (N=333) were randomly selected from the general population to frequency-match the cases by sex, age and residence. Mothers provided answers to an administered questionnaire about their medical, environmental exposures and occupational history. Blood sample from the mother and the child was drawn to test mutations in studied genes. Odds ratios (ORs) and 95% confidence interval (CI) were calculated using unconditional logistic regression models adjusting for age of the child, maternal age, urban/rural residence and education of parents. Having normal delivery was a protective factor (OR = 0.65; 95% CI 0.45-0.93). Use of fertility medication prior to pregnancy in the index child was associated with increased risk (OR = 2.65; 95% CI 1.24-5.66). Exposure of mothers during pregnancy to Environmental Tobacco Smoke at work or home (other sources than the husband) was associated with increased risk (OR = 16.24; 95% CI 6.24-42.25). Having a mutant allele of MTHFR 2 in mothers was associated with increased risk (OR = 1.38; 95% CI 0.95-2.0).

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ADVANCED GLYCATION END PRODUCTS, SOLUBLE RECEPTOR FOR ADVANCED GLYCATION END PRODUCTS AND RISK OF LIVER CANCER. *K.A. Moy, L. Jiao, N.D. Freedman, S.J. Weinstein, R. Sinha, J. Virtamo, D. Albanes, R.Z. Stolzenberg-Solomon (National Cancer Institute, Rockville, MD 20852)

Binding of advanced glycation end products (AGEs) to their receptor (RAGE) may increase oxidative stress and inflammation and may be involved in carcinogenesis. Soluble RAGE (sRAGE) can neutralize the effects mediated by AGEs/RAGE complex. We examined associations between prediagnostic serum levels of N-(carboxymethyl)lysine (CML)-AGE and sRAGE with liver cancer in a case-cohort study within a cohort of 29,133 Finnish male smokers who completed questionnaires and donated fasting serum in 1985-88. During follow-up through April 2006, 145 liver cancers occurred. Serum levels of CML-AGE, sRAGE, glucose and insulin were determined in cases and 485 randomly sampled cohort participants. Chronic HBV and HCV were also measured. Weighted Cox proportional hazards regression was used to calculate relative risks (RR) and 95% confidence intervals (CI), adjusted for age, years of smoking and body mass index. Compared to the lowest tertile of sRAGE, RR(95% CI) for the 2nd and 3rd tertiles were 0.91 (0.56-1.47) and 0.77 (0.48-1.24), respectively (continuous RR=0.86, 95% CI=0.75-0.99). The RR(95% CI) for the 2nd and 3rd tertiles of CML-AGE compared to the lowest tertile were 0.52 (0.33-0.81) and 0.19 (0.10-0.35), respectively (continuous RR=0.74, 95% CI=0.64-0.84). Further adjustment for glucose and insulin or exclusion of the 1% of cases with chronic HBV or HCV did not change the associations. This is the first epidemiologic study examining prediagnostic serum levels of CML-AGE and sRAGE in association with liver cancer risk. These results suggest the complexity of the AGE-RAGE axis in liver cancer etiology.

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THE INFLUENCE OF HUMAN PAPILLOMAVIRUSES ON THE RELATIONSHIP BETWEEN ORAL HEALTH INDICATORS AND HEAD AND NECK CANCER. *Farsi N.J, Rousseau M-C, Allison P, Franco E, Coutlee F, Nicolau B (McGill University, Montreal, Canada, H3A 2A7)

The main risk factors of Head & Neck Cancer (H&NC) are tobacco smoking and alcohol consumption. Other factors include human papillomaviruses (HPV), poor oral health conditions and dietary habits. Although several studies have suggested that HPV-positive and HPV-negative H&NC are etiologically distinct, few have focused on the role played by HPV on the association between oral health indicators and H&NC risk. We used data from an ongoing international hospital-based case-control study to investigate whether HPV infection modifies the relationship between oral health indicators (e.g., number of missing teeth and dental visits) and H&NC. Cases (n=211) were newly diagnosed H&NC patients recruited from four main Montreal area hospitals, while controls (n=230) were randomly sampled from various outpatient clinics in the same hospitals. An interaction effect between number of missing teeth and HPV status was observed. Thus, our logistic regression models were stratified into no/low and high risk HPV infection adjusting for smoking, alcohol consumption and education. When comparing those who had >11 missing teeth with those who had ≤11, the Odds Ratio (OR) was higher in the no/low risk HPV strata [OR= 1.23, 95% confidence interval (CI): 0.72-2.13] than in the high risk HPV strata [OR=0.75, 95%CI: 0.38-1.48]. A lower frequency of dental visits was associated with an increase in H&NC risk in both no/low risk HPV [OR=1.99, 95%CI: 1.17-3.39] and high risk HPV [OR=2.19, 95%CI: 1.13-4.27] groups. Our findings suggest that the role of some but not all oral health indicators in H&NC risk may vary depending on HPV status.

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VARIATION IN TLR-NFKB PATHWAY GENES AND RISK OF BREAST CANCER. *A.J. Resler, K.E. Malone, L.G. Johnson, M. Malkki, E.W. Petersdorf, B. McKnight, and M.M. Madeleine. (Fred Hutchinson Cancer Research Center and University of Washington, Seattle, WA 98109)

The transcription factor nuclear factor- κ B (NF κ B) controls many genes important in inflammation and cancer. The classical NF κ B pathway is regulated through activation of the I κ B kinase complex, which results from stimulation of toll-like receptor (TLR) ligands and pro-inflammatory cytokines. To investigate the relationship between this pathway and breast cancer risk, we examined variation in 233 tagging single nucleotide polymorphisms within 31 candidate genes involved in the classical TLR-NF κ B pathway. This population-based study in the Seattle area included 845 cases aged 65-79 at diagnosis with invasive breast cancer and 807 controls frequency matched to cases by age. All analyses were restricted to Caucasian women and logistic regression was used to compute odds ratios and 95% confidence intervals. After correcting for multiple comparisons using permutation testing, four genes were found to be significantly ($p < 0.05$) associated with breast cancer risk at the gene level: MAP3K1, MMP9, TANK, and TLR9. Results from these genes were similar when examining breast cancer risk by ductal and luminal subtypes. In an exploratory pathway analysis using GRASS, neither of the two pathways examined (TLR and NF κ B) was significantly associated with risk. Finally, using publicly available GWAS data from the CGEMS study as a validation cohort (N=1145 cases, N=1142 controls), we found strong evidence only that rs889312 from MAP3K1 was associated with risk ($p = 0.04$). The results of this study do not suggest a strong association between genetic variation in the TLR-NF κ B pathway and breast cancer risk, though further studies are warranted.

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HELICOBACTER PYLORI INFECTION AND LIVER CANCER MORTALITY IN 67 RURAL CHINESE COUNTIES. L. Wang, T. Zollinger, and *J. Zhang (Indiana University, Indianapolis, IN 46202)

Mounting evidence suggests that helicobacter pylori may play a role in liver cancer etiology. Helicobacter pylori DNA sequence has been detected in the liver tissues of both animals and humans. Furthermore, the positive detection rates of helicobacter pylori are significantly higher in liver tissues of the patients with liver cancer than those of the patients with other liver diseases (e.g., trauma, hepatolithiasis). To date, however, few epidemiologic studies have investigated this hypothesis. Therefore, we sought to evaluate the association between helicobacter pylori infection and liver cancer mortality in 67 rural counties across China. Liver cancer mortality rates in 1986-88 for the 67 Chinese counties were obtained from a nationwide survey among subjects aged 35-69 years. Blood samples were collected from selected individuals of the similar age range in the same 67 counties in 1989. Helicobacter pylori infection was evaluated by measuring its antibodies (IgG) in serum samples using an enzyme-linked immunosorbent assay (ELISA). Pearson correlation and multiple regression analyses were performed to test our hypothesis. Prevalence rates of helicobacter pylori infection were positively correlated with liver cancer mortality in both men ($r=0.43$, $p=0.0002$) and women ($r=0.41$, $p=0.0005$). This significant association persisted among women after adjustment for BMI, income, cigarette smoking, alcohol consumption, HBsAg positivity, diabetes mortality, and salt intake. Although the ecologic fallacy could not be entirely ruled out, the present study offers novel epidemiologic evidence suggesting that infection with helicobacter pylori is associated with an increased risk of death from liver cancer among rural female Chinese populations.

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POSTTRAUMATIC GROWTH AND PHYSICAL ACTIVITY AMONG HISPANIC AND NON-HISPANIC WHITE LONG-TERM BREAST CANCER SURVIVORS. *Dongyan Yang, Richard N. Baumgartner, Kathy B. Baumgartner (University of Louisville, Louisville, KY 40202)

Background: As the number of breast cancer survivors has increased there is interest in long-term emotional stress, psychological needs and social support among these women. Few studies have investigated the association between Posttraumatic Growth Inventory (PTGI) and physical activity (PA) among long-term survivors. **Objective:** The aim of this study was to compare long-term breast cancer survivors and controls for differences in PTGI and its association with PA. **Materials and Methods:** The data (N=457) are from a 12-15 year follow-up of women in the New Mexico Women's Health study, a population-based case-control study. Data were collected by telephone-administered interviews. Factor analysis was used to analyze the PTGI questionnaire and linear regression was used to compare cases with controls and ethnic groups for PTGI scores and the association of PTGI with PA, adjusting for covariates. **Results:** Factor analysis revealed 4 factors: relating to others, new possibility, spiritual change, appreciation of life. Total PTGI score was significantly ($p=0.04$) higher in Hispanics (H) (57 ± 29) than non Hispanic Whites (NHW) (51 ± 25). No difference between cases and controls. The total PA score was 8 units lower in cases than controls and 2 units lower in H than NHW. Time since the traumatic event was associated with a 0.2 decrease in PA score. A one-unit increase in PTGI score was associated with a 0.01 increase in PA score. These associations were not significant or consistent when stratified by ethnicity or case-control status. **Conclusion:** Hispanic women had higher PTGI scores than NHW women and there was no association between PTGI and level of PA among long-term breast cancer survivors.

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COMPARISON OF BREAST AND CERVICAL CANCER SCREENING AMONG RURAL AND URBAN HISPANIC AND AMERICAN INDIAN WOMEN IN THE U.S. SOUTHWEST. *Tomas Nuño, Joe K. Gerald, Robin Harris, Maria Elena Martinez Antonio Estrada, and Francisco García (University of Arizona, Tucson, AZ)

Purpose: Rural Hispanic and American Indian (AI) women are at risk of non-participation in cancer screening programs. The purpose of this study was to compare breast and cervical cancer screening among Hispanic and AI women that reside in rural areas of the Southwest to their urban counterparts and to assess characteristics that influence screening. **Methods:** This study utilizes Behavioral Risk Factor Surveillance System (BRFSS) data from 2006 and 2008 for Arizona and New Mexico. The BRFSS is a federally funded telephone survey to collect data on risk factors contributing to the leading causes of death and chronic diseases. **Results:** Rural Hispanic and AI populations reported some differences in screening rates compared to their urban counterparts. Eighty three percent of rural Hispanic women had ever had a mammogram, compared to 86 percent of urban Hispanic women. Eighty one percent of rural AI women had ever had a mammogram, compared to 89% of urban AI women. Rural Hispanic women were less likely to have ever had a mammogram (OR=0.8; 95% CI=0.5-1.3) compared to urban Hispanic women. Rural AI women were less likely to have ever had a mammogram (OR=0.5; 95% CI=0.3-0.9) compared to urban AI women. **Conclusion:** Hispanic and AI women that reside in rural areas of the Southwest may have lower rates of breast and cervical cancer screening use compared to their urban counterparts. Special efforts are needed to identify ways to overcome barriers to breast and cervical cancer screening for rural Hispanic and AI women.

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SHORT-TERM OUTCOMES FOLLOWING MALIGNANT BOWEL OBSTRUCTION. S.J. Mooney*, M. Winner, D.L. Hershman, and A.I. Neugut (Mailman School of Public Health, Columbia University, New York, NY 10032)

BACKGROUND: Malignant bowel obstruction (MBO) is a complication of late-stage abdominal cancer in which cancerous growth causes intestinal blockage. Few publications have addressed short-term outcomes such as discharge disposition after hospitalization for MBO or total days spent in hospital at the end of life. We hypothesized that surgical as compared to non-surgical therapy would be associated with more days in the hospital during the last months of life. **METHODS:** We used the Surveillance, Epidemiology and End Results (SEER) and Medicare claims linked databases to select patients >65 yrs who died of primary invasive colon adenocarcinoma between 1/1/1992 and 12/31/05. We used Medicare claims to identify hospitalizations for bowel obstruction during the last six months of life, and to identify the use of surgical therapy. We used subsequent claims to assess short-term outcomes and Chi-squared and Mann-Whitney U tests to test statistical significance. **RESULTS:** We identified 18728 colon cancer patients, of whom 1631 (8.7%) developed MBO. Among 370 treated surgically, 163 (44%) were discharged to home care, as compared to 671 of 1261 treated non-surgically (53%); this difference was statistically significant ($p=.002$). Surgical patients spent a median 17/48 days in the hospital between MBO and death, versus 10/34 days in the non-surgical group. The difference in median proportion of days spent in hospital between MBO and death was statistically significant ($p=0.02$). **DISCUSSION:** Surgical treatment of MBO in the setting of terminal cancer was associated with less frequent discharge to home care and more days spent in hospital in the last months of life; such outcomes should be reported in studies of palliative care for MBO.

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HEART RATE VARIABILITY AND INFLAMMATORY MARKERS IN URBAN POLICE OFFICERS. *A Mnatsakanova, CM Burchfiel, ML Kashon, S Li, LE Charles, DB Miller, JM Violanti, ME Andrew (NIOSH, Morgantown WV, 26505)

The aim of this cross-sectional study was to investigate associations of heart rate variability (HRV) with inflammatory markers among Buffalo, NY police officers. A total of 383 officers had complete data on HRV (high (HF) and low (LF) frequency power and heart rate) and inflammatory markers (C-reactive protein (CRP), interleukin 6 (IL-6), tumor necrosis factor-alpha (TNF α) and fibrinogen). Electrocardiographic (ECG) data were processed using consensus standards for analysis of HRV; 5 minutes of resting ECG data were analyzed. Inflammatory markers were measured after fasting 12 hours using standard techniques. Linear regression and analysis of variance and covariance were used to assess mean levels of inflammatory markers across tertiles of HRV components. Univariate analysis revealed that HF and LF measures were strongly and inversely correlated with CRP ($r=-0.21$, $p<0.001$ and $r=-0.23$, $p<0.001$, respectively). In multivariate models, this relationship was attenuated and no longer significant ($\beta=-0.09$, $p=0.057$ and $\beta=-0.11$, $p=0.066$, respectively). Mean levels of TNF α and fibrinogen decreased significantly with increasing tertiles of HF power ($p=0.004$ and $p=0.028$, respectively), but after multivariate adjustment for other risk factors results were attenuated ($p=0.097$ and $p=0.992$). Heart rate was positively and significantly associated with CRP and IL-6 across all models. Findings from this study were consistent with other studies where measures of vagal nerve activity, such as HF and LF power, were inversely related to inflammatory markers. Results suggest that cardiovascular risk factors account for some of the inverse association between HRV and inflammatory markers.

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DISPARITIES IN MULTIPLE RISK FACTORS FOR HEART DISEASE AND STROKE IN THE MISSISSIPPI DELTA. *V. Mendy, V. Short, L. Smith, A. Gamble, (Mississippi State Department of Health, 570 East Woodrow, P.O.Box 1700, Jackson, MS, 39215)

Introduction: The prevalence of multiple risk factors (MRFs) for heart disease and stroke in Mississippi adults is among the highest in the nation. While national studies suggest prevalence differences by race and socioeconomic indicators, the prevalence and distribution of MRFs in the Mississippi Delta by sociodemographics is unknown. We examined MRFs for heart disease and stroke by race and socioeconomic status (SES) among Mississippi Delta adults. Methods: Self-reported Behavioral Risk Factor Surveillance System data (2007-2010; N=7,886) for the Mississippi Delta were subjected to descriptive and multivariate logistic regression analyses. Hypertension, hyperlipidemia, diabetes, smoking, obesity and physical inactivity were assessed. MRFs were defined as having ≥ 2 of these factors. Differences in distribution of MRFs by race, age, sex, SES (income, education and employment) and healthcare coverage were examined. Results: Data indicate risk factor prevalence for obesity (68.0%), diabetes (12.0%), hypertension (36.6%), smoking (23.2%), hyperlipidemia (40.9%) and physical inactivity (33.3%). Over half (50.6%) reported MRFs. Adjusted odds ratios (AOR) indicate that race, sex and healthcare coverage were not significantly associated with MRFs. Less than a high school education (AOR 1.66, 95% CI 1.31-2.10), unemployment (AOR 1.25, 95% CI 1.05-1.49), household income less than \$10,000 (AOR 2.13 95% CI 1.53-2.97) and age 50-64 years (AOR 3.21, 95% CI 2.59-3.97) significantly predicted MRFs. Conclusion: Mississippi Delta adults have high prevalence of MRFs for heart disease and stroke. Having MRFs is significantly associated with low SES and age. Focusing public health efforts on specific groups may help decrease disparities in the Mississippi Delta.

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GAIT SPEED AND STROKE SYMPTOMS IN ADULTS IN DA NANG, VIET NAM. O Uwhuba*, T Xia, C McKinney, AL Fitzpatrick (University of Washington, Multidisciplinary International Research Training Program, Seattle, WA)

Objective: To examine the relationship between gait speed and stroke symptoms in Viet Nameese adults. Methods: 1621 Vietnamese adults aged 35 and older in Da Nang, Viet Nam participated in this study. Data on demographics, socio-economic status, and history of disease and health behaviors, as well as anthropometry, blood pressure, cognitive and physical function were collected using a questionnaire and clinical exam. Bivariate logistic regression was used to calculate the odds ratios (OR) and confidence intervals (CI) for risk of stroke symptoms by speed (in seconds) to walk 15 feet at a usual and fast pace. Results: Gait speed at both fast and usual paces were highly correlated with stroke symptoms in bivariate analysis ($p < 0.001$). When stratified by gender, the associations remained significant ($p < 0.001$), except for gait at fast pace for males which was slightly less significant ($p = 0.032$). After controlling for demographics, gait speed at both a usual and fast pace was associated with an increased risk of reporting stroke symptoms. Individuals in the slowest quartile of gait at usual pace (> 5.385 seconds) had almost a three-fold increased risk of stroke symptoms (OR=2.76, 95%CI: 1.55-4.94) and individuals in the slowest quartile of gait at fast pace (> 4.175 seconds) had a more than two-fold increased risk of stroke symptoms (OR=2.20, 95%CI: 1.27-3.82). Conclusion: Study results indicate that gait speed, as determined by a 15 foot walk test at usual and fast pace, was positively associated with stroke symptoms in study participants from Da Nang, Viet Nam. This inexpensive procedure for measuring functional status may be useful in developing countries to screen for stroke.

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BALANCE AS A RISK FACTOR FOR STROKE SYMPTOMS IN COMMUNITY-DWELLING ADULTS IN DA NANG, VIETNAM. T Xia*, O Uwhuba, C McKinney, AL Fitzpatrick (University of Washington School of Public Health, Seattle, Washington, USA)

Objective: In a random sample of community-dwelling adults in Da Nang, Vietnam, we sought to measure the association between balance problems and stroke symptoms. Methods: We surveyed 1,621 adults age 35 and older in six regions of Da Nang focusing on two variables: balance and stroke symptoms. Balance was assessed as the ability to complete side by side, semi-tandem, and tandem stands for a period of 10 seconds. Stroke symptoms were self-reported with binary responses to questions on the presence of sudden painless weakness on one side, sudden numbness on one side, loss of speech, loss of linguistic understanding, and two questions on vision loss. We used multivariate logistic regression procedures to estimate adjusted odds ratios (OR) and 95% confidence intervals (CI). Results: After adjusting for demographic and behavioral factors, side-by-side (OR: 6.11; 95% CI: 2.03-18.37), semi-tandem (OR: 2.79; 95% CI: 1.06- 7.30) and tandem stands (OR: 3.88; 95% CI: 1.48-10.18) were found to significantly increase the risk of having reported stroke symptoms. All three balance stands displayed a strong association with the individual stroke symptoms of weakness, numbness, and communication with the side-by-side stand as the strongest. Balance was not associated with the questions on vision. Conclusion: These results suggest that balance stands may be used to identify individuals at a high risk for stroke in community settings in low resource countries. Longitudinal research looking at relationships between balance and stroke symptoms is needed to determine the temporality between the variables and to develop prevention measures in low resource countries like Viet Nam.

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ASSOCIATIONS OF CHRONIC STRESS AND STROKE SYMPTOMS IN DA NANG, VIET NAM. D Trinh*, S Sharp*, C McKinney, AL Fitzpatrick (University of Washington School of Public Health, Seattle, Washington, USA)

Objective: While stress has been found to negatively impact a number of diseases including cardiovascular disease (CVD) in developed countries, little is known about its impact in developing countries. The goal of this study was to evaluate the relationship of chronic stress and stroke symptoms as well as hypertension and diabetes in participants ages 35 and older in Da Nang, Viet Nam. Methods: Interviews and health procedures were conducted either at the local health clinic or participants' homes. Stress was measured using the chronic stress burden scale. Stroke was ascertained as a self-report of symptoms related to stroke or transient ischemic attack collected by the Questionnaire to Verify Stroke-Free Status (QVSFS). Multiple logistic regression procedures were employed to estimate adjusted odds ratios (OR) and 95% confidence intervals (CI) of risk of stroke in relation to stress (no stress, 1-2 symptoms, and 3-5 symptoms). Results: Bivariate relationships were found between levels of stress and socio-demographic and healthy lifestyle characteristics ($p < .001$). After adjustment for confounders, as well as diabetes and hypertension, individuals experiencing stress at the highest level (3-5 domains) were more than eight times as likely to report stroke symptoms as those with no stress (OR: 8.13, 4.43-14.91). Lower levels of stress (1-2 domains) also increased significantly the risk of stroke symptoms (OR: 3.27, 95% CI: 2.01-5.34). Conclusion: We found stress to be independently associated with risk of stroke as measured by stroke symptoms. Confirmation of these results as well as development of interventions to reduce stress in health transition countries is greatly needed.

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THE RELATIONSHIP BETWEEN CHRONIC STRESS AND CORONARY HEART DISEASE AND HYPERTENSION IN DA NANG, VIETNAM. S Sharp*, D Trinh, C McKinney, AL Fitzpatrick (University of Washington School of Public Health, Seattle, Washington, USA)

Objective: This study was conducted to investigate whether chronic stress influenced the development of chronic diseases, specifically coronary heart disease (CHD) and hypertension among community dwelling adults in Da Nang, Vietnam. Methods: A total of 1621 Vietnamese adults participated in this study. Data on demographics, socioeconomic status, physician-diagnosed diabetes, hypertension and experience of stress symptoms were collected using a questionnaire. Anthropometric measures were also collected during clinical examination. We employed logistic regression procedures to assess the odds of increased cardiovascular outcomes related to the level of stress within the categories of no stress symptoms, 1-2 symptoms, and 3-5 symptoms in unadjusted and adjusted models. Results: Those reporting 1-2 stress symptoms were 40% more likely to experience hypertension (OR=1.43, CI: 1.02-2.01), while individuals experiencing 3-5 stress symptoms were 3 times more likely to have hypertension (OR=3.06, CI: 1.80-5.19). After adjusting for potential confounders those reporting 1-2 domains of stress were 4.63-times as likely to have CHD (OR=4.63, CI= 2.48-8.65) and those reporting 3-5 domains had an 8-fold increased risk (OR: 8.26, 95% CI: 3.72-18.36). Adjusting for hypertension in addition to demographic and health variables for chest pain did not attenuate results. Conclusion: Our results indicate that stress is strongly associated with the development of CHD and hypertension. Confirmation of these results as well as development of interventions to reduce stress in health transition countries are greatly needed.

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ASSOCIATION OF SELF-REPORTED AND OBJECTIVELY MEASURED SLEEP DURATION WITH CAROTID ARTERY INTIMA-MEDIA THICKNESS AMONG POLICE OFFICERS. *Ma CC, Burchfiel CM, Charles LE, Dorn JM, Andrew ME, Gu JK, Joseph PN, Fekedulegn D, Slaven JE, Hartley TA, Mnatsakanova A, Violanti J. (National Institute for Occupational Safety and Health, Morgantown, WV 26505)

The aim of this cross-sectional study was to examine the association of self-reported sleep duration (SRSD) and objectively measured sleep duration (OMSD) with subclinical atherosclerosis, measured as carotid artery intima-media thickness (IMT) in urban police officers, a group at high risk of cardiovascular disease. Data were collected among 464 officers from the Buffalo, NY Police Department from 2004–2009. Mean maximum IMT (MMXIMT) was the average of the largest 12 values scanned bilaterally from three angles of the near and far wall of the common carotid, bulb, and internal carotid artery. SRSD was obtained via the Pittsburgh Sleep Quality Index questionnaire. OMSD was obtained using actigraphy. Linear and quadratic regression models were used to test the association of SRSD and OMSD with IMT among 431 participants (mean age: 42.3 years) and among 263 participants (mean age: 42.1 years), respectively. A U-shaped association between OMSD and MMXIMT was observed from unadjusted ($p=0.080$), age-adjusted ($p=0.031$), and multivariable-adjusted ($p=0.077$) models using orthogonal polynomial contrast coefficients for a quadratic trend. A similar association was observed between SRSD and MMXIMT. MMXIMT values in participants with between 5.0 and 7.9 hours of SRSD and OMSD were smaller than those with less than 5.0 hours and 8.0 or more hours of sleep. Results show that less than 5.0 and 8.0 hours or more of sleep are associated with increased mean MMXIMT. These findings have important implications regarding sleep and atherosclerosis in police officers.

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PREVALENCE OF HYPERTENSION AND DIABETES AMONG ETHIOPIAN ADULTS. LD Nshisso*, A Reese*, B Gelaye, S Lemmac, Y Berhanec, MA Williams (University of Washington School of Public Health, Seattle, Washington, USA)

Objective: To determine the prevalence of hypertension and diabetes among Ethiopian adults and to examine the proportion of adults who were aware of their conditions. Methods: A total of 2,153 of subjects were included in this cross-sectional study. The World Health Organization STEPwise approach for non-communicable diseases was used to collect socio-demographic data, blood pressure measures and blood samples from participants. Prevalence estimates for hypertension and diabetes were determined separately. The 95% confidence intervals for prevalence estimates were also determined. Results: The overall prevalence of hypertension was 19.1% (95% CI: 17.1-20.8) and 22% (95% CI: 20.2-23.8) and 14.9% (95% CI: 13.4-16.4) among men and women respectively. The overall prevalence of diabetes was 6.5% (95% CI: 5.4-7.6) and 6.4% (95% CI: 5.0-7.8) and 6.6% (95% CI: 4.8-8.4) among men and women correspondingly. Notably, 15% of hypertensives reported never having had their blood pressure checked prior to the present study examination. Approximately 45% of participants who had their blood pressure checked were never diagnosed with hypertension, but were found to be hypertensive in our study. Approximately 27% of newly diagnosed diabetics (during this study) reported never having a previous blood glucose test. Among those who had their blood glucose assessed prior to this study, 17.4% were found to have diabetes but were never diagnosed. Conclusion: The high prevalence of hypertension and diabetes reported in our study confirms findings from other Sub Saharan Africa countries where non-communicable diseases are emerging as a major public health concern.

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MIDDAY NAPS AND THE RISK OF CORONARY ARTERY DISEASE. RESULTS OF THE HEINZ NIXDORF RECALL STUDY. *A. Stang, N. Dragano, S. Moebus, S. Moehlenkamp, A. Schmermund, H. Kaelsch, R. Erbel, K.-H. Joeckel (Martin-Luther-University of Halle-Wittenberg, Germany, Halle)

Background: Several studies have assessed the association between midday naps (siesta) and cardiovascular outcomes and reported heterogeneous results. Concern exists that confounding might have distorted these results and contributed to discrepancies among them. This study prospectively examines the association between siesta habits and the occurrence of coronary artery disease in a non-mediterranean population. Methods: The baseline examination of 4123 participants aged 45-75 years included interviews, physical examinations, laboratory tests, and electron beam computed tomography. We studied the influence of siesta habits on risk of coronary artery disease. We adjusted for several potential confounders including measures of subclinical atherosclerosis like coronary calcium score and ankle brachial index at baseline. Cardiac events during a median follow-up of 8.1 years were defined as non-fatal myocardial infarction and sudden cardiac death. Results: Overall, 135 out of 4123 subjects (3.3%) either suffered from acute myocardial infarction (81 subjects) or died due to a sudden cardiac death (54 subjects) during follow-up. After adjustment for several confounders including measures of subclinical atherosclerosis, regular long (> 60 min) siesta was associated with an increased hazard ratio of cardiac events (hazard ratio 2.1, 95% confidence interval 1.1-4.0). Conclusions: As our detailed confounder analyses showed, confounding is not the sole explanation for this finding. Future research on siesta should focus on biological mechanisms that may be responsible for increasing the risk of coronary artery disease among subjects taking regular long siesta.

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USUAL SODIUM INTAKE AMONG PRESCHOOL CHILDREN, UNITED STATES 2001 – 2008. *N. Tian, Z. Zhang, F. Loustalot, Q. Yang, M. Cogswell. (Center for Disease Control and Promotion, Atlanta, GA 30341).

Background: Excess sodium intake is associated with high blood pressure which tends to start in childhood. By race-ethnicity, the prevalence of high blood pressure is highest among non-Hispanic black adults. However, limited information exists on how usual sodium intake in non-Hispanic black preschool children compares with that among preschool children in other racial/ethnic groups. We investigated sodium intake among US children aged 1 – 5 years. Methods: Using 2001-2008 National Health and Nutrition Examination Survey data for 3,067 children aged 1 – 3 years and 1,454 children aged 4 – 5 years, we compared mean daily sodium intake and the prevalence of excess sodium intake (>1500 mg/day for children aged 1 – 3 and >1900 mg/day for those aged 4 – 5 based on the Institute of Medicine Tolerable Upper Intake Levels) among racial/ethnic groups. Results: Mean sodium intake was significantly higher among non-Hispanic black than among non-Hispanic white or Mexican-American children ($P < 0.05$ for all comparisons). Among children aged 1 – 3 years, the prevalence of excess sodium intake was 85% (95% confidence interval [CI]: 82% - 90%) among non-Hispanic blacks, 79% (95% CI: 76% - 83%) among non-Hispanic whites, and 73% (95% CI: 68% - 79%), among Mexican-Americans. Among children aged 4 – 5 years, the corresponding prevalence rates were 97%, 82%, and 84%, respectively. Conclusions: Most U.S. preschool children consume excessive sodium. Mean sodium intake and the prevalence of excess sodium intake are both highest among non-Hispanic black children. These findings suggest enhanced strategies are needed to reduce sodium intake among preschool children, and particularly among non-Hispanic black children.

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GLOBAL BURDEN OF METABOLIC RISK FACTOR OF CHRONIC DISEASES COLLABORATING GROUP (MEDIATED EFFECT OF ADIPOSITY). *Y Lu, M Ezzati, G Danaei, K Hajifathalian and 153 Investigators from 61 Prospective Studies (Harvard School of Public Health, Boston, MA 02115)

To quantify the effect of adiposity on CHD and stroke mediated by blood pressure, cholesterol and blood glucose, we conducted a systematic review and meta-analysis of prospective studies from MEDLINE and EMBASE (up to March 2010). We contacted the corresponding authors requested re-analysis of data if an included article did not report the quantities of interest. For each included study, we compared relative risks (RRs) of adiposity with and without adjustment for different mediators, and estimated the RR ratios. We pooled data using random effect model and estimated the proportion of excess RRs explained by mediators. Overall, we included 51 prospective cohort studies (with 1,178,126 participants) that reported 36,843 CHD events and 19,806 stroke events during a follow-up period ranging from 3 to 43 years. The pooled RRs of 5 kg/m² BMI increment was 1.27 (95% confidence interval 1.20-1.33) for CHD, and 1.17 (1.11-1.23) for total stroke after adjustment for potential confounders including at least age, sex, and smoking status. With additional adjustment for baseline blood pressure, cholesterol and blood glucose, the RRs for CHD were reduced to 1.18 (1.14-1.23), 1.24 (1.18-1.31), 1.22(1.16-1.28) respectively, and the RRs for stroke were lowered to 1.06 (1.02-1.10), 1.16 (1.10-1.23), 1.13 (1.07-1.20). After adjustment for all 3 mediators, the RR was 1.13 (1.09-1.18) for CHD and 1.05 (1.01-1.19) for stroke, indicating a reduction in excess RRs of 49% (24 -64%) for CHD and 70 % (36 -95%) for stroke. Although the biological pathways for the effect of adiposity on cardiovascular diseases are still being investigated, our results suggest that a substantial proportion of the effect of adiposity on CHD and stroke is mediated through blood pressure, cholesterol and blood glucose. Our findings imply that efforts to reduce the cardiovascular disease burden associated with adiposity can focus on the modifiable metabolic risk factors that partly mediate the effect.

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ALANINE TRANSAMINASE HAS OPPOSITE ASSOCIATIONS WITH DEATH FROM DIABETES AND ISCHEMIC HEART DISEASE IN NHANES III. *CM Schooling, EA Kelvin, HE Jones (CUNY School of Public Health at Hunter College, New York, NY10035, USA)

Diabetes is a well-established risk factor for ischemic heart disease (IHD). However, stringent control of diabetes does not reduce cardiovascular events and there are global regions, such as East Asia, where there are paradoxically low mortality rates from IHD and high rates of diabetes. Based on a theoretical framework the authors hypothesized that some aspects of liver function might have different associations with diabetes, IHD related to diabetes and IHD unrelated to diabetes. Multivariable Cox proportional hazards regression was used in 16,865 adult participants from NHANES III (1988-994) followed until 31st December 2006 to assess the adjusted associations of sex-specific tertiles of alanine transaminase (ALT), as a marker of hepatocellular damage, and bilirubin (BIL), as a control exposure relevant to cholestasis of the liver, with death from diabetes (n=132), from IHD related to diabetes (n=153) and from IHD unrelated to diabetes (n=921). ALT was positively associated with death from diabetes (hazard ratio (HR) 2.17, 95% confidence interval (CI) 1.19 to 3.98 for high compared with low ALT tertile) and IHD related to diabetes (HR 2.20, 95% 1.13 to 4.28) but negatively associated with IHD unrelated to diabetes (HR 0.74, 95% CI 0.58 to 0.95) adjusted for age, sex, education, race/ethnicity, smoking and alcohol use. There were no such associations for BIL. This study suggests that ALT may be a marker of an underlying etiology that relates to the paradoxical associations of diabetes and IHD at a population level, which may warrant further investigation.

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PET OWNERSHIP AND FACTORS ASSOCIATED WITH CARDIOVASCULAR HEALTH: THE CORONARY ARTERY RISK DEVELOPMENT IN YOUNG ADULTS (CARDIA) STUDY. *P. Schreiner (University of Minnesota, Minneapolis, MN 55454)

Health benefits of pet ownership in early childhood and the elderly are well known, but limited data exist on middle-aged individuals. Participants from the Minneapolis CARDIA field center, ages 43-55 years, completed a questionnaire about current, past and never pet ownership as part of the 25-year follow-up exam (2010-2011). Pet data were linked cross-sectionally to traditional cardiovascular risk factor data including lipids, blood pressure, and inflammatory markers, as well as subclinical atherosclerosis. Multivariable models were adjusted for age, race, sex, BMI, smoking, physical activity and education. Out of 837 respondents, 33.2% were current cat owners and 34.1% were current dog owners. After multivariable adjustment, mean triglyceride levels were 129.6 mg/dL in current cat owners versus 116.1 mg/dL in past/never cat owners ($p=0.032$); current cat owners had a 40% lower odds of asthma ($p=0.036$) and a 90% higher odds of sleep apnea ($p=0.027$) compared to past/never cat owners. Current dog owners had a mean hemoglobin A1c of 5.72% versus 5.59% ($p=0.027$) in past/never dog owners, and current dog owners had a 101% higher odds of diabetes ($p=0.0145$); similar to the cat data, current dog owners had a 33% lower odds of asthma compared to past/never dog owners ($p=0.091$). Other lipids, inflammatory markers, blood pressure and subclinical atherosclerosis did not differ by pet ownership status. No consistent risk factor patterns were apparent by pet ownership status in this middle-aged cohort. Further analyses are needed to examine temporality in risk factor trends and to account for potential selection bias based on respiratory symptoms beyond these cross-sectional results.

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THE ASSOCIATION OF SERUM COTININE LEVEL AND DIABETES IN NEVER SMOKERS. *O.Alshaarawy, J.Xiao, and A.Shankar(Center on Aging, West Virginia university, Morgantown, WV,26505)

Several studies have shown that smoking is associated with an increased risk of developing diabetes. However, there are no studies investigating the relationship between environmental tobacco smoking (ETS or passive smoking), measured objectively by serum cotinine levels, and diabetes in never smokers. We examined n=3151 never smokers from the National Health and Nutrition Examination Survey (NHANES) 2005-08. Our exposure of interest was ETS estimated by serum cotinine level and our outcome was diabetes (n=404), defined based on the guidelines of the American Diabetes Association. We found that in never smokers, higher serum cotinine levels were positively associated with diabetes. Compared to those with serum cotinine levels ≤ 0.025 ng/mL, the multivariable odds ratio (OR) (95% confidence interval [CI]) of diabetes among those with cotinine levels 0.026-0.053 ng/mL was 1.27 (0.84-1.92), among those with cotinine levels 0.054-0.223 ng/mL was 1.39 (0.99-1.95) and among those with cotinine level ≥ 0.224 ng/mL was 1.52 (1.01-2.29); p-trend=0.0284. Higher ETS exposure measured objectively by serum cotinine was found to be associated with diabetes in never smokers.

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THE EFFECT OF METABOLIC MARKERS ON INSULIN RESISTANCE AMONG OBESE ADOLESCENTS IN TAIWAN. *CL Chang, CY Lee, WT Lin, HC Tu, YJ Hung, CJ Yu, HL Huang, CH Lee (Kaohsiung Medical University, Taiwan)

Insulin resistance (IR) has a vital role in the pathogenesis between obesity and atherosclerotic diseases. Epidemiological evidence showed that metabolic markers in youth increase risks of type 2 DM and cardiovascular diseases in adult life. While the prevalence of obesity among adolescents in Taiwan has increased in recent decades, the effect of metabolic markers on insulin resistance among obese adolescents remains inadequately recognized. We conducted a large-scale study to clarify such concerns for adolescents in Taiwan. A total of 2739 representative junior-high school students who were multistage-sampled from 36 different urbanization-level of schools participated in this study and offered blood samples (response rate, 73%). Demographic, health behavioral factors, anthropometric outcomes as well as insulin and metabolic markers were measured. We defined metabolic syndrome (MetS) using ATP III criteria for youth. Adolescents with homeostasis model assessment of insulin resistance (HOMA-IR) >75 percentile was considered presence of IR. Data was analyzed using survey-data modules adjusted for the complex survey design. Controlling for covariates, HOMA-IR levels increased with a higher level of body mass index in both genders. High fasting glucose, triglyceride, systolic blood pressure and low high-density cholesterol were associated with a 1.6 to 2.0-fold risk of having IR. Adolescents with MetS were found to have a 2.3-fold IR risk. Such relationship was strengthened among obese adolescents. While cardiovascular disease does not become clinically apparent until the adulthood, our data stress the relationship between MetS and IR that is attainable in childhood, especially in obese adolescents.

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THE ASSOCIATION BETWEEN PERSISTENT ORGANIC POLLUTANTS (POPS) AND DIABETES IN EPIDEMIOLOGICAL STUDIES. *Kyla Taylor, Henry Anderson, Linda Birnbaum, Chad Blystone, Mike Devito, David Jacobs, Josef Köhrle, Duk-Hee Lee, Lars Lind, Rogelio Tornero-Velez, Abee Boyles, Kristina A. Thayer, Raymond Novak (National Toxicology Program, Morrisville, NC 27560)

Background: On January 11-13, 2011, the National Toxicology Program organized a workshop to evaluate the science associating exposure to certain chemicals or chemical classes, including persistent organic pollutants (POPs), with development of diabetes and/or obesity. Objective: A total of 72 epidemiological studies considered as the primary literature were identified from a PubMed search and by reviewing the reference lists of relevant studies or review articles. These studies were discussed during a breakout session at the workshop where participants were asked to review the literature and to focus on evaluation of the consistency, strength/weaknesses, and biological plausibility of findings, and to identify data gaps and areas for future evaluation/research. This report summarizes the major conclusions from the POPs breakout group. Conclusions: The breakout group concluded the evidence is "sufficient" for an association with diabetes and certain organochlorine POPs. The data was not considered sufficient to establish causality. Initial data-mining indicates that the strongest correlations of diabetes are with organochlorine compounds, such as trans-nonachlor, DDE, and dioxins/dioxin-like chemicals including PCBs. There is less indication for an association with other non-organochlorine POPs such as perfluoroalkyl acids (PFAAs) and brominated compounds.

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DIABETES AND INCOME INEQUALITY AMONG MANITOBA CANADA FIRST NATIONS ADULTS. *B. Elias, M. Hall, S. P. Hong, L. Hart, C. Chartrand, P. Martens (University of Manitoba, Winnipeg Manitoba Canada, R3E 3P4)

In Canada, First Nations people experience a greater burden of diabetes. Since 1984, this epidemic has evolved with genetic-environmental interactions proposed as the likely cause. A major driver of a diabetogenic environment is poverty, but only a few studies have investigated this association. Our study explored the prevalence of diabetes over fiscal years 2004/05 – 2006/07 among Manitoba (Canada) residents aged 19+, comparing on and off reserve First Nations (FN)(N=11,035) with all other Manitoba (AOM) residents (N=67,312), by region and by income quintile. Study data are from the Population Health Research Data Repository housed at the University of Manitoba Centre for Health Policy and were derived from data provided by Manitoba Health and a federal First Nations registry file. Prevalent diabetes cases were defined over 3 years using diagnostic codes from hospital abstracts, physician claims, and/or prescription drug claims. A diabetes prevalence of 28% for FN was more than 3 times greater than that of 8% for AOM. This discrepancy in diabetes prevalence was evident in all regions of Manitoba, both rural and urban. A difference was also evident in all income quintiles for both FN and AOM, rural and urban (linear trend = $p < 0.01$). In summary, this study described the disproportionate burden of diabetes for FN and illustrates the social gradient of diabetes for FN and AOM regardless of where they live. More research is required to investigate this disparity. As governments refocus on securing stable economic growth, preventing and managing diabetes cannot get lost. Advocacy strategies to optimize health dignity and quality of life will be required.

MORTALITY AMONG PEOPLE DIFFERENTIALLY CLASSIFIED FOR DIABETES USING A1C, FASTING GLUCOSE, AND 2-HOUR GLUCOSE. *Andy Menke, Catherine C Cowie (Social & Scientific Systems, Silver Springs, MD 20910)

New guidelines published by the American Diabetes Association in 2010 suggest using A1C in addition to fasting plasma glucose (FPG) and 2-hour plasma glucose (2-hr PG) to diagnose diabetes. The risk of complications including mortality associated with having diabetes has not been fully characterized for people differentially classified by the 3 markers. The purpose of the current analysis was to evaluate the association of differential diabetes classification and mortality in the general US population. In a prospective cohort study of 3,020 participants of the Third National Health and Nutrition Examination Survey Mortality Study, A1C, FPG, and 2-hr PG were measured at baseline in 1988-1994 and participants were followed through December 31, 2006 for mortality. The multivariable adjusted hazard ratios (95% CI) for all-cause mortality associated with having markers above the diabetes cutpoint were 0.50 (0.20-1.25) for A1C only, 1.12 (0.56-2.24) for FPG only, 1.22 (0.78-1.91) for 2-hr PG only, 0.43 (0.12-1.57) for A1C and 2-hr PG only, 1.29 (0.62-2.68) for FPG and 2-hr PG only, and 1.54 (1.01-2.33) for all 3 markers. We repeated the analysis using the at-risk for diabetes cutpoints and the hazard ratios were 1.18 (0.81-1.73) for A1C only, 1.19 (0.87-1.62) for FPG only, 1.15 (0.78-1.70) for 2-hr PG only, 1.40 (0.97-2.04) for A1C and FPG only, 1.97 (1.15-3.40) for A1C and 2-hr PG only, 1.33 (0.95-1.87) for FPG and 2-hr PG only, and 1.68 (1.20-2.35) for all 3 markers. The risk of mortality was higher for people positive for 2-3 markers and nonsignificant for people positive for only 1 marker. The nonsignificant results for people positive on only 1 marker may be due to a greater proportion of early stage cases and misclassified people without diabetes.

NOVEL RISK FACTORS AND THE PREDICTION OF TYPE 2 DIABETES IN THE ATHEROSCLEROSIS RISK IN COMMUNITIES (ARIC) STUDY. LA Raynor*, JS Pankow, BB Duncan, MI Schmidt, R Hoogeveen, M Pereira, JH Young, C Ballantyne (University of Minnesota, Minneapolis, MN)

The objective of this study was to determine the potential added value of novel risk factors in predicting the development of type 2 diabetes beyond that provided by standard clinical risk factors. Analyses were conducted using participants from the ARIC study, a population-based cohort study. Novel risk factors were either measured in the full cohort or in a case-control sample nested within the cohort. We started with a basic prediction model, previously validated in ARIC, and evaluated 35 novel risk factors using a forward selection methodology. The area under the curve (AUC), net reclassification index (NRI), and integrated discrimination index (IDI) were calculated to determine if each of the novel risk factors improved risk prediction. There were 1457 incident cases of diabetes over an average of 7.6 years of follow-up among 12,277 participants at risk. None of the novel risk factors significantly improved the AUC. Forced expiratory volume in 1 second was the only novel risk factor that resulted in a significant NRI (0.54%; 95% Confidence Interval: 0.33-0.86%). Adiponectin, leptin, gamma glutamyltransferase, ferritin, inter-cellular adhesion molecule 1, complement C3, white blood cell count, albumin, activated partial thromboplastin time, factor VIII, magnesium, hip circumference, heart rate, leg length, and a genetic risk score significantly improved the IDI, but net changes were small. Thus, the evaluation of a large panel of novel risk factors for type 2 diabetes indicated only small improvements in risk prediction, which are unlikely to meaningfully alter clinical risk reclassification or discrimination strategies.

FINAL ASSESSMENT OF HEALTHY PEOPLE 2010 DIABETES OBJECTIVES AND LOOKING FORWARD TO THE NEXT DECADE. *Lesley Dobrzynski; Rebecca Hines; (National Center for Health Statistics, CDC, Hyattsville, MD, 20782)

Healthy People (HP), now in its fourth decade, has provided science-based, national goals and objectives with 10-year targets designed to guide national health promotion and disease prevention efforts to improve the health of Americans. The HP2010 goals for the Diabetes Topic Area were to reduce the disease and economic burden of diabetes and improve the quality of life for all persons who have or are at risk for diabetes. Progress was tracked and measured for 14 objectives using the percentage of targeted change achieved at the final data point; differences between the baseline and final data point values were tested for significance. Disparities were assessed by race/ethnicity, education status, disability status, sex, and geographic location when data were available; disparities were defined as the percent difference between the group with the best or most favorable rate and the rates for each of the other groups in the demographic domain. Progress over the decade was observed for 71% of the diabetes-related objectives that could be assessed (including diagnosed diabetes, diabetes related deaths, lower extremity amputations, receiving A1C test, and self-blood-glucose monitoring). Little or no change was observed for persons with diagnosed diabetes receiving annual dilated eye exam, annual foot exam, or annual dental exam. Objectives that tracked diabetes incidence and prevalence moved away from the established 2010 targets. Disparities greater than 100% in magnitude were observed at the end of the decade for four objectives. Where applicable, results will be updated to show the latest trends for the nine objectives that were retained in HP2020, and objectives new to HP2020 will be introduced.

SLEEP PATTERNS AND TYPE 2 DIABETES: FINDINGS FROM THE MILLENNIUM COHORT STUDY. E Boyko, MD, MPH, *A Seelig MPH, I Jacobson MPH, T Hooper, MD, MPH, B Smith MPH, PhD, T Smith MS, PhD; N Crum-Cianflone MD, MPH for the Millennium Cohort Study (TeamDeployment Health Research Department, Naval Health Research Center, San Diego, California (Ms Seelig and Ms Jacobson, Dr B. Smith, Dr Crum-Cianflone); Seattle Epidemiologic Research and Information Center, Veterans Affairs Puget Sound Health Care System, Seattle, Washington (Dr Boyko); Department of Preventive Medicine and Biometrics, Uniformed Services University of the Health Sciences, Bethesda, Maryland (Dr Hooper); Department of Community Health, School of Health and Human Services, National University Technology and Health Sciences Center, San Diego, CA (Dr T. Smith))

Population-based studies are needed to determine how poor sleep affects the health of US military service members. Using self-reported data from the Millennium Cohort Study collected from 2001-2008, we evaluated the association of baseline sleep duration and trouble sleeping on the development of new-onset type-2 diabetes among Cohort members. Longitudinal modeling techniques including generalized estimating equations were used to estimate the odds of developing diabetes, while adjusting for relevant covariates including known risk factors such as age, sex, race/ethnicity, education and BMI, and also military specific exposures including deployment and combat experience. Participants who reported sleeping less than 5 hours per night had 1.71 (95% Confidence Interval 1.13, 2.58) greater odds of developing type-2 diabetes, while those who had deployed had reduced odds of developing diabetes (p-value <0.05) A focus on improving sleep patterns and encouraging healthy sleep habits is recommended to improve the health and well-being of service members.

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SERUM RETINOL AND CAROTENOIDS IN ASSOCIATION WITH BIOMARKERS OF INSULIN RESISTANCE AMONG HEALTHY, PREMENOPAUSAL WOMEN: THE BIOCYCLE STUDY. SA Blondin, *EH. Yeung, SL. Mumford, C. Zhang, RW. Browne, J. Wactawski-Wende, EF. Schisterman (Epidemiology Branch, Division of Epidemiology, Statistics, and Prevention Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, MD, 20892).

Background: Dietary carotenoids and retinol are suspected to play a role in the pathogenesis of insulin resistance by reducing oxidative stress. The aim of this study was to investigate how serum retinol and carotenoids (β -carotene, β -cryptoxanthin, lutein+zeaxanthin, lycopene) are associated with biomarkers of insulin resistance. Methods: The BioCycle Study (2005-2007) is a prospective cohort of 259 healthy, premenopausal women. Fasting serum samples were collected at up to sixteen clinic visits, from which retinol, carotenoids, insulin, glucose, and sex hormone-binding globulin (SHBG) were measured. Insulin resistance was estimated by the homeostasis model assessment (HOMA-IR). Linear mixed models were used to determine associations adjusting for age, race, BMI, education, smoking, physical activity, triglycerides, and energy intake. Results: Median (interquartile range (IQR)) serum retinol and β -carotene levels were 0.38 (0.34-0.44) and 0.15 (0.10-0.23) $\mu\text{g/ml}$, respectively. Retinol was positively associated with HOMA-IR ($\beta=0.19$ (95% CI: 0.07, 0.32)) units per $\mu\text{g/ml}$ increase in retinol; the relationship was driven by insulin ($\beta=0.20$ (95% CI: 0.08, 0.31)), as no association was found with glucose ($P=0.7$). Retinol was inversely associated with SHBG ($\beta=-0.22$ (95% CI: -0.28, -0.16)). Although no significant associations were found between serum carotenoids and HOMA-IR, β -carotene was positively associated with SHBG and β -cryptoxanthin was inversely associated with fasting plasma glucose. Conclusion: Serum retinol was significantly and positively associated with measures of insulin resistance and SHBG, indicating its possible role in the pathogenesis of type 2 diabetes. However, results do not support a strong association between individual or total serum carotenoids and insulin resistance.

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MEASURING CONCURRENT ADHERENCE FOR ORAL HYPOLYCEMIC AGENTS AND ANTIDEPRESSANTS AND THE ASSOCIATION WITH CLINICAL OUTCOMES. Hillary R. Bogner, M.D., M.S.C.E., *Heather F. de Vries, M.S.P.H., Alison J. O'Donnell, B.A., Knashawn H. Morales, Sc.D. (Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania, Philadelphia, PA.)

Our objective was to compare self-reported adherence and electronic monitoring for oral hypoglycemic agents and antidepressants and to examine the relationship of adherence with clinical outcomes. In this primary care based longitudinal study adherence was assessed in 180 patients prescribed pharmacotherapy for type 2 diabetes mellitus and depression. Adherence data was collected at baseline and 12 weeks using self-reports and electronic monitoring. Hemoglobin A1c (HbA1c) assays assessed glycemic control and the Patient Health Questionnaire assessed depression. Self-reported adherence and electronic monitoring showed weak agreement at 12 weeks (72.8% vs. 65.6%, oral hypoglycemic agents, $p=0.004$; 70.6% vs. 58.3%, antidepressants, $p<0.001$). Patients who achieved HbA1c $<7\%$ were more likely to achieve $\geq 80\%$ adherence to oral hypoglycemic agents measured with electronic monitoring in comparison to patients who did not achieve HbA1c $<7\%$ at 12 weeks (adjusted odds ratio = 3.52, 95% confidence interval [1.07, 11.57]). Patients who achieved HbA1c $<7\%$ were not more likely to achieve $\geq 80\%$ adherence to oral hypoglycemic agents measured using self-reported adherence in comparison to patients who did not achieve HbA1c $<7\%$. Measures of adherence for antidepressants were not associated with depression outcomes in adjusted models. Compared with electronic monitoring, self-reported adherence overestimated medication adherence. Electronic monitoring for oral hypoglycemic agents predicted glycemic control, but self-reported adherence did not predict clinical outcomes.

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WRIST BREADTH AS A MARKER OF INSULIN RESISTANCE IN YOUTH. *N. Mueller, W. Johnson, A. Odegaard, M. Lee, S. Czerwinski, E. Demerath (University of Minnesota, Minneapolis, MN 55454; Wright State University, Dayton, OH 45420)

Insulin resistance (IR) is the central driver of metabolic dysfunction in children; thus, identifying easy-to-measure markers of IR in children is important for primordial prevention of cardiometabolic diseases later in life. Recently, wrist circumference was found to be associated with IR after adjusting for body mass index (BMI) in overweight/obese Italian children. To investigate whether wrist breadth (in lieu of circumference) was associated with homeostasis model assessment of IR (HOMA-IR) in youth from a general population, independent of adiposity measures, we used serial data (1,051 total measures) on 313 European-American youth (ages 8—18 y) from the Fels Longitudinal Study. Internal standard deviation (SD) score for wrist breadth was evaluated as a predictor of HOMA-IR (log-transformed) before and after adjusting for BMI, waist circumference (WC), and total fat from dual energy x-ray absorptiometry SD scores in separate models using generalized estimating equations. We specified an exchangeable correlation structure for the serial measurement and adjusted all models for age, sex, and Tanner stage. Before adiposity adjustment, we found a statistically significant ($p<0.0001$) positive association between wrist breadth and HOMA-IR ($\beta=0.13$; 95%CI: 0.09-0.18). This association remained significant after adjusting for either total body fat ($\beta=0.09$; 95%CI: 0.06-0.13; $p<0.001$), BMI ($\beta=0.06$; 95%CI: 0.02-0.10; $p=0.002$), or WC ($\beta=0.06$; 95%CI: 0.02-0.10; $p=0.002$). In youth from a general population, wrist breadth was associated with HOMA-IR, independent of adiposity measures. Prospective studies are needed to determine if wrist bone or other measures in youth improve prediction of IR and cardiometabolic diseases into adulthood.

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SLEEP AND DIABETES STATUS: EVIDENCE FROM NHANES. *J. Engeda, B. Mezuk, S. Ratliff, and Y. Ning (Virginia Commonwealth University, Richmond, VA 23298)

Inadequate sleep has been linked to obesity, insulin resistance, and cardiovascular disease. Few studies have examined the relationship between sleep, pre-diabetes and diabetes, or if the relationship between sleep and diabetes differs for clinically-identified vs. undiagnosed cases. Design: Data come from the National Health and Nutrition Examination Survey (2005-2008). Measures: The primary exposures were four aspects of sleep behavior: sleep duration, trouble initiating sleep, trouble maintaining sleep, and waking up too early. The primary outcomes were clinically-identified and undiagnosed pre-diabetes and diabetes as defined by the American Diabetes Association. Participants were categorized using fasting glucose levels as normoglycemic (glucose $<100\text{mg/dl}$) ($n=838$), undiagnosed pre-diabetes (glucose $\geq 100\text{mg/dl}$ $<126\text{mg/dl}$) ($n=758$), clinically-identified pre-diabetes (glucose $\geq 100\text{mg/dl}$ $<126\text{mg/dl}$ plus clinician diagnosis) ($n=80$), undiagnosed diabetes (glucose $>126\text{mg/dl}$) ($n=63$), and clinically-identified diabetes (glucose $>126\text{mg/dl}$ plus clinician diagnosis or antidiabetic prescription) ($n=240$). Results: After adjustment for health behaviors, short sleep duration ($\leq 5\text{hrs/night}$) (odds ratio (OR): 2.42, 95% confidence interval (CI): 1.01-5.08 vs. 7 hours) and trouble maintaining sleep (OR: 2.84, 95% CI: 1.12-7.23) were significantly associated with clinically-identified pre-diabetes relative to normoglycemia. The relationship between sleep duration and clinically-identified pre-diabetics was U-shaped ($p=0.035$). Conclusions: Sleep duration and difficulty maintaining sleep are associated with clinically-identified, but not undiagnosed, pre-diabetes.

LOW AND HIGH GLYCATED HEMOGLOBIN PREDICTS MORTALITY IN CHINESE WITHOUT KNOWN DIABETES. *M. P. Banks, A. O. Odegaard, M. D. Gross, W-P. Koh, J-M. Yuan, M. A. Pereira (University of Minnesota, Minneapolis, MN)

Glycated hemoglobin (HbA1c) is a robust biomarker of diabetes and cardiovascular disease (CVD) risk, yet there are few studies, especially in non-Caucasians, on the association between HbA1c and mortality. We examined associations between HbA1c and total and cause-specific mortality in the Singapore Chinese Health Study, including 5,716 men and women aged 48-83 at the time of the blood draw (1999-2004), when they reported no diabetes diagnosis. Through the end of 2010 we observed 483 total deaths, 146 CVD deaths, and 217 cancer deaths, ascertained by ICD-9 codes. Hazard ratios (HR) for mortality according to HbA1c percentage were estimated with Cox regression, adjusted for age, sex, cigarette smoking, alcohol consumption, dialect, year of interview, body mass index, and education. HbA1c was modeled in five categories from <5.0% (LO, 2.9% of the sample) to \geq 6.5% (HI, 6.3% of the sample), with the referent being 5.0-5.5% (19.0% of the sample). A 'U-shaped' curve in total mortality risk was observed, with higher rates among those with LO (HR = 1.88, 95% CI = 1.14-3.10) as well as HI (HR = 2.35, 95% CI = 1.68-3.29) HbA1c. The results were similar for CVD mortality, whereas for cancer mortality the HR was only elevated for the HI group. The findings were not materially different after excluding deaths in first three years of follow-up. Elevated HbA1c, consistent with undiagnosed diabetes, is not only a robust predictor of CVD mortality, but also of cancer and total mortality. Low HbA1c appears to increase mortality non-trivially and does not appear to be explained by reverse causality. More studies are needed to penetrate etiologic pathways.

EXXONMOBIL'S HEALTH RESEARCH ETHICS PROGRAM:THE FIRST DECADE(2002-2012). *Karlene Lavelle and Steve Lerman (ExxonMobil,Annandale, NJ, 08801)

Protecting human subjects from risk or harm is a long-recognized imperative of ethical research. Title 45 of the US Code of Federal Regulations (The Common Rule), regulates research ethics for most federally-funded human research, but does not apply to research that is privately funded. ExxonMobil conducts and supports research to examine potential risks associated with Company productions and operations. Although generally not required by law, protection of human subjects is consistent with ExxonMobil's ethics and health policies. Modeled on the Common Rule, ExxonMobil established a company-wide research ethics program in 2002 to ensure that human research conducted or supported by the Company is ethical and scientifically sound. The Program consists of six key elements: (1) A Health Research Ethics Committee (HREC) responsible for managing all aspects of the Program; (2) Formal written Guidelines that establish standards of research conduct; (3) a tiered review process in which all potential research involving human subjects receives a Level 1 Review, with proposed activities that meet the definition of research advancing to a Level 2 Review; complex studies may require review by an external IRB (Level 3 Review); (4) Annual training of both HREC members and individuals likely to be involved in conducting or sponsoring health research activities; (5) Annual Program Review to inform continuous improvements; and (6) Resource/reference materials and an intranet site. A total of 66 reviews has been conducted since 2002. Endorsed studies are monitored and investigators are required to report protocol changes to the HREC. We believe ExxonMobil's research ethics program serves as a model for protecting human subjects in industry-sponsored research.

MEASURING THE NORMATIVE: HEALTH DISPARITIES. *A.Ward (615 Newport Road, Hutchinson, KS, 67502)

Although most people value the opportunity to attain or maintain good health, differences exist in the distributions of health opportunities and outcomes. However, not all health differences are health disparities. Health disparities, as opposed to health differences, are assessments of health inequities. There is, though, considerable confusion, ambiguity and disagreement about this distinction. The result is that people mistakenly apply metrics appropriate only for health differences to health disparities. Some authors even argue that because health inequities are normative assessments, there are no true health disparity metrics (presumably, because ethical claims are not quantitative claims). A principal conclusion of this study is that neither alternative is correct. The normative dimension of health inequities, properly conceived, provides the elements for constructing a decision procedure that permits identification of those health differences relevant to making warranted claims about the presence and scope of health disparities. Put differently, while a clear and robust concept of health inequities does not, by itself, provide a metric for health disparities, it does provide a method for selecting those health differences that are also health equities, and so for identifying and measuring health disparities. The study has three major parts. First, an examination of representative health differences in the U.S., Kansas and Minnesota noninstitutionalized civilian adult populations. Second, a conceptual analysis of health difference, health inequality, health inequity, and health disparity. Finally, an application of the conceptual analysis to the empirical analysis of the U.S. and state populations' health differences, thereby identifying the existence and nature of health disparities.

GENETIC VARIATION IN FATTY ACID ELONGASES IS NOT ASSOCIATED WITH CARDIOVASCULAR RISK. *S. Aslibekyan, M. Jensen, H. Campos, C. Linkletter, E. Loucks, J. Ordovas, R. Deka, E. Rimm, A. Baylin (SA, CL, EL, AB-- Brown University, Providence, RI, 02903; MJ, HC, ER-- Harvard School of Public Health, Boston, MA, 02215; JO-- Tufts University, Boston, MA, 02111; RD-- University of Cincinnati, Cincinnati, OH, 45267; AB-- University of Michigan, Ann Arbor, MI, 48104).

Elongases 2, 4, and 5, encoded by genes ELOVL2, ELOVL4, and ELOVL5 respectively, play a key role in the biosynthesis of very long chain polyunsaturated fatty acids. To date, few studies have explored the associations between elongase polymorphisms and cardiovascular health. We investigated whether ELOVL polymorphisms are associated with adipose tissue fatty acids, serum lipids, inflammation, and nonfatal myocardial infarction (MI) in a Costa Rican population. MI cases (n=1 650) were matched to population-based controls (n=1 650) on age, sex, and area of residence. Generalized linear and multiple conditional logistic regression models were used to assess the associations between seven common ELOVL polymorphisms and cardiometabolic outcomes. Analyses were replicated in The Nurses' Health Study (n=1 200) and The Health Professionals Follow-Up Study (n=1 295). Variation in ELOVL2, ELOVL4, and ELOVL5 was not associated with adipose tissue fatty acids, intermediate cardiovascular risk factors, or MI. In the Costa Rica study, the number of the minor allele copies at rs2294867 in the ELOVL5 gene was associated with an increase in total and LDL cholesterol (adjusted P= 0.001 and <0.0001 respectively). Additionally, the number of the minor allele copies at rs761179, also in the ELOVL5 gene, was significantly associated with an increase in total cholesterol (adjusted P=0.04). However, the observed associations were not replicated in independent populations. In conclusion, there is no evidence to suggest that common genetic variants in elongases are associated with adipose tissue fatty acids, serum lipids or inflammatory biomarkers, or the risk of MI.

DRUG-GENE INTERACTIONS AND THE SEARCH FOR MISSING HERITABILITY: A CROSS-SECTIONAL PHARMACOGENOMICS STUDY OF THE QT INTERVAL. *CL Avery and CM Sitlani, for the Cohorts for Heart and Aging Research in Genomic Epidemiology (CHARGE) consortium. The University of North Carolina (CLA) and the University of Washington (CMS)

Variability in response to drug exposure is common and heritable, suggesting that genome-wide pharmacogenomic studies may help explain the missing heritability previously undetected by genome-wide association (GWA) studies. We describe four pharmacogenomic studies in 35,000 participants of European descent from ten cohorts designed to identify genetic variants modifying the effects of drugs on the duration of the QT interval (QT), a heritable measure of ventricular repolarization. Each study cross-sectionally examined four drug classes at the baseline exam: thiazide diuretics (prevalence = 13.6%), tri/tetracyclic antidepressants (2.6%), sulfonyleureas (2.9%), and University of Arizona Center for Education and Research on Therapeutics-classified QT prolonging drugs (4.6%). Interactions were estimated using covariable adjusted linear regression with an additive genetic model and robust standard errors. Estimates were combined using fixed-effects meta-analysis. Although drug-SNP interactions were biologically plausible, variables were well-measured, and statistical approaches were valid, findings from the four meta-analyses were null (Pinteraction > 5.0 x 10⁻⁸), as were results from meta-analyses restricted to the 26 SNPs with significant main effects on QT in published GWA studies (Pinteraction ≥ 0.01). Simulation suggested that additional efforts, including longitudinal modeling to increase statistical power, are likely needed to identify potentially important pharmacogenomic effects, although the possibility remains that in this population there are no interactive effects on QT.

POLYMORPHISMS IN METABOLISM GENES MAY MEDIATE THE ASSOCIATION OF DIETARY INTAKE ON PANCREATIC CANCER RISK. *Rick J. Jansen, Dennis P. Robinson, Rachael Z. Stolzenberg-Solomon, William R. Bamlet, XiangLin Tan, Julie M. Cunningham, Yin Li, David N. Rider, Ann L. Oberg, Traci J. Hammer, Kari G. Rabe, Kristin E. Anderson, Janet E. Olson, Rashmi Sinha, and Gloria M. Petersen (1Department of Health Sciences Research, Mayo Clinic, Rochester, Minnesota 55905).

A source of variation for the inconsistent dietary association with pancreatic cancer maybe that individuals carrying constitutional metabolism gene variants (minor alleles) may differentially benefit compared to homozygous (major allele) individuals. The authors genotyped 76 SNPs that tag thirteen candidate genes (CAT, GAA, GCK, GSTA1, GSTP1, MT1E, SOD2, UGT1A6, UGT1A7, UGT1A8, UGT1A9, UGT2B4, and UGT2B7) involved in the metabolism of fruits, vegetables, fiber, or grains to test if differential associations exist with pancreatic adenocarcinoma. A clinic-based case-control design was used to rapidly ascertain 251 cases and 970 controls (frequency matched on age at recruitment, race, sex, and region of residence) who provided blood samples and completed a 144-item food frequency questionnaire. A dominant coded SNP model was used and dietary categories split based on median intake among controls. Logistic regression was used to calculate odds ratios (OR) and 95% confidence intervals (95% CI), adjusted for potential confounding factors. The greatest interaction benefit (all P ≤ 0.0009) was observed for carriers of no minor alleles and higher intake for: rs11032702 (CAT)-insoluble dietary fiber (OR[95%CI]: 0.506[0.37,0.71]); rs2229221 (GAA)-insoluble fiber (0.494[0.35,0.69]); rs735670 (GCK)-fiber (0.422[0.30,0.60]); rs2070836 (MT1E)-fiber (0.438[0.31,0.62]); rs17863778 (UGT1A7)-deep-yellow vegetables (0.510[0.36,0.70]); rs17863762 (UGT1A8)-fiber (0.441[0.32,0.61]). Reference group was no minor alleles with low dietary intake. Inter-individual variation in metabolism of dietary intake via metabolism gene variants may influence pancreatic cancer risk.

USING MULTIPLE MEASURES IN GENETIC ASSOCIATION ANALYSES *A Tin, BC Astor, E Boerwinkle, E Colantuoni, J Coresh, WH Kao (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205)

Background: Multiple measures of an outcome can enhance the power of a study by increasing the precision of the parameter estimate. We used simulated and empirical data to identify factors that influence this gain in genome-wide association studies (GWAS) of estimated glomerular filtration rate (eGFR), an index of renal function. **Methods:** We studied the relationships between the number of measures, correlation between the errors of each measure, and randomly missing data with the reduction in standard error (SE) for the SNP effect. We compared results from 3 GWASs of renal function in the Atherosclerosis Risk in Communities (ARIC) study: a single-measure, a 3-measure model using eGFR based on serum creatinine, and a 6-measure model with 3 additional biomarkers. The multiple measure models were fitted using generalized least squares regression. **Results:** In the simulated data, additional measures resulted in reductions in the SE of the SNP effect. The reduction was greater when the errors of the measures were less correlated. Adding a second measure led to a reduction in SE of 12.3% when the correlation was 0.5 and 4.2% when the correlation was 0.8. In the GWAS of renal function, the single-measure model detected one locus with p < 5x10⁻⁸; the 3-measure model detected three; and the 6-measure model detected two. Despite a greater reduction in SE, the 6-measure model did not discover more loci than the 3-measure model due to weaker associations between the additional markers and some SNPs. **Conclusion:** Multiple measures of a quantitative trait can increase the power of a study without additional recruitment. However, careful attention must be paid to varied effect sizes and the correlated errors between the measures.

A GENOME-WIDE ASSOCIATION STUDY FOR VENOUS THROMBOEMBOLISM. *W. Tang on behalf of the Extended Cohorts for Heart and Aging Research in Genomic Epidemiology (CHARGE) VTE Consortium (University of Minnesota, Minneapolis, MN 55454)

Venous thromboembolism (VTE) is a common, heritable disease resulting in high rates of hospitalization and mortality. Yet, only a few genetic variants, all in the coagulation pathway, have been consistently replicated for association with VTE. To identify additional genetic determinants of VTE, we conducted a 2-step genome-wide association study (GWAS) with replication in the extended CHARGE VTE consortium. The discovery set comprised 1,562 incident VTE cases out of 45,116 Caucasian participants from four community-based studies. Genotypes for genome-wide single-nucleotide polymorphisms (SNPs) were imputed to the ~2.5 million SNPs in HapMap and tested for association with VTE using study-design appropriate regression models. Results were meta-analyzed. The top 1,047 tag SNPs (p ≤ 0.0016) were selected from the discovery GWAS and tested for association in the follow-up set that included the discovery set and an additional 3,231 cases and 3,536 controls from three case-control studies. In the combined data, genome-wide significant associations were observed at four loci known to be associated with VTE (F5, ABO, F11, and FGG, top p < 5.0x10⁻¹³), while loci at or near the SUSD1, OTUD7A, CNTN6, and SV2C genes showed borderline yet novel associations (p < 1.0x10⁻⁵). In addition, the meta-analysis provided new replication of associations in EDEM2/PROCR, KNG1, and STAB2 genes (p = 0.06-0.03), reported by recent candidate gene studies. In conclusion, this large GWAS replicates key genetic associations in F5, ABO, F11, and FGG loci for VTE in community-based populations. Sufficiently powered replications are needed to confirm the novel findings at the four suggestive loci.

TIME CHANGES, SO DO PEOPLE: REFLECTIONS ON AGE-PERIOD-COHORT ANALYSES BY DISTINGUISHING THE CONCEPT OF TIME IN TERMS OF COMPOSITION AND CONTEXT. *E. Suzuki (Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama, Japan)

When one discusses the dynamic changes in human health over time, one innately conceptualizes time from the three different, but related perspectives – age, period, and cohort. To determine their separate contributions to health outcomes, age-period-cohort analyses have been used for the past 80 years. This study aims to provide some insight into this analytical method by distinguishing the concept of time in terms of composition and context. To demonstrate, I use hypothetical nested data structures of age-period-cohort analyses in the two types of individual-level data, i.e., repeated cross-sectional survey and longitudinal data on the same individuals. The conceptual distinctions between composition and context have profound implications of hypothetical interventions in age-period-cohort analyses. Age is a compositional variable, and a hypothetical intervention to change age is at the individual level. By contrast, both period and cohort are contexts, and thus two distinct types of hypothetical interventions can be envisaged to examine their contextual effects. On a related issue, I also discuss manipulability of time. Although time is a significant context in biomedical science, it is not the only context. In this study, context is proposed to be classified into three fundamental dimensions – *relational*, *spatial*, and *temporal*. Inattention to the contextual triad leads to a biased and precarious knowledge base for public health action, and the continuing flow of performance over time is an intrinsic component of improving our understanding of multilevel causal inference in the new era of eco-epidemiology.

MODELING SURVIVING TO DISCHARGE FROM A NEONATAL UNIT: AN APPLICATION OF COMPETING RISKS. S Hinchliffe, SE Seaton, PC Lambert, and *BN Manktelow (Department of Health Sciences, University of Leicester, UK).

Competing risks are present when a patient is at risk of more than one event and the occurrence of any one of these events will prevent the rest from ever happening. Competing risks methodology allows us to estimate the probability of a specific event in the presence of competing events. Estimates of length of stay for babies in acute neonatal care are vital for clinical care, counselling parents and planning care. Previous work has focused only on babies who survive to discharge, ignoring those who die on the neonatal unit. However, the babies that die have underlying conditions that make them fundamentally different to those that survive to discharge. Competing risks methodology allows us to simultaneously model the competing outcomes of death or discharge. This work uses data from The Neonatal Survey, which collects data on babies admitted to 29 neonatal units in the East of England. Using data from 2007-2010 for babies born 24-28 weeks gestation, competing risks regression models were constructed to estimate the probability of leaving hospital, dead or alive, as a function of time, adjusted for gestation, birthweight and gender. Non-linear effects were estimated by restricted cubic splines. 2176 babies were identified. Competing risks models were fitted and the probability of discharge of death as a function of time from birth displayed in simple to interpret graphs. These probabilities were also estimated conditional on survival to 1 and 7 days of life. For healthcare systems increasingly focusing on costs and the consequences of care, it is more important than ever to consider length of stay. These methods provide important estimates for planning services and counselling parents.

A QUESTION OF ACCURACY: GENERATIONAL DIFFERENCES IN RESPONSES. *A.Pinto, K.J.Cruickshanks, C.W.Acher, G.-H.Huang, B.E.K. Klein, R. Klein, DM Nondahl (University of Wisconsin, Madison, WI 53726)

Studies assessing trends in the prevalence of self-reported health problems are potentially biased if there are generational differences in reporting. The purpose of this paper was to evaluate the accuracy of self-reported hearing impairment in several generations: Greatest Generation 1901-1924 (n=1290), Silent Generation 1925-1945 (n=2198), Baby Boomers 1946-1964 (n=1837), and Generation X 1965-1981 (n=615). Data from the population-based Epidemiology of Hearing Loss Study (ages 48-92 years at baseline) along with their adult children (ages >25) participating in the Beaver Dam Offspring Study were included. The question 'Do you feel you have a hearing loss?' was compared with an audiometric measure of hearing impairment, pure-tone average greater than 25 dB, as a measure of accuracy (agreement). Overall (n=5490), 32 percent had a measured hearing impairment and 47 percent reported a hearing loss. Sixty-eight percent agreement was observed, along with 65 percent specificity and 74 percent sensitivity. Logistic regression models, controlling for age and sex were used. Modeling the entire group revealed men to be the less accurate responders (Odds Ratio (OR) = 0.76, 95% Confidence interval (95%CI) = 0.68, 0.85). In comparison with the Silent Generation, Baby Boomers showed a significantly less accurate response (OR = 0.78, 95%CI = 0.66, 0.92). These results indicate the need to cautiously interpret findings that rely on self-reported outcome measures because of possible generational shifts in reporting.

ASSESSING BIAS ASSOCIATED WITH GEOCODING OF HISTORICAL RESIDENCE IN EPIDEMIOLOGY RESEARCH. *D Han, M Bonner, J Nie, J Freudenheim (Texas A&M Health Science, College Station, TX)

The use of geocoded historical residence as a proxy for retrospective assessment of exposure in early life is increasing in epidemiologic studies of chronic health outcomes. Dealing with historical residence poses challenges primarily due to higher uncertainties associated with data collection and processing, and exclusion of subjects who are not able to be geocoded may be a source of bias. We evaluated potential selection bias, including geographic bias, that may arise due to geocoding failure of such historical residence. Subjects were selected from the WEB (Western New York Exposures and Breast Cancer) study participants born in the study area, and they were grouped into geocoded (n=1309) - address matched subjects using self-reported birth residence information, and non-geocoded (n=201) - subjects failed to be address-matched initially due to missing self-reported birth records but matched based on additional address recoded on a birth certificate. Spatial clustering analysis was performed to identify geographic areas where the proportion of non-geocoded subjects was higher than expected, and geocoded and non-geocoded populations were compared by selected risk factors and by case-control status. Our findings indicate that geocoding status did not modify the spatial patterns of study populations; there were several clusters that had an excess of non-geocoded subjects, however, none was statistically significant. We also found that geocoded and non-geocoded populations did not differ in the distribution of most risk factors compared. However, there was a significant difference in smoking status between the two groups. Further, cases were more likely to be smokers than controls in geocoded populations, while they were less likely to be smokers in non-geocoded populations. Epidemiologic studies should consider the potential biases that may be introduced by incomplete geocoding of historical residence in the investigation of retrospective exposure in early life and chronic health outcomes.

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COMPARING DIFFERENCE-IN-DIFFERENCE TO INSTRUMENTAL VARIABLES ANALYSES. R. Ionescu-Ittu*, J.S. Kaufman, M.M. Glymour, E. Tchetgen Tchetgen (Harvard University, Boston, MA, 02115)

Instrumental variable (IV) methods can remove bias due to unobserved confounding, provided the IV is associated with the outcome only through its effect on the treatment. This assumption may often be violated in applications that use the time period before/after a policy as a proxy for a policy instrument, due to secular trends in the outcome. Difference-in-difference (DID) approaches compare the pre-post outcome difference between an eligible group affected by the policy upon its implementation and an ineligible control group, which is not affected by the policy in either time period. DID can therefore be robust to secular trends in the outcome, provided those trends are equivalent for the eligible and ineligible groups. DID estimates correspond with the overall effect of the policy upon its target population. If the policy is thought to operate via a specific mediator (e.g. additional income may mediate effects of a tax benefit policy), the effects of that mediator can also be estimated by a modified Wald estimator corresponding to the ratio of two DID estimates: the DID estimate on the outcome divided by the DID estimate on the mediator. We show this estimator is equivalent to an IV estimate derived using the interaction between time (pre-post policy implementation) and eligibility for the policy benefit as the instrument and the mediator as an endogenous variable. We discuss and compare the structural assumptions, interpretation of estimates and sources of bias for the DID and IV estimators. We motivate the discussion by examining the effect of the 2006 Canadian universal child benefit policy, an income-based intervention targeting families with young children, on a food insecurity outcome.

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VISUAL ACUITY AND THE NEI VFQ *AJ Paulsen, KJ Cruickshanks, GH Huang, BE Klein, DS Dalton (University of Wisconsin-Madison, WI 53726)

The National Eye Institute Visual Function Questionnaire-25 (NEI VFQ) has been shown to be sensitive to visual impairment (VI). A relationship to visual acuity as a continuous measure has not been widely demonstrated in populations with low prevalence of VI. The Beaver Dam Offspring Study (BOSS) was conducted from 2005-2008 in the adult offspring (N=3285, mean age=49.2 years (standard deviation (SD)=9.9, 54.6% female) of the population-based Epidemiology of Hearing Loss Study cohort. Information on demographics, risk factors, and the NEI VFQ were obtained by in-person interview. Current binocular visual acuity (VA) and ocular images were obtained following standard protocols. The mean NEI VFQ composite score in this population was 92.9 (SD=6.1, Range 20.1-100). The median VA in this population was 20/16 and only 0.67% had an impaired VA (20/40 or worse). Controlling for age, sex, income, number of comorbid medical conditions, cataract or cataract surgery, diabetic retinopathy, and age related macular degeneration, a difference of one line (worse) in VA was statistically significantly associated with a small decrease in NEI VFQ composite score of 1.15 (p<0.0001). Similar associations were found on nine of the twelve NEI VFQ subscales. Even in this middle aged adult population with good vision, a one line difference in visual acuity was independently associated with a small decrease in self-reported visual function.

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USE OF PROPENSITY SCORE MATCHING TO ASSESS THE EFFECT OF A STATE POLICY ON TREATMENT OUTCOMES IN U.S. HIV-INFECTED PERSONS. *DB Hanna, EA Stuart, SJ Gange for the North American AIDS Cohort Collaboration on Research and Design (NA-ACCORD) (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205)

Propensity score matching is used to account for confounding but requires choices that influence how results are interpreted. We explored this issue in a study of 6,547 HIV-infected U.S. residents newly eligible to start antiretroviral therapy (ART) between 2001 and 2007 and participating in NA-ACCORD, a collaboration of HIV cohorts. Our research question concerned the impact of use of waiting lists for AIDS Drug Assistance Program (ADAP) enrollment in a participant's state of residence. ADAP provides ART to eligible low-income persons, but programs differ by state. Outcomes of interest were time to ART initiation (through 6 months after eligibility) and HIV viral load suppression (within one year). We estimated individual propensity scores for living in a state with waiting lists using logistic regression, including known individual, clinic and state level confounders. Propensity score balance was evaluated graphically and quantitatively using MatchIt in R, to exclude 48% of exposed individuals without well-balanced controls. Comparing results from conventional survival analysis to methods using only matched individuals, we found reversed directions in outcome associations. The association between living in a state with a waiting list and ART initiation changed from a hazard ratio (HR) of 1.12 (95% CI 0.93-1.36) to 0.94 (0.74-1.20); the association with viral load suppression changed from a HR of 1.24 (1.03-1.51) to 0.92 (0.72-1.19). We illustrate how propensity score methods can reduce bias by restricting analysis to more exchangeable exposure groups, at the expense of more limited generalizability.

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VARIATIONS IN AND USES OF LIFE EXPECTANCIES REPORTED BY UNITED STATES GOVERNMENT AGENCIES. *S. Day (Mortality Research & Consulting) and R. Reynolds (University of Texas Health Science Center at Houston)

In the United States (US), various government agencies publish tables of mortality. These agencies, and some courts of law, mandate the use of specific tables for specific purposes. The Internal Revenue Service (IRS) relies on gender-neutral Table 2000CM. The Pension Benefit Guaranty Corporation (PBGC) uses Employee Retirement Income Security Act (ERISA) tables. Courts of law often cite Centers for Disease Control and Prevention (CDC) tables. The tables are most often used by these agencies to determine expected present values of lifetime streams of payments in various contexts. Examples include annual costs of care in personal injury litigation, charitable lead trusts for estate planning, and annuities for pension plans. Life expectancies based on these tables vary considerably, and often do not accurately reflect the life expectancy of an individual for whom they are used. In some cases, other mortality information (e.g., from the US Renal Data System, or the Surveillance, Epidemiology, and End Results Program) can lead to more accurate estimates of life expectancy. Inaccuracies can be advantageous for an individual in some cases (e.g., in estate planning or in medical malpractice litigation), but disadvantageous in others (e.g., the IRS's Table 2000CM systematically undervalues charitable contributions in life annuities for females). Refined estimates can have important ramifications for estate planning, legal settlements, annuity pricing, and other purposes. Here we review several major sources of mortality information and demonstrate common methods for adjusting these rates for greater accuracy.

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COMPARISON OF CAUSAL INFERENCE TECHNIQUES FOR ADJUSTING FOR THE HEALTHY WORKER EFFECT IN SIMULATED OCCUPATIONAL COHORTS. Brown DM* and Eisen EA (University of California, Berkeley, CA)

Causal inference techniques allow unbiased estimation of statistical parameters for models containing time-varying confounders that are associated with prior exposure. Health status often plays the role of this confounder in occupational cohorts. It can be affected by prior exposures and can affect both the outcome of interest and future exposures, for example by way of employment status. This leads to a negative bias in effect estimation that is known as the Healthy Worker Survivor Effect (HWSE). We simulate a longitudinal cohort data structure subject to the HWSE compatible with both Cox marginal structural models (MSM) and structural nested accelerated failure-time models (SNAFTM). The exposure-response parameter is estimated using both inverse probability of treatment weighting (IPTW) and targeted minimum-loss based estimation (TMLE) for the Cox MSM. G-estimation is used for parameter estimation in the SNAFTM. The performances of the three estimation methods are compared in in terms of mean squared error. The sensitivity of each method to the misclassification of individuals' true time-varying health status is also explored.

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COMPLETENESS AND ACCURACY OF THE COMPUTERIZED QUEBEC BCG VACCINATION REGISTRY. *F Conus, J Li, M El-Zein, M-E Parent, M-C Rousseau (INRS-Institut Armand-Frappier, Laval, QC, Canada, H7V 1B7)

The BCG (Bacillus Calmette-Guérin) Vaccination Registry for the Canadian province of Quebec comprises some 4 million vaccination records from 1926-1993. Vaccination cards have been kept at INRS-Institut Armand-Frappier, and alphabetical listings were produced to assist in the consultation of individual records. Recently, these listings were computerized into a database using optical character recognition. Completeness and accuracy of the computerized registry need to be verified before conducting large scale epidemiological studies. We systematically retrieved 4,972 vaccination cards (0.1% of the registry) from the archives, covering years 1956-1975. Every card was compared to its corresponding entry in the computerized registry. Accuracy of data was assessed for 12 variables including given name, surname, birth date, father's given name, gender, information on pre-vaccination test (date, type, reaction) and on vaccination (date, mode of administration). Out of the vaccination cards verified, 4,709 (94.7%) were found in the computerized registry. We observed exact agreement on 12 variables for 3,840 (81.5%) records, 1 difference in 834 (17.7%) records, 2 differences in 31 (0.7%) records, and 3 differences in 4 (0.1%) records. The proportion of exact agreement per variable was lowest for gender (91.6%) and given name (92.2%), and highest for date and mode of administration of BCG vaccination (100%). Overall, the vast majority of vaccination cards were found, and identical to their corresponding computerized record. Very few records (0.8%) had differences in more than 1 variable. Thus, the computerized BCG Vaccination Registry is quite complete and highly accurate, remarkably for variables related to BCG vaccination.

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USING TAX PARCEL DATA TO COMPARE GEOCODING ACCURACY OF URBAN AND NON-URBAN ADDRESSES IN WISCONSIN. *EJ Bergman, FJ Nieto, AJ Bersch, WR Buckingham, K Malecki (University of Wisconsin - Madison 53726)

Geocoding, the process of assigning latitude and longitude to an address point, is becoming increasingly common in the field of epidemiology. However, there is variability in the geographic coordinates assigned depending on geocoding program, and the degree of variation is not the same in urban and rural locations. The objective of this study was to compare results from two commonly used geocoding services (Centrus desktop GIS software and Mapquest online geocoding services), using online tax parcel data as a gold standard, across urban and non-urban areas in Wisconsin. The method of comparing geographic coordinates was determined by whether the address was correctly located inside or outside each block group. The 13,403 addresses (8,999 urban and 4,404 non-urban) used in this study were purchased from MSG Genesys at the census block group level to serve as the basis of the sampling frame for the Survey of the Health of Wisconsin. Centrus and Mapquest had 90.8% agreement. However, agreement between the two geocoding services did not translate into agreement with tax parcel data; only 46.3% of households on which both Centrus and Mapquest classified as being outside the block group were correctly classified based on tax parcel data. The results were different between urban and non-urban households as well. Centrus and Mapquest were more accurate in locating a household outside a block group in non-urban areas (76%) compared to urban areas (14%). These preliminary results demonstrate that care should be taken when interpreting geocoding results, and that tax parcel data, when available, should be used for verification.

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DEVELOPMENT OF A CASE-CONTROL STUDY OF PULMONARY ARTERIAL HYPERTENSION IN WOMEN. *JK Paulus, KM Switkowski, IR Preston, NS Hill, KE Roberts (Tufts Medical Center, Boston, MA 02111)

Background: Pulmonary Arterial Hypertension (PAH) is rare disease marked by sex differences in incidence, with women at least twice as likely to be affected as men. We characterized a registry of female PAH cases in order to identify the underlying source population, with a long-term goal of establishing a hospital-based case-control study of reproductive, hormonal, dietary and molecular risk factors for PAH among women. Methods: The Pulmonary Hypertension Database was established at Tufts Medical Center (TMC) in 2005 as a resource for pulmonary vascular disease research. Prevalent female cases of PAH enrolled in the database from 7/2005 – 1/2012 were characterized with respect to demographic and clinical factors in order to define the secondary study base. Case characteristics were summarized using means, proportions and corresponding measures of variability. Results: The database includes 66 female cases primarily of Caucasian (92%) or African American (5%) race. Mean current age is 63.1 y (SD 12.9) and mean time since PAH diagnosis by catheterization is 5.6 y (SD 5.2). Over half (56%) of cases have a history of hypertension, and 21% have a history of diabetes. As of January 2012, 21 (34%) of the cases had died, and mean time from diagnosis until death was 3.8 y (SD 4.7). Residential zip codes indicate that most cases live in Southeastern MA (29%), Northeastern MA (24%), Central/Western MA (11%), and RI (15%). Analysis of referring physician zip codes indicates that most cases were referred from sites in Southeastern MA (27%), Northeastern MA (26%), Central/Western MA (14%) and RI (15%). Conclusion: The source population for female PAH cases at TMC is likely to include Caucasian populations mainly from Eastern MA and RI.

COMPARISON OF NORMAL AND BERNOULLI MODEL OF SPATIAL SCAN STATISTIC TO DETECT LOCALIZED DISEASE CLUSTERS. *D. Agustian, J.R. Rodd, E. Lawrence, H. Reed (Department of Epidemiology, Colorado School of Public Health, University of Colorado at Denver, 13001 E.17th Place, Campus Box B119, Aurora, CO 80045)

The spatial scan statistic has been very useful for detecting localized clustering processes in exploratory etiological research. Various model approach could be used to answer the same research question. This study aiming to compare Normal and Bernoulli Model in detection of localized disease clustering. We compared the models for spatial scan statistic using SaTScan computer software package to test the presence of purely spatial clusters of high body mass index in the Atlanta Metropolitan Region. Various set of parameters and covariates adjustments was used to assess the sensitivity of different models to look for statistically significant clusters. In general, less significant clusters is detected by Normal model which indicate the sensitivity to of the outliers. However, covariates adjustment is more easily implemented in the Normal model. The Bernoulli and Normal model showed different result where the investigator could use both as a complement of each other. The use of several models in spatial scan statistics is warranted to provide rigorous result.

IS META-ANALYSIS ENOUGH? DEVELOPING METHODS FOR IDENTIFYING, EVALUATING AND SELECTING PUBLICLY AVAILABLE DATASETS FOR TARGETED COMMUNITY-BASED HEALTH INTERVENTIONS. *K. Hoefft, M. Handley (University of California, San Francisco, CA 94143)

Local 'hot spots' of poor health outcomes present a challenge for developing evidence-based interventions because much of the information allowing population-based characterization of health disparities is derived from analysis of larger national or regional data, and evidence about health intervention effectiveness is often developed outside the local setting. As part of a larger community-university partnership designing physical activity and nutrition interventions to decrease obesity in a high-need neighborhood in San Francisco, CA, we sought to determine the feasibility of using publicly available datasets for characterization of local community health disparities and evidence of potential interventions. **METHODS:** A review of datasets was conducted using internet search engines, academic literature, and consultation with the UCSF Clinical and Translational Science Institute and Department of Public Health. Any dataset which included the zip code region in its catchment area and measured proximal or distal variables related to obesity was included. All relevant variables were catalogued. To determine which databases and variables were appropriate for these targeted interventions, traditional meta-analysis was compared with a novel community-participatory synthesis of the databases. **RESULTS:** Developing strategies to both measure small pockets of poor health as well as evaluate local data on potential interventions is an important challenge in health disparities research. Methods to evaluate and quantify dataset usefulness to a particular, geographically focused at-risk population, such as those presented here, will be in increasingly greater demand.

AN ALTERNATIVE APPROACH TO HANDLING MISSING DATA IN SELF-REPORT SURVEYS. *J. McKibben, C. Gray, S. Mason, R. Rios, and J. Fauerbach (Uniformed Services University of the Health Sciences, Bethesda, MD 20814)

Background: The pervasiveness of missing data in epidemiologic studies using self-report measures is well-known. Multiple imputation is often used, but is not always appropriate. Restricting analyses to participants with complete data can significantly reduce power and increase bias. An alternative approach that optimizes the existing data in obtaining prevalence rates when using self-report instruments is proposed. **Methods:** Simulated data for 1000 participants with varying prevalence rates (10%, 30%, 50%) and levels of incomplete data (2%, 5%, 10%) are examined using different scoring algorithms, including our own. Determining non-cases involves ignoring missing data for two methods, and one only uses persons with complete data. Our method emphasizes optimizing available information without committing errors of misclassification. For this example, the Posttraumatic Checklist scoring is used to identify the prevalence of posttraumatic stress disorder. **Results:** The proposed algorithm yields results within 0.1%-1.2% of those achieved with no missing data. It also performed significantly better than other standard approaches, for 50%, 30%, and 10% prevalence with 10% missing ($\chi^2(1)=19.04$, $p<.001$, $\chi^2(1)=11.91$, $p<.01$, $\chi^2(1)=4.44$, $p<.05$) and for 50% prevalence with 5% missing (trend for 30%) ($\chi^2(1)=3.84$, $p<.05$, $\chi^2(1)=2.98$, $p<.10$). Further, it retained significantly more information than if only participants with complete data were used across all prevalence rates and levels of missing data ($p<.001$). **Conclusions:** The proposed alternative to handling missing data in self-report surveys achieves a balance between accuracy and efficiency when other options are deemed inappropriate.

WHEN TO SWITCH CART: NOVEL METHODS FOR THE COMPARISON OF SWITCHING STRATEGIES USING OBSERVATIONAL DATA. *LE Cain*, JAC Sterne, MT May, SM Ingle, S Abgrall, M Saag, and MAHernán for the HIV-CAUSAL Collaboration and the ART-CC (Harvard School of Public Health, Boston, MA)

The optimal time to switch from a first-line antiretroviral regimen following virologic failure is unknown. Clinical guidelines recommend strategies that range from switching immediately (tight-control) to waiting until confirmation of HIV-RNA>5,000 copies/ml (loose-control). The best way to compare these strategies is a randomized clinical trial. In this trial, we would identify eligible individuals (HIV-infected, no AIDS, confirmed virologic failure (2 HIV-RNA>200 copies/ml) following suppression (HIV-RNA?200 copies/ml), on a first-line regimen), randomly assign individuals to either 1) switch within 3 months of confirmed virologic failure, or 2) switch within 3 months of HIV-RNA>5,000 copies/ml, and compare the survival. In the absence of a randomized trial, we describe how to emulate one using inverse probability (IP) weighting of a dynamic marginal structural model. We identify eligible individuals and determine with which strategies their data are consistent. If the individual's data at baseline are consistent with both strategies, we replicate the individual and assign one replicate to each of the strategies. If and when the replicate's data become no longer consistent with the assigned strategy, we artificially censor it. All analyses are IP weighted to control for the possible time-varying selection bias introduced by the artificial censoring. Using this approach, we can compare several switching strategies simultaneously (e.g., 200<hiv-rna

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CAUSAL PIE BINGO! A FUN AND INTUITIVE INTRODUCTION TO CAUSAL MODELS FOR STUDENTS OF ALL LEVELS. *C.Y. Johnson and P.P. Howards (Emory University, Atlanta, GA, 30322)

The sufficient-component cause model, also known as “causal pies”, is a causal model commonly used to introduce students to concepts of causality in epidemiology. Causal Pie Bingo! is a game that provides an intuitive introduction to the sufficient component-cause model and causality. The game follows the traditional “bingo” format. Students are given a game card that includes one or more causal pies (sufficient causes), each made up of different combinations of risk factors for disease (component causes). The instructor draws component causes from a hat and players color in the corresponding risk factors on their cards. When a complete sufficient cause is colored in, the player gets the outcome (and a sticker, for younger students). The complexity of the game can be modified to suit the level of the players. Concepts easily incorporated into Causal Pie Bingo! include necessary and sufficient causes, rates, risks, interaction, competing risks, and the relationship between the sufficient-component cause model and the potential outcome model. For games using infectious disease outcomes, person-to-person transmission, vaccination, and herd immunity can also be covered. To date, we have used Causal Pie Bingo! to teach elementary school students (aged 10-14) about what epidemiologists do, to introduce causal models to undergraduate students taking an introductory epidemiology course, and to entertain epidemiology faculty and doctoral students at lunchtime. Causal Pie Bingo! is an alternative to lectures for teaching students the sufficient-component cause model and is a fun and intuitive way to introduce concepts of causality to students of all levels.

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POSTTRAUMATIC STRESS DISORDER AND DEPRESSION AMONG US MILITARY HEALTH CARE PROFESSIONALS DEPLOYED IN SUPPORT OF THE OPERATIONS IN IRAQ AND AFGHANISTAN. *I. Jacobson, J. Horton, C. LeardMann, M. Ryan, E. Boyko, T. Wells, B. Smith, T. Smith for the Millennium Cohort Study Team (Deployment Health Research Department, Naval Health Research Center, San Diego, CA 92106)

Few prospective studies exist that evaluate the mental health status of military health care professionals who have deployed. This study used prospective data from the Millennium Cohort Study with longitudinal analysis techniques to examine whether health care professionals deployed in support of the operations in Iraq and Afghanistan were more likely to screen positive for new-onset PTSD or depression postdeployment than individuals deployed in other occupations. Millennium Cohort participants are surveyed at approximate 3- year intervals and subjects included in this study completed a baseline and at least one follow-up questionnaire, with some subjects completing two follow-up questionnaires. Of 65 108 subjects included who did not screen positive for PTSD or depression at baseline, 9371 (14.4%) reported working as health care professionals for at least one assessment. The incidence rates of positive screens for PTSD or depression were similar for those in health care occupations (4.7% and 4.3%) compared with those in other occupations (4.6% and 3.9%) for the first and second follow-up, respectively. Among military personnel deployed with combat experience, health care professionals compared to service members in other occupations did not have an increased risk for new-onset PTSD or depression over time. Among deployed health care professionals, combat experience was associated with significantly increased the risk (as estimated with an adjusted odds ratio [AOR] = 2.01; 95% confidence interval [CI], 1.06 to 3.83) for new-onset PTSD or depression. These results suggest that being a military health care professional confers neither greater nor lesser risk for PTSD or depression after military deployment. Consistent with previous findings, combat experience, not features specific to health care professions, emerged as the key factor explaining differences in risk.

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ASSOCIATIONS OF PRENATAL MATERNAL SMOKING WITH OFFSPRING HYPERACTIVITY: CAUSAL OR CONFOUNDED? *Keyes KM, Davey Smith G, Susser E (Columbia University, New York, NY)

Introduction: The relation between prenatal tobacco exposure and hyperactivity remains controversial. Reported associations are countered by sibling studies which suggest substantial family-level confounding. Sibling studies, however, also have limitations, e.g., using only mothers who changed their smoking habits. Another strategy is to compare the associations of maternal and paternal smoking. This strategy is enhanced if applied to populations where family-level confounding is less likely. **Methods:** We used data from a longitudinally-followed subsample the Child Health and Development Study (N=1,752), a population-based pregnancy cohort ascertained in 1961-1963 in California. Prenatal smoking was common (33.4%), and the associations with family socioeconomic position was minimal. Maternal and paternal smoking patterns were assessed at three time points by mother report. Hyperactivity was assessed at mean age ten based on mother report to a personality inventory. **Results:** In unadjusted analyses, both maternal ($\beta=0.16$, 95% C.I. 0.14, 0.18) and paternal ($\beta=0.13$, 95% C.I. 0.11, 0.15) smoking during the pregnancy period were associated with offspring age 10 hyperactivity. When adjusting for partner smoking patterns, post-pregnancy smoking, and demographics, a stronger effect of maternal smoking ($\beta=0.27$, 95% C.I. 0.11, 0.41) on offspring hyperactivity than paternal smoking ($\beta=-0.02$, 95% C.I. -0.14, 0.18) was observed. **Discussion:** Prenatal maternal smoking may indeed be causally related to risk for child hyperactivity. Many potential adverse consequences for offspring of mothers who smoke during pregnancy have been described in the literature, and it is important that robust approaches to inferring causality are applied.

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ASSOCIATIONS OF SHIFT WORK WITH LEPTIN, INSULIN, AND ADIPONECTIN. *LE Charles, CM Burchfiel, JK Gu, D Fekedulegn, JM Violanti, CC Ma, LC Adjeroh, ME Andrew. (CDC/NIOSH, Morgantown, WV 26505)

Shift work disrupts circadian rhythms and may affect metabolic function. Our objective was to investigate cross-sectional associations between shift work and three biomarkers of metabolic function: leptin, insulin, and adiponectin. Participants were 394 police officers from Buffalo, NY. Objective data on shift work were obtained from daily city payroll records over 12 years. Officers were categorized as working day, afternoon, or night shift based on the shift for which they had the highest percentage of hours. Metabolic markers were measured after fasting using standardized techniques. Mean levels of the biomarkers were compared across shifts using ANOVA and ANCOVA. Shift work was significantly associated with insulin among officers with BMI <25 kg/m² (p=0.015) and BMI significantly modified this association (interaction p=0.018). Among officers with BMI <25 kg/m², those who worked the afternoon shift had higher mean levels of insulin (7.7 uU/mL, 95% confidence interval (CI): 4.9-12.2) than those on day shift (3.5 uU/mL, 95% CI: 2.5-4.8); p=0.004, after adjustment for age, gender, race, sleep duration, workload, smoking, HDL and total cholesterol, triglycerides, and glucose. Mean insulin levels were higher overall across shifts among officers with a BMI \geq 25 kg/m², though not significantly different. Shift work was not significantly associated with leptin or adiponectin after accounting for gender. Several factors that could affect metabolic function (e.g., irregular or poor eating patterns) have been shown, in previous studies, to be associated with shift work. Our results show that working on the afternoon shift was associated with the higher insulin levels in officers with a BMI <25 kg/m².

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AGRICULTURAL EXPOSURES AND STROKE MORTALITY IN THE AGRICULTURAL HEALTH STUDY. *J.L. Rinsky, J.A. Hopkin, A. Blair, F. Kamel, K. He, L.E. Beane Freeman, H. Chen. (NIEHS/NIH/DHHS, RTP, NC 27709)

Although farmers have reduced rates of stroke compared to the general public, certain exposures common to farming could still be associated with stroke. Few studies have examined these occupational risk factors. We analyzed data from 51,603 male pesticide applicators (mostly farmers) enrolled in the Agricultural Health Study (1993-1997). Vital status was obtained through 2008 and stroke mortality was defined by underlying or contributing cause of death on the death certificate (ICD-9 codes 430-438, and ICD-10 codes I60-I69). Information about exposure to crops, pesticides, and animals, as well as potential confounders was self-reported at baseline. Cox proportional hazards models with time from age at enrollment to age at death or censoring were used to estimate hazard ratios (HR) adjusted for state, smoking, and alcohol consumption. Median follow-up time was 13.7 years/participant, during which 390 stroke deaths occurred. Associations between stroke mortality and established risk factors (e.g., smoking, BMI, drinking) were in the expected direction and magnitude. Overall, use of 50 specific pesticides was not associated with stroke mortality. However, stroke mortality was inversely associated with handling hay, grain, or silage (HR: 0.68; 95% confidence interval (CI): 0.53, 0.86). Although, this association may be a result of a healthy worker effect where people engaging in these activities were at lower risk of stroke, the possibility of a protective role of inflammation-related processes associated with grain exposures may also explain this finding. Future studies should focus on stroke incidence to better evaluate these risk factors.

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PRESENTEEISM ACCORDING TO HEALTHY BEHAVIORS, PHYSICAL HEALTH, AND WORK ENVIRONMENT. *R.M. Merrill, S.G. Aldana, J.E. Pope, D.R. Anderson, C.R. Coberley, W. Whitmer (Brigham Young University, Provo, UT).

Background: To identify the contribution that selected demographic characteristics, health behaviors, physical health outcomes, and workplace environmental factors have on presenteeism (on-the-job productivity loss attributed to poor health). Methods: Analyses are based on a cross-sectional survey administered in 2010 among three geographically diverse U.S. companies. Results: Work-related factors had the greatest influence on presenteeism (e.g., too much to do but not enough time to do it and insufficient technological support/resources). Personal problems and financial stress/concerns also contributed substantially to presenteeism. Factors with less contribution to presenteeism included physical limitations, depression or anxiety, inadequate job training, and problems with supervisors and coworkers. Presenteeism was greatest for ages 30-49, women, separated/divorced/widowed employees, and those with a high school degree or some college. Clerical/office workers and service workers had higher presenteeism. Managers and professionals had the highest level of presenteeism due to having too much to do but too little time to do it and transportation workers had the greatest presenteeism because of physical health limitations. Conclusions: Lowering presenteeism will require that employers have realistic expectations of workers, help them prioritize, and provide sufficient technological support. Financial stress and concerns may warrant financial planning services. Health promotion interventions aimed at improving nutrition, physical and mental health may also contribute to reducing presenteeism.

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FACTORS ASSOCIATED WITH PARTICIPATION IN AND BENEFITS OF A WORKSITE WELLNESS PROGRAM. *R.M. Merrill, J. Hull (Brigham Young University, Provo, UT)

Objective: To describe employees most likely to participate in a Personal Health Appraisal (PHA) and/or in a worksite Wellness Program (WP), and to identify whether an association exists between participation and trends in number of healthcare services, cost of services per person, and cost per service. Design: Retrospective cohort study. Setting: United States. Participants: Employees using medical claims data from the Deseret Mutual Benefit Administrators. Intervention: Financial incentivized PHA and WP. Main Outcome Measure(s): Average number of healthcare services, cost per person, and cost per service. Results: The PHA and WP involved above 30% of employee contract holders. Participation in the PHA and WP were lower in the older age group and higher among women, married, and those with annual income of at least \$40,000. Those who received more services and had greater costs per person during 2004-06 were more likely to go on and participate in the PHA once it became available in 2007-09. There was no association between average cost per service and going on to participate in the PHA. Those who had a higher average cost per person or per service in 2004-06 were less likely to go on and participate in the WP. There was an increase in the average number of services received over the study period, but more so for those who participated in one or more PHA during 2007-09. Conclusion: Healthier employees are more likely to participate in the PHA and WP. The lower rate of increase in the trends for average cost per person and average cost per service among those in the WP indicates that the intervention is effective at slowing escalating costs. Additional years of data should be assessed, when available, to confirm this pattern.

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MORTALITY EXPERIENCE AMONG MINNESOTA TACONITE MINERS. *EM Allen, BH Alexander, JH Mandel, G Ramachandran, RF MacLehose (University of Minnesota, Minneapolis MN 55455)

Objective: Taconite iron ore mining industry workers are exposed to respirable dusts containing silica and elongated mineral particles. In response to concerns about mesothelioma in the Minnesota taconite iron ore mining industry, we evaluated the mortality experience in this population with specific reference to mesothelioma and lung cancer. Methods: From a cohort of 44,159 taconite workers born in 1920 or later, we identified 30,360 with at least one year of documented employment. Vital status from multiple sources and causes of death from mortality records were ascertained through December 31, 2007. Standardized mortality ratios (SMRs) were calculated using the state of Minnesota as the reference population. Results: There were a total of 9,012 deaths, of which 2,693 were from all cancers, 943 from lung cancer, and 30 from mesothelioma. Mortality from all causes was as expected in the Minnesota population (SMR = 1.02, 95% Confidence Interval (CI): 1.00-1.04). Mortality from lung cancer and mesothelioma were higher than expected with SMRs of 1.16 (95% CI: 1.09-1.24) for lung cancer and 2.79 (95% CI: 1.88-3.98) for mesothelioma. Conclusions: This preliminary analysis suggests taconite workers in Minnesota have an increased risk for lung cancer and mesothelioma. The extent to which mining-related exposures contribute to this excess are being explored.

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OCCUPATIONAL INJURIES IN THE METALLURGICAL INDUSTRIES IN MOROCCO. *H. Hami¹, F-Z. Azzaoui², D. Raougui², A.O.T. Ahami² (¹ Laboratory of Genetic and Biometry, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco; ²Equip of Clinic and Cognitive Neurosciences and Health, Laboratory of Biology and Health, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco)

This study aims to describe the profile of occupational injuries occurring in the metallurgical industries in Kenitra city, economic capital of the Gharb region (NW of Morocco). A descriptive retrospective analysis of occupational injuries notified in the delegation of employment of Kenitra in 2008, was performed. The results do not include occupational diseases or journey accidents. In 2008, 79 occupational injuries were reported in the metallurgical industries; 65 have resulted in temporary disability and 14 a permanent disability. According to data recorded, 97.5% of reported accidents have involved male workers. Accidents in this sector are caused by machinery and falling materials, followed by falls from height. Occupational injuries could have serious consequences. Measures are needed to ensure safety and protect workers' health.

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OCCUPATIONAL SPINAL CORD INJURY: POPULATION-BASED INCIDENCE RATES USING MULTIPLE DATA SOURCES, MINNESOTA 1999-2009. S Devagupthapu¹, D Parker¹, J Roesler². (¹-HealthPartners Medical Group, ²- Minnesota Department of Health, St. Paul, MN 55164).

Background: Work-related traumatic spinal cord injuries (SCIs) are an important concern for workers, employers, and the workers' compensation system throughout the United States. There are no treatment options for complete recovery from spinal cord injuries; prevention continues to be the best strategy. SCIs often lead to severe untoward medical complications and significant permanent disability. Methods: Data from three population-based surveillance systems – the Minnesota Spinal Cord Injury Registry from the Minnesota Department of Health, workers' compensation claims data from the Minnesota Department of Labor and Industry, and hospital discharge data from the Minnesota Hospital Association were linked to estimate the population-based incidence rate of occupationally-related spinal cord injuries in Minnesota over a ten year period, 1999-2009. Results: Incidence rates will be compared to national statistics provided by the Bureau of Labor Statistics (BLS). BLS data are based on the workers' compensation system, and the National Spinal Cord Injury Statistical Center (the hospital-based, NIDDR-funded, SCI Model Systems, Birmingham, Alabama). This comparison will be used to evaluate completeness of reporting for work-related SCIs on a national basis when compared with the three Minnesota systems. The Minnesota data allow the use of multiple data sources for capture-recapture analysis. Discussion: To our knowledge this is the first study to estimate the population-based incidence of work related spinal cord injuries. The data provide important insights in the problem of serious work-related traumatic injuries.

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B READER VARIABILITY IN TACONITE MINERS. *C. Lambert, D. Perlman, J. Mandel, BH. Alexander, G. Ramachandran, L. Studenski, R. Hoffbeck (University of Minnesota, Minneapolis, MN, 55455).

The evaluation of chest radiographs for abnormalities consistent with dust-related illness is performed using the International Labor Office International Classification guidelines. Despite the creation of a proficiency program and the use of standard films in classification, the method is subject to error between readers and within a single reader. We assessed inter and intra-reader variability in a cohort of 1,184 former and current taconite miners in Minnesota. Two NIOSH certified B readers served as primary reviewers of the films, with a third reader performing arbitration reads on 301 films. The primary readers blindly reread 149 films for quality assessment purposes. Inter-reader agreement on overall status of the film (normal/abnormal) was 87%, but 52% among films that had been classified as abnormal by at least one reader (kappa=0.6095). Reader agreement on parenchymal abnormalities improved with increasing level of profusion, with a kappa of 0.4253 on films read as 1/0 or above and a kappa of 0.9469 on films read 2/1 or above. Agreement for pleural abnormalities (present/absent) had a kappa of 0.6221. Intra-reader agreement was consistently higher for films initially read as normal. For overall status of the film, percent agreement for abnormal and normal films was 53% and 92% for Reader 1 respectively, with a kappa of 0.4632, and 70% and 97% for Reader 2 (kappa=0.6989). The lowest level of agreement was seen between each primary reader and the arbitration reader, kappa of 0.2808 and 0.3613 for overall film status, likely due to the higher level of difficulty in reading these films. Results indicate intra and inter-B reader variability is influenced by degree of morbidity in this work group.

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WORK STRESS AND ALCOHOL USE IN THE CANADIAN WORKING POPULATION. A. Jones*, and J.Wang (University of Calgary, Calgary, AB)

Background: Changes in the world economy and industrial re-organization has resulted in employers facing increasing pressure to be more competitive. Such changes are generating job insecurity and placing further demands on cerebral skills and mental performance. Despite mental health accommodation and promotion in the workplace becoming an emerging necessity, there are currently no Canadian studies investigating the availability of worksite mental health promotion and accommodation programs. Objective: Develop and test a questionnaire to be used in collecting information about workplace mental health accommodations and promotion programs and the barriers to providing such accommodations. Methods: A cross sectional study of Canadian employers was conducted to pilot a questionnaire. A random download of 10,000 Canadian companies was made from the D&B database; 200 companies were further randomly selected as potential participants for this pilot study. A questionnaire was developed to collect information about availability of worksite mental health promotion and accommodation programs as well as barriers to providing such accommodations and promotion. Results: The response rate was 59.5%, with smaller companies less likely to participate. The majority identified as private worksites and being in the service industry. When asked if the worksite had a health and safety policy 78.2% of participants responded 'yes'. In addition to information regarding the availability of worksite mental health promotion and accommodation programs as well as barriers to providing such accommodations, this pilot study obtained participant suggestions for questionnaire revisions that will be taken into account when developing the questionnaire to be used in a formal study of 8,000 Canadian employers.

COMPARING PULMONARY FUNCTION DATA IN FLAVORINGS MANUFACTURING WORKERS. D. Hollins, M. Jacobsen, D. Paustenbach, D. Galbraith, *C. Ronk (ChemRisk, LLC, San Francisco, CA, 94105)

In 2008, the National Institute for Occupational Safety and Health (NIOSH) performed a Health Hazard Evaluation at a flavorings manufacturing facility. The objective of the study was to evaluate the prevalence of abnormal pulmonary function in workers and the possible relationship to chemical exposures in the workplace. NIOSH stated that they found excessive declines in forced expiratory volume in one second (FEV1), a metric of pulmonary function, in employees currently working or who had ever worked in areas with higher potential for exposure to flavorings through the use of multiple linear regression models. After reviewing the available spirometry and demographic data, we concluded that the generalized estimating equation (GEE) model was better suited than the multiple linear regression techniques used by NIOSH to properly analyze these correlated data. We evaluated job titles and spirometry results for 112 current and former employees, and applied GEE models to determine whether the workplace (e.g., work area, tenure) might be associated with reported adverse longitudinal changes in pulmonary function. We found no statistically significant difference for declines in FEV1 ($p=0.54$) or forced vital capacity (FVC; $p=0.84$) according to work area classifications, after adjusting for obesity, change in weight, age, and smoking. Tenure in an area with high potential for exposures to flavorings chemicals was also not found to be associated with declines in FEV1 (adjusted $p=0.27$) or FVC (adjusted $p=0.59$). Overall, exposures to food flavorings, job tenure and job duties in this facility were not associated with abnormal decrements in pulmonary function when compared to internal controls.

BIAS IN SELF-REPORTED WEIGHT: EFFECTS OF FRIENDS' CHARACTERISTICS. *Shoham DA, Lynch E, Dugas L, Zhang J, Durazo RA, and Luke A (Loyola University Chicago, IL, 60153)

Body size perception is a function of actual body mass index (BMI) and social-demographic characteristics, yet the contribution of social networks hasn't been assessed. We hypothesized that underreporting weight and body image perception are inversely related to average friends' BMI. Data were from the National Longitudinal Study of Adolescent Health. Measures were collected from 3877 respondents (egos) and their friends (alters). Average of alters' measured BMI was the main exposure. Measured BMI were based on weight (kg) over height (m^2). Weight bias: reported minus measured weight (pounds). Body weight image: Scale from 1 (very underweight) to 5 (very overweight). Measured body size category: 1= very underweight (<17.5), 2= underweight (17.5-19.9), 3=ideal (20-24.9), 4=overweight (25-29.9), or 5=obese (30+). Body image bias: body weight image minus body size category. Model 1a regressed weight bias on average alter BMI and school; Model 1b added controls for ego's measured BMI, race-ethnicity, age, and gender. Model 2a regressed body image bias on average alter BMI and school; Model 2b added controls for ego's measured BMI, race-ethnicity, age, and gender. Results: In Model 1a, subjects underreported weight by 0.16 pounds per unit increase of their friends' BMI (95% confidence interval, CI: -.25, -.07); in model 1b, there was no association with friends' BMI (95% CI: -.09, .08). In Model 2a, body image bias was -0.016 units per unit increase in friends' BMI (95% CI: -.023, -.010); model 2b eliminated this association (95% CI: -.007, 0.004). Conclusion: Peer effects in underreporting or perceived body size are explained by subjects' characteristics, and may represent an artifact the propensity for similar individuals to form friendships.

ASSESSMENT OF THE EXPOSURE-RESPONSE RELATIONSHIP BETWEEN DIACETYL AND RESPIRATORY HEALTH OUTCOMES AMONG POPCORN AND FLAVOR MANUFACTURING WORKERS. *L.E. Johns¹, J.S. Pierce¹, L.J. Roberts¹, L.J. Lievens¹, and B.L. Finley² (¹ChemRisk, Chicago, IL 606021; ²San Francisco, CA 941052)

Diacetyl is a ubiquitous diketone that occurs naturally and as an additive in foods, and is present in both indoor and outdoor environments. Recently it has been proposed that there may be an association between diacetyl exposure and severe lung disease. Nonetheless, heretofore a comprehensive review of the epidemiological evidence to support or refute this assertion has not been conducted. The purpose of this review was to assemble all epidemiologic studies in which the risk or frequency of respiratory health outcomes was stratified by a metric of exposure (e.g., cumulative, peak, average), and to critically evaluate the presence of an exposure-response relationship. We identified 10 studies that assessed the respiratory health of workers potentially exposed to diacetyl in 21 flavor manufacturing facilities and 9 microwave popcorn production plants. Health outcomes evaluated in these studies included self-reported respiratory symptoms, abnormal spirometry, and bronchiolitis obliterans. Of the 8 studies that stratified the risk or frequency of respiratory health outcomes by three or more levels of exposure, the results of only one study supported the presence of an exposure-response relationship. However, this investigation did not adequately account for potential confounding variables (i.e., presence of other chemical exposures including known bronchiolitis obliterans inducers, pre-existing lung conditions). Based on our analysis of the epidemiologic literature, we concluded that the evidence is insufficient to support the presence of a diacetyl exposure-response relationship among flavoring and popcorn manufacturing workers.

HOUSEHOLD FINANCIAL DISTRESS AND CHILD BODY MASS INDEX IN A LONGITUDINAL SURVEY SAMPLE. *C. Margerison-Zilko and C. Cubbin (University of Texas at Austin, Austin, TX 78703)

Between 2008 and 2010, an estimated 39% of US households experienced financial distress, such as a job loss, resulting in loss of income, or foreclosure because of inability to maintain housing payments. Little is known about how such household financial distress affects children's health. Our objective is to determine whether household financial distress is associated with changes in children's body mass index (BMI) outcomes. We will examine data from the National Longitudinal Survey of Youth 1979 (NLSY79), which enrolled participants between the ages of 14 and 22 in 1979 and surveyed them annually until 1994 and biannually until the present (most recent data available for 2008). Detailed assessments of children of the NLSY79 women have also been conducted since 1986 ($n=8,100$). Our sample will include children with at least two measures of weight and height between the ages of 4 and 18. Household economic disruption will be measured by: 1) maternal job loss and 2) household income falling below the poverty level. We will take advantage of the longitudinal data to compare children whose household experienced financial distress between two surveys to those whose household did not experience financial distress. We will examine associations between household financial distress and: 1) changes in BMI-for-age percentiles (by sex) using linear regression models and 2) BMI transitions, i.e. moving from one BMI category (e.g., normal weight) at baseline to another category (i.e., underweight, overweight, obese) at follow-up, using multinomial logistic regression models. We will examine whether associations between household financial distress and child BMI outcomes differ by age and/or race/ethnicity.

ASSOCIATIONS BETWEEN EDUCATION AND TOBACCO-RELATED INDICATORS BY RACE/ETHNICITY, NATIONAL HEALTH INTERVIEW SURVEY, 2010. *C. Margerison-Zilko and C. Cubbin (University of Texas at Austin, Austin, TX 78703)

Research has documented an inverse gradient relationship between current smoking and education; this gradient is most apparent among non-Hispanic whites compared to other race/ethnic groups. Little is known about the education gradient for other tobacco-related indicators, both overall and within race/ethnic groups. Using the 2010 National Health Interview Survey, we examined age-adjusted prevalences and means of current smoking, age of initiation, number of cigarettes per day, quit attempt in the past year, years quit, use of treatment to quit, and smoking inside the home, stratified by education and race/ethnicity. Educational gradients in tobacco-related indicators differed substantially by race/ethnicity. For example, at each level of education, non-Hispanic whites had the highest prevalence of smoking and smoking inside the home, initiated earliest, and smoked the most compared with the other two race/ethnic groups. For these outcomes, stepwise education gradients in the expected direction were generally found among whites and blacks; gradients were less clear among Hispanics. Blacks were most likely to report a quit attempt in the past year, with no educational gradient. In contrast, quit attempts among whites increased with increased education, but among Hispanics, quit attempts decreased with increased education. Among blacks, those with less than a high school education had a lower probability of using treatment to quit compared to those with a college education; this relationship was reversed among whites. These findings suggest that the education gradient in tobacco-related indicators differs both by the tobacco indicator and race/ethnicity.

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REDUCING SOCIOECONOMIC INEQUALITIES IN HEALTH: THE ROLE OF SIMULATION MODELING IN EVALUATING POPULATION HEALTH INTERVENTIONS.*BT Smith, PM Smith, S Harper, DG Manuel and CA Mustard (University of Toronto, Toronto, ON, CA, M5G 2E9)

The utility of simulation studies to evaluate the effectiveness of population health interventions for reducing socioeconomic inequalities in health is not known. We conducted a review of simulation studies to assess the types of population health research questions that can be answered with this methodology. This topic was explored using the example of socioeconomic gradients in coronary heart disease (CHD). The results emphasize the potential for simulation studies to produce unique evidence on the effectiveness of population health interventions to reduce socioeconomic inequalities in health. Specifically, simulation models can help estimate the effect of a number of “what-if” scenarios, where the introduction of population health interventions could be tested for their capacity to improve both population health and also promote health equity. In the CHD literature, this has been achieved in two ways: 1) modeling past trends to determine the degree to which changes in risk factors explain the observed CHD rates; 2) evaluating the impact of population health interventions on changing future CHD rates. A significant gap was identified, as to date simulation models have not been used to estimate the effect of population health interventions on socioeconomic inequalities in CHD. We demonstrate the potential of this methodology by modeling changes in diabetes rates on future CHD incidence in the population and by socioeconomic group. Simulation models are a flexible, evidence-based research method with the capacity to inform public health policy-makers regarding the implementation of population health interventions to reduce socioeconomic inequalities in health.

PERCEIVED AND SELF-REPORTED RACE/ETHNICITY IN THE LOS ANGELES FAMILY AND NEIGHBORHOOD SURVEY (L.A.FANS). *C. L. Ford, P. T. Le, and A. R. Pebley. (UCLA, Los Angeles, CA 90095)

In social epidemiologic research, perceived race and/or ethnicity (PRE), which is the race/ethnicity observers ascribe to people they encounter, may be more meaningful than self-reported race/ethnicity (SRE), a proxy for personal identity, for identifying social determinants of health disparities. This study examined the relationship between perceived and self-reported race/ethnicity and identified factors associated with perceiving racially/ethnically diverse respondents as Latino or as black. This was a cross-sectional study of adults (N=3,517) in the Los Angeles Family and Neighborhood Survey (L.A.FANS). Data were collected via face-to-face interview. Prior to each interview and without telling respondents, interviewers indicated the race/ethnicity they believed best described each respondent (i.e., PRE). During the interview, respondents self-reported their race/ethnicity (i.e., SRE). We used multinomial logit regression to obtain relative risk ratios (RRR) for three separate models predicting interviewers' perceptions of respondents as (1) Latino vs. not Latino, (2) black vs. not black, or (3) Latino only, Latino mixed race/ethnicity, or not Latino, controlling for demographic factors. PRE differed from SRE for 2.95% of self-reported blacks, 2.96% of Latinos and 7.48% of whites. SRE was the strongest predictor of PRE. The magnitude of this association was greatest for persons self-reporting any black background (beta coefficient (β)black=9.98, 95% confidence interval (CI)=8.83 11.12; β Latino=6.30, 95% CI=5.88, 6.71). While low educational attainment and foreign-born status were associated with perceiving people as Latino, only self-report of any black background was associated with perceiving them as black.

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DEVELOPMENT OF A MEASURE OF NEIGHBORHOOD CONTENTEDNESS M. Bazaco, S. Wisniewski, T. Bear, A. Foulds, J. Duell, M. Pereira, A. Fabio, (University of Pittsburgh, Pittsburgh PA 15261)

Neighborhood safety, collective efficacy and underlying neighborhood variables are known to influence individual behavior. Using two populations, we developed and validated a neighborhood contentedness scale. Neighborhood contentedness, assessed by a 5-question index, is a measure of the comfort level one feels with their neighborhood, dimensions of social cohesion and neighborhood safety. The questions inquire about familiarity with people, trust, happiness and safety in their neighborhood. The National Longitudinal Study of Adolescent Health (Add Health) is a cohort study of a nationally representative sample of U.S. adolescents in grades 7-12 during the 1994-95 school year. Exploratory factor analysis was used to determine whether the individual domains would cluster together in Wave 1 of the survey. Eigenvalues indicated all five domains clustered well; the factor accounted for 100% of variance. Confirmatory factor analysis in Wave 2, for grades 8-12, validated the contentedness scale (Root Mean Square Error of Approximation (RMSEA)=0.067, Standardized Root Mean Square Residual (SRMSR)=0.041). We tested the scale further using the Casino & Arena Study - Impact on Neighborhood Outcomes (CASINO) - a community based survey using a random sample of landline telephone numbers. These results did not support those from the Add Health Sample (RMSEA=0.143, SRMSR=0.071). In particular, the domain of familiarity did not load strongly. These results suggest that the domains of neighborhood contentedness may vary by population demographics, as the CASINO population was much older (mean = 64±15 years) with a higher proportion of females (70%). It may therefore be important to develop these scales independently for each population.

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INTERVENING TO REDUCE OBESITY: AN AGENT-BASED MODELING APPROACH TO ASSESS THE EFFICACY OF NETWORK-BASED INTERVENTIONS. *A.M. El-Sayed, P. Scarborough, L. Seemann, S. Galea (Oxford University, Oxford, UK, OX1)

Obesity has nearly tripled in the past 30 years in high-income countries. Despite substantial investments, highly efficacious interventions to reduce obesity in the population remain elusive. Recent research has demonstrated that social networks may mediate the spread of obesity in populations, and therefore, may present important opportunities for intervention. We used a stochastic agent-based model to assess whether interventions that targeted highly networked individuals could contribute to reducing obesity in populations. Agents were nested within a scale-free social network with assortative mixing between demographically similar agents. We compared the effects of implementing obesity mitigation interventions targeted at (a) the most connected individuals in a social network and (b) individuals at random within the social network. We tested three interventions against obesity: (1) preventing obesity among 10% of the population at the simulation outset, (2) reducing obesity among 10% of the obese population each year, and (3) reducing obesity among 10% of the newly obese population each year. We found that interventions that targeted highly networked individuals did not outperform interventions implemented at random in the population. Although descriptive epidemiologic studies have shown that networks influence the spread of obesity, our findings suggest that interventions that target well-connected members in a social network may not reduce obesity any more than interventions that target network members randomly. Further study is needed to determine if network-informed obesity reduction experiments in human populations, informed by the observational data, are warranted.

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JOHN HENYRISM AND HYPERTENSION RISK AMONG HISPANICS. * B Boden-Albala, E Roberts, L Quarles, P Tehranifar, S Bakken, JT Bigger, A Wilcox. (Columbia University, New York, NY 10032)

High stress coping strategies over prolonged intervals (John Henryism (JH)) has been linked with increased risk of hypertension (HTN) among blacks. Little is known about JH and HTN among Hispanics. We sought to explore the impact of social determinants on vascular disease through prospective in-person enrollment of randomly chosen households in the Northern Manhattan community using the WICER study. During baseline interview blood pressure was measured. HTN was defined as a blood pressure of 140/90 mmHg or greater, or currently being on anti-hypertensive medication. JH was measured using an 8 item scale: a response of 'not true' was scored a 1, 'sometimes true' a 2, and 'always true' a 3. Responses were summed and split at the median to determine high and low levels of JH. Educational attainment was split into three groups: low education (less than a high school degree), medium education (a high school degree or equivalent), and high education (at least some college). We also controlled for age, gender and current smoking. We calculated the adjusted predicted probability of HTN for each combination of JH and SES using logistic regression models. We sampled 469 Hispanic households; 65% female; mean age 47 yrs. Among those with high levels of JH but low education the adjusted prevalence of hypertension was 57.9% but 48.7% in the high education/high JH group. Whereas we see a more blunted relationship between SES and HTN in the low JH group (low ed = 36.2%, high ed = 37.7%). Using education as our measure of SES we find evidence to support the John Henryism hypothesis among Hispanics.

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IS INCOME INEQUALITY CAUSALLY ASSOCIATED WITH INFANT MORTALITY? AN ANALYSIS OF 34 HIGH INCOME COUNTRIES USING FIXED EFFECT MODELS IN THE PERIOD 1960-2008. *M Avendano (London School of Economics and Political Science, London, UK; Harvard School of Public Health, MA 02138, Cambridge, USA)

Income inequality is associated with infant mortality, but whether this association is causal has not been established. This paper examines whether changes in income inequality are associated with changes in infant mortality based on new data from the Standardized World Income Inequality Database, containing yearly estimates for the period 1960-2008 in 34 high-income countries, linked to infant mortality data from the OECD Health database. Mortality was modelled in a country fixed effect Poisson model that controlled for all time-invariant confounders, additionally including year fixed effects to control for time-varying confounders, and controls for secular changes in employment and economic conditions. In models without country fixed effects, a one-point increase in the Gini coefficient was associated with a 7% increase in the infant mortality rate (Rate ratio[RR]=1.07, 95% Confidence Interval [CI] 1.06, 1.07). Controlling for confounding across countries in fixed effect models, however, income inequality was no longer associated with infant mortality (RR=1.00, 0.99, 1.00). Models indicated that changes in the composition of employment, particularly a decrease in the share of the population employed in agriculture and industry and an increase in employment in services, partly explained the association between income inequality and infant mortality. Findings suggest that income inequality per se is not causally associated with infant mortality, and raise questions regarding the role of secular changes in labour markets and employment as potential determinants of infant mortality over the last 60 years.

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A TYPOLOGY OF NEIGHBORHOODS AND BLOOD PRESSURE IN THE RECORD COHORT STUDY. *A Van Hulst, F Thomas, TA Barnett, Y Kestens, L Gauvin, B Pannier, B Chaix (Department of Social and Preventive Medicine, Université de Montréal, Montreal Canada)

Studies of associations between neighborhood environments and blood pressure (BP) have relied on imprecise characterizations of neighborhoods. We examine associations between systolic and diastolic BP and a neighborhood typology based on numerous residential environment characteristics. Data from the RECORD Study involving 7290 participants aged 30 to 79 years and residing in Paris (France) were analyzed. Cluster analysis was applied to measures of the physical, services and social interactions aspects of neighborhoods. Six contrasting suburban to central urban neighborhood types, with varying levels of adverse social conditions, were identified and examined in relation to systolic and diastolic BP using multivariable linear regression. Systolic BP was 2-3 mmHg higher among participants residing in suburban neighborhood types and in the urban with low social standing neighborhood type, compared to residents of central urban with intermediate social standing neighborhoods. The association between residing in urban low social standing neighborhoods and systolic BP remained after adjusting for individual/neighborhood socioeconomic status and individual risk factors for hypertension (2.11 95% Confidence Interval: 0.70; 3.52). Overall, an inverse association between diastolic BP and level of urbanicity of the neighborhood was observed, even after adjustment for individual risk factors for hypertension. Different patterns of variations in systolic and diastolic BP were observed by levels of urbanicity and social conditions of residential neighborhoods. Population interventions to reduce hypertension targeted towards specific neighborhood types hold promise.

EFFECT OF LARGE SCALE BUSINESS DEVELOPMENTS ON NEIGHBORHOOD COLLECTIVE EFFICACY. *A Fabio, A Foulds, M Bazaco, T Bear and J Duell (University of Pittsburgh, Pittsburgh PA 15261)

Debate exists as to whether development of large scale businesses benefit neighborhood residents. In Pittsburgh we have assessed the effects of two developments in disadvantaged neighborhoods on collective efficacy. Collective efficacy moves away from built environment and aggregated factors and measures a neighborhood's shared expectation and mutual engagement. The first neighborhood, the Hill District, has undergone development of a new sports arena. The second, the Northside, has undergone the development of a casino. We conducted a community based survey using a random sample of listed landline telephone numbers. A household member 18 years or older was asked to participate. We retrospectively collected changes in collective efficacy by measuring perceptions of residential mobility, social cohesion and violent crime change over five years. We completed 1209 interviews across the two neighborhoods and four control neighborhoods. Respondents were older (mean = 64±15 years), mostly females (70%) and white (53%). Residential mobility was greater in neighborhoods which had undergone developments with more subjects reporting moving into these neighborhoods within the past five years (24% vs. 18%, P=0.02). Neighborhood social cohesion also increased in these neighborhoods compared to the control neighborhoods (33% vs. 20%, P<0.01). Residents in the Hill District perceived more violent crime (41%) compared to control neighborhoods (26%, P<.01), but the Northside reported similar increases as the control neighborhoods (24%). These data suggest that, with the exception of an increase in violent crime, the initial effect of the developments have shown a positive effect on neighborhood resident perceptions.

DOES NEIGHBORHOOD COLLECTIVE EFFICACY CHANGE OVER TIME? THE BOSTON NEIGHBORHOOD SURVEY. N Schmidt, E Tchetgen Tchetgen, A Ehntholt, J Almeida, QC Nguyen, B Molnar, D Azrael, *TL Osypuk. (Northeastern University Boston MA 02115).

Objective: Neighborhood social contexts influence health. Secondary data is often repurposed for operationalizing neighborhood exposure variables but such data is collected intermittently. Few studies have tested whether neighborhood social context remains stable over time. We use data from a population-based study to assess the stability of collective efficacy in 38 Boston neighborhoods. Methods: The Boston Neighborhood Survey was a repeat cross-sectional, random digit dial phone survey of adults 18+ in Boston city neighborhoods in 2006 & 2008 (n=3417). Our outcome collective efficacy was derived using item response theory applied to 3 validated scales (informal social control, social cohesion, intergenerational closure; Cronbach's α =.93). We tested a null hypothesis of stability from 2006 to 2008 using: 2-level random effects linear regression (accounting for clustering by neighborhood), fixed effects linear regression (with neighborhood indicators & year*neighborhood interactions), T-tests (bonferroni corrected), and Wilcoxon rank tests. Results: We found no statistically significant change in collective efficacy from 2006 to 2008 across or within the 38 Boston neighborhoods. Unadjusted random effects models showed a marginally-significant 2006-2008 change indicated by random slope for year, but this compositional effect was attenuated to p=.10 after controlling for individual covariates. Conclusion: Our findings suggest short-term stability in neighborhood collective efficacy, adjusting for neighborhood resident composition. If neighborhood collective efficacy is measured 1-2 years before or after the actual exposure period of interest, assuming stability may be valid.

QUALITY OF LIFE IN MEN WITH HEMOPHILIA. *A Siddiqi¹, M Oakley¹, M Soucie¹, S duTreiil², M Beckman¹, R Kulkarni³, V Byams¹ (¹Centers for Disease Control and Prevention, Atlanta, GA 30333; ²Tulane University, New Orleans, LA 70112; ³Michigan State University, East Lansing, MI 48824)

We describe the EuroQol 5D (EQ-5DTM) score calculated using US preference weights, and its association with demographic and clinical features of men with hemophilia (MWH) enrolled in the Universal Data Collection (UDC) program. Using data from the first UDC QOL form completed by MWH UDC enrollees \geq 18 years of age from 2005-2010, we calculated the mean and standard deviation (SD) of EQ-5D for various patient characteristics and used multivariate regression analysis to identify characteristics associated with EQ-5D score. Of 3569 eligible enrollees, 3429 (96%) completed EQ-5D. The unadjusted mean EQ-5D was 0.802 (SD 0.189). Omitting nonsignificant findings, in a multivariate model higher scores were seen in MWH who were: factor IX (vs. factor VIII) deficient (parameter estimate 0.016, p<0.02), employed (0.076,<0.01), current students or had more than high school education (0.043,<0.01), hepatitis C antibody negative (0.028,<0.01) and reported fewer actual bleeds in the past six months (0.001,<0.01). Men with more total joint range of motion (ROM) had higher EQ-5D scores, that varied by disease severity (interaction term 0.0004, p<0.01). Age (range 18-92 years) showed a U-shaped relationship with EQ-5D. Holding other variables constant, predicted EQ-5D was high (0.873) at the youngest ages, declined to a low (0.751) at age 51 and rose again thereafter (Age -0.11,<0.01, Age-squared 0.0001,<0.01). The non-linear relationship of age with EQ-5D score and the suggested interaction between disease severity and ROM warrant more research to explore and explain these findings. Acknowledgement: Hemophilia Treatment Center Network Investigators.

ALTERNATIVE HIGH SCHOOL CREDENTIALS AND MORTALITY: IS A GED COMPARABLE TO A HIGH SCHOOL DEGREE? *Sze Yan Liu, M Maria Glymour, (Harvard School of Public Health, Boston, MA)

Since 1943, the General Educational Development (GED) test has certified a high school level of academic knowledge. GEDs are widely accepted as the equivalent of a US high school diploma. Currently 15-20% of all new high school credentials issued annually are GEDs. Although it is standard practice to equate GED credentials with high school diplomas, there may be considerable heterogeneity in the health returns of these credentials because of the difference in academic content, value of the credential, or age of completion. To date, there has been limited research examining the association between GED and health outcomes. We used a Cox proportional hazard model to assess the association between high school credentials and mortality. Data were drawn from the National Longitudinal Study (NLSY) Mature and Young Women sample, a cohort of females between the ages of 14 to 44 followed from 1968 to 2003. Of the 10,165 women in our sample, 48% had no HS credentials, 49% had at least a HS diploma, and 3% had at least a GED. No difference in mortality risk was noted between GED-holders and individuals with no high school credentials (HR=0.80, 95% CI=0.57, 1.12) after adjusting for race, region of birth and father's education. However, mortality risk was significantly lower for individuals with a HS degree compared to those with no HS credentials (Hazard Ratio (HR) =0.63, 95% CI=0.56, 0.71). There may be differences in mortality risk associated with GED depending on age of receipt. The HR for GEDs was obtained before age 26 (HR=0.60, 95% CI=0.25, 1.45) was lower than the HR for GEDs obtained at age 26 and older (HR=0.84, 95% CI=0.57, 1.23). GEDs may not provide health benefits equivalent to high-school diplomas because of timing of receipt, but this remains a critically under-researched area.

ECONOMIC CONDITIONS AND HEALTH BEHAVIORS DURING THE RECENT ECONOMIC CRISIS. *A Nandi, T. Charters, E. Strumpf, J. Heymann, S. Harper (McGill University, Montreal, Quebec, H3A 1A3 CANADA)

The adoption of healthier behaviors has been hypothesized as a mechanism to explain recent empirical findings of population health improvements during economic downturns. We estimated the causal effect of unemployment rates on smoking, alcohol consumption, and weight using pooled annual surveys from the 2003-2010 years of the Behavioral Risk Factor Surveillance Survey (BRFSS), a state-based, random-digit-dialed telephone survey of the adult, non-institutionalized US population. Analyses were based on approximately 1.3 million respondents living in 90 Metropolitan Statistical Areas (MSAs). The primary exposure was the MSA quarterly unemployment rate. Outcomes included current smoking status, attempts to quit smoking in the past 12 months, past-month alcohol consumption, past-month heavy drinking [consumption of at least 5 (4) drinks on one occasion for men (women)], and body mass index (BMI). Over the study period, the average unemployment rate across MSAs increased more than two-fold, from a low of 4.5% in 2006-7 to a high of 9.3% in 2010. In multivariable models accounting for individual-level socio-demographic characteristics (age, sex, race education, income, employment status, marital status) and including state and quarter fixed effects, a one percentage point increase in unemployment was associated with a decline of 0.20 drinks consumed in the past month [95% confidence interval (CI)=-0.36, -0.05]. The effect of the unemployment rate was nearly null for all other outcomes. We found scant evidence that the association between the unemployment rate and health behaviors was modified by individual-level employment status. Our largely null results suggest that additional work investigating the consequence of the recent economic crisis on health behaviors, morbidity, and mortality is warranted.

EVALUATION OF SOCIAL VULNERABILITY INDICES IN US RURAL COUNTY LEVEL ENVIRONMENTAL HAZARDS. *Shannon C. Grabich (UNC Chapel Hill, Chapel Hill, NC 27599)

Background: Social vulnerability indices (SVI) are necessary; however it is difficult to find empirical evidence to quantify the complexity hidden in human aspects. Rural counties face unique challenges with regard to disaster vulnerability and resilience. We compare the use of two SVIs indices, Cutter et. al. 2003(SoVI) and Flanagan et. al. 2011, on rural county level data in the southeast United States. SoVI 2000 data uses factor analysis to generate 11 factors to create a total score and percentile ranking for each county. Flanagan's method uses 15 census variables at the census tract level to create 4 domains, SES, Household Composition, Minority Status, and Housing/Transportation, which can be used to generate a percentile ranking for each county. Our study assesses the social vulnerability faced in the rural counties and validates the use of the Flanagan method on county level data. Methods: The indices were implemented in 96 selected rural counties within 8 states in the southeast region of the United States. County population data was obtained from the 2000 US Census. Indices were validated using factor and Cronbach Alpha analysis. Pearson correlation was used to compare the two indices percentile rankings. Results: Factor analysis yielded different proposed clusters using the Flanagan method. Correlations for the county percentile based on the two indices were not found to be significant(R: -0.015). While both SVIs were implemented for assessing environmental hazards, further validation is needed to evaluate which measures of social vulnerability these indices predict. The use of several domains of vulnerability as seen in Flanagan may be a more precise predictor than a single social vulnerability indicator SoVI once properly validated.

IMPORTANCE OF DIFFERENT ACCESSIBILITY FACTORS IN WHERE CONSUMERS IN THE U.S. CHOOSE TO SHOP FOR GROCERIES, HEALTHSTYLES 2010. *Shannon C. Grabich (University of North Carolina st Chapel Hill, Chapel Hill, NC, 27955), Latetia Moore Freeman(Centers for Disease Control and Prevention, Atlanta, GA 30341.

Background: Accessibility encompasses proximity, cost, and quality of foods with literature focusing on proximity. We examined whether consumers valued proximity over other accessibility factors in deciding where to shop using data from the 2010 mail survey, HealthStyles. Methods: 3,718 U.S. participants rated the importance of 7 accessibility factors in determining where the household shopper buys groceries: produce quality, produce variety, organic/local produce availability, produce cost, proximity to home regardless of price, proximity to work regardless of price, and lower prices regardless of proximity. Factors were rated on a 5 point scale from very important (1) to not important (5). Percentages of rated importance were calculated overall and by selected demographics. Odds of rating each factor as important were modeled by demographics using multinomial models. Results: Quality, variety, cost, and lower prices were rated higher in importance than proximity to home (87.6%, 77.1%, 76.5%, 53.5% versus 42.1%, respectively). Although this pattern was consistent across demographic groups, variation existed within age, incomes, and employment. Compared to whites, Hispanics had 40% higher odds of rating closeness to home as important versus unimportant and blacks had a 50% higher odds of rating closeness to work as important. Conclusions: Proximity is rated consistently low in comparison to other accessibility factors. Results suggest a need to re-evaluate the public health focus to include different aspects of accessibility.

CLUSTERING OF COMORBID PAIN CONDITIONS WITH VULVODYNIA. *R. Nguyen, C. Veasley, B. Harlow, D. Smolenski (Univ MN, Minneapolis, 55454)

Individual comorbid pain conditions occur with chronic vulvar pain (vulvodynia) but cluster analysis of comorbidity patterns is needed to determine potential shared etiology. Methods: 1457 women with vulvodynia (localized, generalized, or both) were surveyed by the National Vulvodynia Association regarding co-morbid pain conditions including: temporomandibular joint, interstitial cystitis, fibromyalgia (FM), chronic fatigue syndrome (CFS), and irritable bowel syndrome (IBS), endometriosis (ENDO) and chronic headache. Age-adjusted latent class analysis modeled extant patterns of comorbidity by the three vulvodynia types, and a multigroup model tested for equality of the comorbidity patterns and comparison of comorbidity prevalence. Results: A two-class model (no comorbidity versus any comorbidity) had the best fit to the data in individual and multigroup models. The dominant class was no comorbidity; while the other latent class comprised women with ≥ 1 comorbidities, with the dominant pattern showing both IBS (posterior probability=62%) and FM (54%). CFS and ENDO had the lowest posterior probabilities of 26% each. Prevalence of the dominant pattern differed by vulvodynia type: both (37% prevalence, referent), generalized (21.6% prevalence, OR = 0.41, 95% CI = 0.27, 0.61), and localized (12.5% prevalence; OR = 0.31, 95% CI = 0.21, 0.47). Conclusion: This novel work provides insight into potential shared mechanisms of vulvodynia and comorbid pain conditions by describing that a prominent comorbidity pattern in women with vulvodynia is having both IBS and FM, however, that the prevalence of this comorbidity pattern differs by vulvodynia type. Our data can be used to aid in the determination of potential shared etiology between IBS, FM and women with vulvar pain.

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HEARING IMPAIRMENT IN THE UNITED STATES AND NORWAY. *H J Hoffman, C-M Li, C L Themann, K Tambs, B Engdahl (NIDCD/NIH, Bethesda, MD 20892)

Few studies have analyzed differences in hearing impairment (HI) across modern industrial societies. Several logistic hurdles impede collection of comparable hearing thresholds in cross-national studies, including the need for acoustic booths to control ambient noise levels. However, the US National Health and Nutrition Examination Survey (NHANES) 1999–2006 and Nord-Trøndelag (NT) Hearing Loss Study 1996–98 were both conducted on population samples of adults aged 20+ years using acoustic booths. The resulting US and NT hearing level (HL) percentiles were recently proposed as international standards and analyzed by the 2010 Global Burden of Disease (GBD) Hearing Loss Team using a HI classification recommended by the GBD Expert Group. The recommendation employs a better ear (BE), pure-tone average of thresholds at frequencies of 0.5, 1, 2, and 4 kilohertz to classify HL into uniformly spaced 15 decibel (dB) HL groups. The six BE HI categories are: mild (20–34 dB HL), moderate (35–49 dB HL), moderately severe (50–64 dB HL), severe (65–79 dB HL), profound (80–94 dB HL), and deaf (>95 dB HL). Unilateral HI is defined as <20 dB HL in BE and >35 dB HL in worse ear. To compare US and Norway, HI is collapsed into unilateral and BE mild, moderate, or worse (moderately severe to deaf) groups. Below age 65, US males had 5.5% higher average prevalence of mild HI ($p < 0.005$); US females had 1.5% higher average prevalence of mild HI ($p = 0.18$). Except for higher US prevalence of mild HI, age- and sex-specific prevalences across HI categories did not differ. US and NT unselected population percentiles for HL in the proposed new international standards are very similar; the main difference appears to be attributable to higher prevalence of mild HI in US males less than 65 years old.

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RESTLESS LEGS SYNDROME AND FUNCTIONAL LIMITATIONS AMONG AMERICAN ELDERS IN THE HEALTH AND RETIREMENT STUDY. *DJ Cirillo and RB Wallace (University of Iowa, Iowa City, IA, 52242)

Restless legs syndrome (RLS), a common complaint of older adults, but its impact on disability is unknown. We studied a sub-sample ($n = 1,008$) of the 2002 interview wave of the Health & Retirement Study, a representative cohort of U.S. elders born before 1947. The prevalence of RLS was 10.6%. Activities of daily living (ADL), instrumental ADL, and limitations for mobility, large muscle, gross and fine motor function were measured biennially for incident functional limitations over 6 years of follow-up. Factors associated with increased prevalence of RLS at baseline included: overweight body mass index (multivariate-adjusted prevalence ratio = 1.77; 95% confidence interval (CI) 1.05-2.99); bodily pain (2.67, 1.47-4.84); pain inferring with activity (3.44, 2.00-5.93); ≥ 3 chronic medications (2.54, 1.26-5.12), highest quartile of medical expenses (2.12, 1.17-3.86), frequent falls (2.63, 1.49-4.66), health limiting work (2.91, 1.75-4.85), or symptoms of early waking or frequent waking (1.69, 1.09-2.62 & 1.55, 1.00-2.41, respectively). Alcohol consumption (0.59, 0.37-0.92) and frequent healthcare provider visits (0.49, 0.27-0.90) were associated with decreased RLS prevalence. RLS did not predict incident disability for aggregate measures but was associated with increased risk for specific limitations, including: difficulty climbing several stair flights (multivariate-adjusted hazard ratio = 2.38, 95% CI 1.39-4.06), prolonged sitting (2.17, 1.25-3.75), rising from a chair (2.54, 1.62-3.99), stooping (2.66, 1.71-4.15), moving heavy objects (1.79, 1.08-2.99), carrying 10 pounds (1.61, 1.05-2.97), raising arms (1.76, 1.05-2.97), or picking up a dime (1.97, 1.12-3.46). RLS sufferers are more likely to develop certain impairments, independent of health status and pain syndrome correlates.

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METABOLIC GENES AND BLOOD LEAD CONCENTRATIONS IN JAMAICAN CHILDREN WITH AND WITHOUT AUTISM SPECTRUM DISORDERS. *M.H. Rahbar, M. Samms-Vaughan, K.A. Loveland, M. Ardjomand-Hessabi, J. Bressler, D.A. Pearson, Z. Chen, M. L. Grove, S. Shakespeare-Pellington, K. Bloom, E. Boerwinkle (The University of Texas Health Science Center, Houston, Texas 77030, USA, and The University of the West Indies, Mona Campus, Kingston, Jamaica)

Lead is a toxic metal shown to cause neurodevelopmental disorders in children. Autism Spectrum Disorders (ASDs) are common neurodevelopmental disorders manifesting by early childhood. Their etiology is unknown, but may involve both genes and environment. Exposure to environmental contaminants including lead has been associated with several glutathione-S-transferase (GST) family genes that play a major role in defense against oxidative stress. We used data from 59 ASD cases (2-8 years) and age- and sex-matched controls to study the association of blood lead concentration (BLC) and ASD in Jamaican children. Using General Linear Models (GLM), we also investigated the relation of variation in metabolic genes GSTM1, GSTP1, and GSTT1 to BLC. Univariate GLM analysis did not find a significant difference between geometric mean BLCs of ASD cases and controls ($P = 0.46$). After adjusting for a shellfish diet, GSTT1 polymorphism, socioeconomic status, and parish of birth, there was no significant difference between adjusted geometric mean BLCs of ASD cases and controls (2.81 $\mu\text{g}/\text{dL}$ cases vs. 2.43 $\mu\text{g}/\text{dL}$ controls, $P = 0.34$). While there was a marginal association between BLC and GSTT1 polymorphism ($P = 0.10$), associations with GSTP1 and GSTM1 polymorphisms were not significant. Overall, about 3.4% of children had elevated BLC ($\geq 10 \mu\text{g}/\text{dL}$). Our results do not support an association of BLC to ASD, but do suggest the need to implement appropriate interventions to reduce lead exposure in Jamaican children.

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MATERNAL PERICONCEPTIONAL FOLIC ACID INTAKE AND RISK FOR DEVELOPMENTAL DELAY AND AUTISM SPECTRUM DISORDER: A CASE-CONTROL STUDY. *R.J. Schmidt, S. Ozonoff, R. Hansen, J. Hartiala, H. Allayee, L. Schmidt, F. Tassone, and I. Hertz-Picciotto (University of California Davis, Davis, CA, 95616)

Periconceptional folate is essential for proper neurodevelopment. Maternal folic acid intake was examined in relation to risk for autism spectrum disorder (ASD) and developmental delay (DD). Families enrolled in the CHARGE (Childhood Autism Risks from Genetics and Environment) Study from 2003-2009 were included if their child had a diagnosis of ASD ($n = 429$), DD ($n = 130$) or typical development (TD, $n = 278$) confirmed at the UC Davis M.I.N.D. Institute using standardized clinical assessments. Average daily folic acid was quantified for each mother based on dose, brands, and intake frequency of vitamins, supplements, and breakfast cereals reported through structured telephone interviews. Mean (SE) folic acid intake was significantly greater for mothers of TD children than for mothers of children with ASD in the first month of pregnancy (P1) (779.0 \pm 36.1 and 655.0 \pm 28.7 μg , respectively, $P < 0.01$). Mean daily folic acid intake of 600 μg or more (compared to less than 600 μg) during P1 was associated with reduced risk ASD (adjusted odds ratio = 0.62, 95% CI 0.42, 0.92, $P = 0.02$), and risk estimates decreased with increased folic acid ($P_{\text{trend}} = 0.001$). Folic acid was associated with reduced ASD risk only when mothers or children had MTHFR 677 C>T variant genotypes. Mothers of DD children tended to report lower folic acid intake during the three months before pregnancy relative to mothers of TD children ($P = 0.08$) but not after adjustment for other nutrients. Periconceptional folic acid may reduce ASD risk for those with inefficient folate metabolism. Replication of these findings and investigations of mechanisms involved are warranted.

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RECOMMENDATIONS FOR OPTIMAL ICD CODES TO STUDY NEUROLOGICAL CONDITIONS: A SYSTEMATIC REVIEW. *C. St.Germaine-Smith, A. Metcalfe, T. Pringsheim, J. Roberts, C. Beck, B. Hemmelgarn, J. McChesney, H. Quan; N. Jette (University of Calgary, Calgary, Alberta, Canada)

Objectives: Administrative data are increasingly used in epidemiological research. We performed a systematic review of international classification of disease (ICD) coded validation studies for neurological conditions. Methods: Two reviewers independently assessed all abstracts and full text articles for eligibility identified through a systematic search of Medline and Embase. Data were abstracted to identify ICD -code based case definitions and corresponding sensitivity (Sn), specificity (Sp), positive predictive values (PPV) and negative predictive values (NPV). Results: Thirty full text articles met the eligibility criteria including: 8 studies for Alzheimer's disease/dementia (Sn: 8.0-86.5, Sp: 56.3-100, PPV: 60.0-97.9, NPV: 68.0-98.9), 2 for brain tumor (Sn: 54.0-100, Sp: 97.0-99.0, PPV: 91.0-98.0), 4 for epilepsy (Sn: 98.8, Sp: 69.6, PPV: 62.0-100, NPV: 89.5-99.1), 4 for motor neuron disease (Sn: 78.9-93.0, Sp: 99.0-99.9, PPV: 38.0-90.0, NPV: 99), 2 for multiple sclerosis (Sn: 85.0-92.4, Sp: 55.9-92.6, PPV: 74.5-92.7, NPV: 70.8-91.9), 4 for Parkinson's disease/parkinsonism (Sn: 18.7-100, Sp: 0-99.9, PPV: 38.6-81.0, NPV: 46.0), 3 for spinal cord injury (Sn: 0.9-90.6, Sp: 31.9-100, PPV: 27.3-100), and 3 for traumatic brain injury (Sn: 45.9-78.0 Sp: 97.8, PPV: 23.7-98.0, NPV: 99.2). No studies met eligibility criteria for cerebral palsy, dystonia, Huntington's disease, hydrocephalus, muscular dystrophy, spina bifida, or Tourette syndrome. Conclusions: The validity of ICD coding and case definitions for neurological conditions needs to be considered when interpreting population-based studies utilizing administrative health data.

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MATERNAL IMMUNE-MEDIATED CONDITIONS IN ASSOCIATION WITH CHILD IMMUNE-RELATED OUTCOMES AND AUTISM SPECTRUM DISORDERS. *K. Lyall, P. Ashwood, J. Van de Water and I. Hertz-Picciotto. (University of California, Davis, MIND Institute, Sacramento, CA)

Prior work has suggested maternal immune aberrations influence autism. We examined whether maternal autoimmune disease, asthma, and allergies influenced phenotypes in children with and without autism spectrum disorder (ASD), including gastrointestinal (GI) diagnoses, asthma, and allergies, and child scores on cognitive and behavioral tests. 377 typically developing controls and 553 confirmed ASD cases from the Childhood Autism Risks from Genetics and the Environment population-based case-control study were included in primary analyses. Logistic regression was used to obtain crude and adjusted odds ratios (OR) for associations of maternal and child immune conditions overall and by case status. Linear regression was used to compare differences in child scores on the Mullen Scales of Early Learning (MSL) and the Aberrant Behavior Checklist (ABC) according to maternal immune-related conditions. Maternal autoimmune disorders significantly increased risk of child GI diagnosis in cases but not controls (adjusted OR in case children=3.21, 95% confidence interval 1.65, 6.28); this association was not seen in a secondary analysis of developmentally delayed children. Risk of child asthma and allergies according to maternal conditions did not differ by case status. Maternal autoimmune diseases and asthma were associated modest changes in child scores on ABC subscales. Our results suggest maternal immune-mediated conditions may account for some phenotypic variability within ASD. In particular, case children whose mothers have an autoimmune disease may be at greater risk for GI diagnosis relative to children whose mothers do not have such conditions.

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IN UTERO EXPOSURE TO SELECTIVE SEROTONIN REUPTAKE INHIBITORS (SSRIS) AND RISK FOR AUTISM SPECTRUM DISORDERS (ASD). NB Gidaya*, BK Lee, I Burstyn, K Heavner, YL Michael, M Yudell, EL Mortensen, CJ Newschaffer. (Drexel University School of Public Health, Philadelphia, PA 19102).

Only one study reported an association between prenatal exposure to antidepressant medications and increased risk of ASD (Archives of General Psychiatry. 68:1104-12). The objective of this study was to investigate associations between maternal use of SSRIs during pregnancy and risk for ASD. We undertook a case-control study of 5,210 ASD cases and 52,100 controls born in Denmark between 1997-2006. Register linkages using Denmark's health and population registers were performed to obtain information on prescription drugs use, ASD diagnosis, parental health and psychiatric illness, and socioeconomic status. Ten controls per ASD case were individually matched on birth month and year. Exposure was estimated by different time windows: for any time pregnancy, preconception, and by trimester. Only 56 cases were exposed to SSRIs in utero. In conditional logistic regression models adjusted for parental age and sex of the child, an increased risk for ASD was associated with exposure to SSRIs at any time during pregnancy (odds ratio (OR) 2.11 [95% confidence interval (CI), 1.57-2.85]). Relative risk remained elevated after statistical adjustment for maternal depression (adjusted OR 1.91 [95% CI, 1.41-2.61]). A Monte Carlo simulation examining the impact of under-ascertainment of maternal depression (which would lead to incomplete control for confounding by indication) suggested that naïve analyses underestimated the association between SSRI use during pregnancy and ASD, if it is indeed causal. Our results contribute to evidence that prenatal exposures to SSRIs play a role in etiology of ASD.

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MATERNAL DIETARY FAT AND FATTY ACID INTAKE IN ASSOCIATION WITH AUTISM SPECTRUM DISORDERS. K. Lyall^{1,2}, K. Munger¹, É. J. O'Reilly¹, S.L. Santangelo^{1,3}, A. Ascherio¹ (Harvard School of Public Health¹; U.C. Davis MIND Institute²; Massachusetts General Hospital Psychiatric and Neurodevelopmental Genetics Unit, Center for Human Genetic Research³)

The goal of this study was to determine whether maternal fat intake before or during pregnancy was associated with risk of autism spectrum disorder (ASD) in the offspring. Using data from the Nurses Health Study II, our primary analysis included 317 mothers who reported a child with ASD and 17,728 comparison mothers. Dietary information was collected prospectively through a validated Food Frequency Questionnaire. Binomial regression was used to obtain crude and adjusted risk ratios (RR). We saw a significant inverse association for maternal intake of polyunsaturated fat, omega-6 and linoleic fatty acids, corresponding to a 40% reduction in risk of ASD comparing the highest quartile to the lowest for each. We also saw a significant increase in risk for those with the lowest intake of omega-3 fatty acids (comparing the lowest 5% of the distribution to others RR=1.53, 95% confidence interval (CI) 1.00, 2.32); this association was stronger in the subgroup of women (86 cases and 5,798 non-cases) with dietary information during pregnancy (RR=2.49, 95% CI 1.19, 4.91). Similar results were seen when assessing diet during an "index period" including either pregnancy or lactation. These results suggest that variations in intake of healthy fats within the range commonly observed among United States women may affect fetal brain development and ASD risk. The number of women with diet assessed during pregnancy, however, was small and these results should be interpreted cautiously.

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MATERNAL VITAMIN D STATUS IN PREGNANCY AND CHILD COGNITION, ACHIEVEMENT, AND BEHAVIOR. *S.A. Keim, M.A. Klebanoff, J.C. Diesel, L.M. Bodnar (The Ohio State University, Columbus, OH 43210)

Low vitamin D was associated with poorer cognition in older adults; two cross-sectional studies of adolescents were null. Animal studies found in utero deficiency to cause altered brain structure and behavior. It is unknown if maternal pregnancy vitamin D influences child development or behavior. We examined serum 25(OH)vitamin D at ≤ 26 weeks' gestation and child cognition, achievement, and behavior at 8 months, 4, or 7 years (Collaborative Perinatal Project, n=3,822, 1959-1973). Participants came from a case-cohort study of preterm birth and preeclampsia. 25(OH)D was measured by LC/MSMS. We used linear regression with restricted cubic splines, controlling for maternal age, race, parity, education, season of blood draw, and study center. Median (IQR) 25(OH)D concentration was 44.6nmol/l (33.7). 25(OH)D was unassociated with Bayley scores (8m) or Stanford-Binet IQ (4y). Increasing 25(OH)D was non-linearly associated with higher Wechsler Intelligence Scales for Children scores (7y) (overall p=0.01, non-linear p=0.03) with peak IQ at 75nmol/L. IQ was 0.8 points lower for children of mothers with 25(OH)D 40nmol/L (a level considered deficient), a small difference that may be meaningful at the population level. There was no further increase in IQ for >75nmol/L. A similar dose-response association was observed for Wide Range Achievement Test Arithmetic scores (7y, overall p=0.10, non-linear p=0.03), but not Spelling or Reading. 25(OH)D was inversely linearly related to hyperactivity at 7y (p=0.046), but otherwise unrelated to behavior (4, 7y). Limitations include multiple comparisons and lack of child 25(OH)D data. We conclude that adequate vitamin D early in utero may promote optimal brain development.

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TARDIVE DYSKINESIA INCIDENCE IN A NON-INSTITUTIONALIZED POPULATION AND IN SUBGROUPS OF DIABETICS AND USERS OF METOCLOPRAMIDE. *P.M. Maticco, J. L. Lyon, R. M. Merrill. (Brigham Young University, Provo, UT, 84602)

Tardive dyskinesia (TD) is a chronic neuromuscular disorder reported to have increased prevalence in diabetics and in persons exposed to metoclopramide (MCP). MCP is the primary drug used to treat diabetic gastroparesis. TD has been well studied in psychoses patients in institutionalized settings, but limited research has involved non-institutionalized populations. In addition, most TD studies provide prevalence data, but not incidence data. The current study explores the incidence of TD in a normal non-institutionalized population. In addition, it examines whether diabetics and persons exposed to MCP have higher incidence rates for TD than non-diabetics. Analyses are based on Deseret Benefits Mutual Association (DMBA) healthcare claims data, covering above 60,000 people annually. The DMBA has diagnosis and prescription information from 1998 through 2010. Approximately 0.2% of this population has TD. Thus study will further our understanding of the incidence (risk) of this disease in a non-institutionalized population, and help us better understand the risks long-term use of MCP and diabetes on developing TD.

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ADAPTATION OF THE MULLEN SCALES OF EARLY LEARNING TO BENIN SETTING. *Ghislain K. Koura, Michael J. Boivin, Leslie L. Davidson, Smaila Ouédraogo, André Garcia, Achille Massougboji, Michel Cot and Florence Bodeau-Livinec (IRD UMR216, Mère et enfant face aux infections tropicales, Paris, France)

The Mullen Scales of Early Learning (MSEL) were designed in the US to assess child development from birth to 68 months. It has never been used in Benin. Our goal was to check its use in one year old Beninese infants, a Francophone country by studying the links between MSEL scores and known risk factors for poor child development. The MSEL was translated and back translated into French. Nurses, led by a psychologist, were trained to administer it in a cross-sectional study in Allada, a semi rural district between April and December 2011. Infant development was assessed using the MSEL at local health centers followed by a home visit to collect information on socio-economic status, non-verbal maternal intellectual quotient (Raven matrix), maternal depressive symptoms (Edinburgh Post Partum Depression Scale, EPDS), and mother-child interactions using the Home Observation for Measurement of the Environment (HOME) Inventory. Three hundred and fifty seven children aged 12 months and their mothers were included. The Mullen composite score was lower in boys (96.9 \pm 1.0) compared to girls (99.7 \pm 1.0) (borderline significance, P=0.05). Receptive Language similarly was lower in boys (45.0 \pm 0.5) than in girls (46.5 \pm 0.5) (P=0.03). The HOME inventory score was significantly correlated with the Mullen composite score (0.20, P<0.001), Gross Motor (0.17, P=0.001), Visual Reception (0.18, P=0.001), Fine Motor (0.12, P=0.02), Receptive Language (0.14, P=0.01) and Expressive Language scores (0.15, P=0.01). Socio economic status and the Raven matrix score were related to the Mullen composite score (P=0.03 and P=0.003, respectively) but no correlation was found between EPDS score and MSEL scores. The Mullen was sensitive to other quality of home environment and caregiving factors known to influence developmental outcomes in children. Therefore, it is a useful test for providing such outcomes in francophone West Africa.

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PRENATAL TESTOSTERONE, AUTISM AND SIBLING SEX RATIOS: METHODS FOR A VALID TEST OF JOINT HYPOTHESES. *K. Cheslack-Postava, K. Liu, P. Bearman (Columbia University, New York, NY, 10027).

Sibling sex ratios have been applied as an indirect test of hypothesized association between prenatal testosterone levels and risk for autism, a developmental disorder disproportionately affecting males. We sought here to clarify elements required for a valid test of this hypothesis using sibling sex ratios; and conduct such a test using a large, population-based sample of children. Directed acyclic graphs were used to illustrate potential causal structures underlying associations between autism diagnosis and sex of observed siblings, and to identify conditions required such that association would be observed only if proband autism and sibling sex share a common cause. The association between California Department of Developmental Services reported autism diagnosis and sex of subsequent sibling was then examined among California births from 1992-2002. Conditions for a valid test included conditioning on sex of proband, control for sex of prior children, considering sex of next-born sibling only, and selecting probands without regard to case status. Among male children with autism, 52.1% of next-born siblings were brothers, versus 51.1% for unaffected males. For females with autism, 50.8% of following siblings were brothers versus 51.2% among control females. The relative risk of a male sibling associated with autism diagnosis was not statistically significant in crude or adjusted analyses. In conclusion, in a large, population-based sample we failed to find evidence for a significant excess of brothers among children with autism while controlling for several threats to validity. The test cannot rule out individually a role of prenatal testosterone in either risk of autism or sex ratio, but suggests against a common cause.

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JOINT EFFECTS OF PRENATAL STRESS AND FAMILY HISTORY ON RISK OF ADHD. *Rowland AS, Skipper B, Umbach DM, Campbell RA, Rabiner DL, Campbell RA, and Sandler DP. (Univ. New Mexico Health Sciences Center, Albuquerque, NM 87110)

Studies have suggested that maternal stress during pregnancy may increase risk of attention deficit/hyperactivity disorder (ADHD) in children. We screened 7587 children in grades 1-5 for ADHD. 81 % of parents gave permission to have their child's teacher complete a DSM-IV behavior checklist. We interviewed parents of children taking ADHD medication or symptomatic at school and potential controls randomly sampled from the whole population using a structured interview (DISC). 72% of eligible parents participated. Parent and teacher ratings were combined to determine ADHD case status. Prenatal stress was defined by mother's ability to pay for food and necessities during pregnancy and how much support she received from her partner and family. Responses were combined to create a score (16-point scale) that was categorized into quartiles. Parental history of ADHD was positive if mother reported that either parent had ADHD symptoms as a child. Because of the complex sampling design, data were analyzed using weighted logistic regression. Among 944 families in the final sample, prenatal stress was associated with ADHD and risk varied by parental history of ADHD. Compared to children with the lowest prenatal stress and no family history, children with high prenatal stress and no parental history had twice the odds of ADHD after controlling for maternal education, gender, income, drinking, and race/ethnicity: OR= 2.4(95% C.I.= 1.2-4.9) The odds ratio was over 7 for children whose mothers reported the highest stress and positive parental history: OR = 7.6(95% C.I.=3.8-15.1) Prenatal stress may increase the risk of ADHD and risk may vary by family history of ADHD symptoms.

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AVPU AS A SEVERITY SCORE FOR PEDIATRIC TBI. *J Roesler, A Gaichas, M Kinde. (Minnesota Department of Health, St. Paul, MN 55101)

Objectives: Previous studies have shown that, in general, severity scores are predictive of mortality and outcome, but are inconsistently applied. The objective of this study is to investigate the usefulness of AVPU (Alert-responsive to Verbal stimulation-responsive to Pain-Unresponsive) in predicting mortality and Glasgow Outcome Score (GOS) at discharge. **Hypothesis:** AVPU can satisfactorily predict pediatric TBI outcome at acute care discharge. **Participants:** The population studied was seven hundred sixty-eight children and adolescents 0 to 19 years of age who were admitted to or died in a hospital with TBI in Minnesota during 1998. **Methods:** Cases were identified from the population-based Minnesota TBI Registry and death certificates. Expanding on the 1993 pediatric TBI study, the initial EMS/ambulance AVPU, the initial emergency department AVPU (AVPUED1), AVPU at admission, and outcome measures were abstracted. Logistic regressions were run for AVPU on mortality and dichotomized GOS. **Results:** For mortality, AVPUED1 had an R-squared of 0.58 and an odds ratio of 21.7. For both fatal and nonfatal outcomes as measured by GOS, AVPUED1 had an R-squared of 0.51 and an odds ratio of 4.4. AVPUED1 was missing for only 3% of cases. **Conclusions:** AVPU is nearly universally obtained and is predictive of outcome. TBI data systems should collect AVPU for pediatric cases.

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TRENDS IN ALS IN DENMARK: AN AGE-PERIOD-COHORT ANALYSIS. *Ryan Seals, Johnni Hansen, Ole Gredal, Marc Weisskopf (Harvard School of Public Health, Boston, MA 02115)

Amyotrophic lateral sclerosis (ALS) is a rare motor neuron disease with poorly understood etiology. To assess whether possible changes in environmental exposures might have contributed to the rising incidence of ALS in many Western countries, we investigated trends in ALS incidence from 1982 to 2009 and mortality from 1970 to 2009 in Denmark using age-period-cohort (APC) models. Data were collected from the Danish National Hospital Register (incidence) and the Cause of Death Registry (mortality). Age- and sex-stratified population data was obtained from annual census data. A total of 4,265 deaths and 3,317 incidence diagnoses were recorded. The overall mortality rate was 4.42 per 100,000 PY, and the overall incidence rate was 4.46 per 100,000 PY. Age-adjusted mortality rates increased by 2.3% annually between 1970 and 2009, and 1.4% annually post-1982. Visual plots of mortality rates over period and over birth cohort, stratified by age, showed evidence of both birth cohort and period effects. Greatest increases in mortality were observed from 1975 to 1980 in individuals 70+ years of age. APC analyses suggested that the full age-period-cohort model provided the best fit to the data ($p < 0.001$). When we restricted mortality data to post-1982, however, the age-cohort model provided the best fit, suggesting that increases in mortality rates largely occurred prior to 1982. Age-adjusted incidence rates increased by 1.1% annually post-1982 ($p < 0.001$), but upon further analysis the effect was best explained solely by birth cohort effects. As with mortality, there was a rapid rise in incidence in those born prior to 1920. We conclude that the observed increase in ALS in Denmark is best explained by birth cohort effects, with the exception of a mortality increase in the elderly prior to 1982.

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ADDRESSING MULTICOLLINEARITY IN THE PREDICTION OF ANTIPILEPTIC DRUG SIDE EFFECTS. *J Dykeman, M Lowerison, TC Turin, P Faris, N Jette, S Wiebe (University of Calgary, Calgary, Alberta, T2N 2T9)

Background: Reported factors associated with the occurrence of side effects (SE) to antiepileptic drugs (AEDs) are inconsistent. Multicollinearity and extensive combinations of AED types and dosages are key challenges in addressing this question. Our aim is to identify sources of multicollinearity and validate a measure of total AED exposure (defined daily dose [DDD]). **Methods:** Self-reported SE to current AEDs were prospectively collected from epilepsy outpatients. AED dose was converted into standard units of DDD as determined by the World Health Organization. Potential predictor variables were polytherapy, history of psychiatric disorders/treatment, clinical and socio-demographic factors. These were included in a principal components analysis to identify variable clusters. Poisson regression was used to examine the association between the DDD of each AED type and the risk of SE with non-significant AEDs being combined. **Results:** Information from 801 patients was used and all variables had less than 5% missing data. Anxiety, depression, and current treatment for a psychiatric condition were clustered with correlations to the first component of 0.70, 0.79, and 0.81, respectively. DDD and polytherapy were clustered with correlations to the second component of 0.86 and 0.84, respectively. Phenytoin DDD was significantly associated with the risk of SE while adjusting for the total DDD of the remaining AEDs ($p = 0.012$). **Conclusion:** Variables from a given cluster should not be modeled together and this may explain previous discrepancies in studies of SE that are related to AEDs. A more accurate single measure of total AED exposure may be possible through a weighted combination of DDD rather than a simple total.

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MEASURING DEPRESSION IN EPILEPSY: A SYSTEMATIC REVIEW AND META-ANALYSIS. *Fiest K, Dykeman, J, Patten S, Kaplan GG, Wiebe S & Jette N (University of Calgary, Calgary, Alberta, T2N 4N1)

Background: Many measures are used for assessing depression in persons with epilepsy (PWE). Our aim was to compare differences in estimates between depression measures. Methods: MEDLINE, EMBASE, and PsycINFO were searched using terms related to depression, epilepsy, and epidemiology. Two reviewers independently screened abstracts, full-text articles, and abstracted data. Included studies provided sufficient data to calculate a population-based odds ratio (OR) and/or prevalence of depression in PWE. Estimates [95% confidence interval] were pooled using random-effects models and mixed-effects models were used to determine significance between groups and degree of heterogeneity accounted for by depression measure using residual tau-squared. Results: Of 7106 abstracts, 166 were reviewed in full-text and 14 studies met all eligibility criteria. Interview methods of determining depression were: Composite International Diagnostic Interview, Structured Clinical Interview for DSM, and Electronic Medical Records. Non-interview methods were: Hospital Anxiety and Depression Scale, Center for Epidemiologic Studies Depression Scale, SF-36, Self-Report, and administrative data. Interview methods had significantly lower prevalence estimates (14.9% [11.5-19.2]) compared to non-interview methods (27.87% [23.7-32.7]) with $p < 0.001$. Depression measure as a moderator accounted for 100% of heterogeneity between prevalence estimates but a significant between-group difference was not found. The OR for depression in PWE was 3 [2.2-4.0]. Conclusion: Significant variation in the prevalence of depression among PWE was observed across measures; depression was significantly associated with epilepsy independent of the depression measure used.

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ASSOCIATION BETWEEN ASTHMA AND DEPRESSIVE SYMPTOMS IN THE CORONARY ARTERY RISK DEVELOPMENT IN YOUNG ADULTS (CARDIA) COHORT. *W. Brunner, P. Schreiner, D. Jacobs, A. Sood (University of Minnesota, Minneapolis, MN 55455)

Temporality of the association between asthma and depression has not been established. We examined asthma and depressive symptoms bidirectionally over time in CARDIA. 2977 participants ages 23-35 years free of elevated depressive symptoms (Center for Epidemiologic Studies Depression Scale (CES-D) <16) were classified by self-reported asthma status (ever versus never diagnosed) and followed 15 years until onset of depressive symptoms. Then, 3599 participants free of baseline asthma were classified by depressive symptoms and followed 15 years to incident asthma. Prevalent asthma and depressive symptom status were significantly positively associated at each exam (odds ratios adjusted for age, sex, race, center, smoking, body mass index, education and physical activity 5, 10 and 15 years after baseline = 1.2, 1.4 and 1.3 respectively). 791 participants (26.6%) developed depressive symptoms. The relative hazard of elevated depressive symptoms for the 11.3% with versus 88.7% without asthma was 0.98 (95% confidence interval (CI): 0.79-1.23), with little change after adjusting for the covariates above (hazard ratio (HR)=0.94 (95% CI: 0.75-1.18)). The relative hazard of incident asthma (280/3599, 7.8%) among the 23.7% with versus 76.3% without depressive symptoms was 1.28 (95% CI: 0.98-1.65). This suggestive association attenuated after adjustment for the same covariates (HR=1.08 (95% CI: 0.83-1.41)). Despite strong cross-sectional associations observed in this cohort, prevalent asthma was not associated with incident depression, nor was prevalent depression associated with incident asthma. These findings suggest that alternate pathways may have led to previously observed clinical associations.

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VALIDITY OF ADMINISTRATIVE DATA FOR IDENTIFYING DEPRESSION – A SYSTEMATIC REVIEW. *K Fiest, C St. Germaine-Smith, N Jette, A Metcalfe, B Hemmelgarn, H Quan, C Beck (University of Calgary, Calgary, Alberta, T2N 4N1)

Objectives: Administrative health data are increasingly used for epidemiological and population based research. Validating administrative health data before using them for health research is of the utmost importance. We conducted a systematic review of published studies assessing the validity of depression coding in administrative databases. Methods: Medline (1950-Jan 2012) and Embase (1980-Jan 2012) databases were searched for studies validating International Classification of Diseases (ICD) coding for depression. Two reviewers independently reviewed all abstracts and full-text articles and abstracted data using a standardized form. Disagreement was resolved by consensus. Results: Of the 1840 abstracts screened for eligibility, 38 were selected for full-text review, 4 met all eligibility criteria (3 US, 1 Canada) and 3 (2 US, 1 Canada) provided sufficient data to be considered for meta-analysis. Clinical (data source, location) and statistical sources of heterogeneity (Q statistic p -value $< .001$ for all measures) were examined and it was determined that the studies should not be pooled in a meta-analysis. The ICD-9 data yielded a range of sensitivity of 46.4-70.6%, specificity of 75.0-88.4%, positive predictive value of 28.5-85.5% and negative predictive value of 69.8-86.7%. Conclusion: The validity of administrative data for identifying depression varies greatly between studies. Considerations of heterogeneity by clinical factors, such as ICD code algorithm and gold standard used, should be taken into account. ICD coding and case definitions for depression should be validated in administrative databases prior to their use in health research.

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LONGITUDINAL ASSOCIATIONS BETWEEN TYPES OF CHILDHOOD TRAUMA AND SUICIDAL BEHAVIOR IN A PROSPECTIVE COHORT STUDY. *BDL Marshall, S Galea, E Wood, and T Kerr (Brown University, Providence, RI, 02903)

Very few studies have assessed prospectively the relation between childhood trauma exposure and suicide risk in later life. We examined the associations between different types of childhood trauma and attempting suicide in a cohort of drug users (DUs) in Vancouver, Canada. Commencing in December 2005, participants completed semi-annual questionnaires eliciting sociodemographics, drug use patterns, childhood maltreatment, and self-reported mental health problems including suicidal behavior. We used recurrent event survival models with time-dependent covariates to determine which types of childhood trauma were associated with attempting suicide at subsequent time points. Of 1635 eligible participants, 80 (4.9%) reported a total of 97 suicide attempts, resulting in an incidence density of 3.2 per 100 person-years. In recurrent event models adjusting for potential confounders, relative to no reported abuse, severe to extreme levels of emotional abuse (adjusted hazard ratio [AHR] = 3.26, 95%CI: 1.44 – 7.40) and sexual abuse (adjusted hazard ratio [AHR] = 2.92, 95%CI: 1.73 – 4.95) were predictive of incident suicide attempts. The magnitude of the association was smaller for physical abuse (AHR = 1.79, 95%CI: 1.04 – 3.08) and physical neglect (AHR = 1.76, 95%CI: 0.97 – 3.18), with no independent relationship observed between attempting suicide and emotional neglect (AHR = 1.52, 95%CI: 0.82 – 2.82). High levels of exposure to childhood emotional and sexual abuse were stronger predictors of attempting suicide than physical abuse and various forms of neglect. Secondary prevention and screening programs for emotional and sexual abuse experienced by DUs should be an integral component of suicide prevention efforts.

COMBAT EXPERIENCES AND PTSD IN A MILITARY SAMPLE: RESULTS FROM A CLASSIFICATION BY EXPERT OPINION. *R.K. Herrell, P.B. Bliese, and C.W. Hoge. (Walter Reed Army Institute of Research, Silver Spring, MD 20910)

Different types and multiple exposures to combat experiences put soldiers at risk of PTSD. We measured 34 specific combat experiences and number of occurrences in a survey of 2481 US Soldiers 6 months after redeployment from Iraq. Based on the independent opinion of 5 Army psychiatrists and psychologists, the items were grouped as follows: fighting (10), killing (3), threat to oneself (9), death/injury of others (6), and witnessing atrocities (2). Number of experiences ranged in 4 categories from none to ≥ 5 . The sum of each category was divided into tertiles, i.e., lowest, intermediate, and highest exposure. PTSD was assessed by the PTSD Checklist (PCL), with ≥ 50 indicating PTSD. Models were fit using indicator variables for each group individually (low as referent) and the 5 groups together. Each group individually increased the probability of PTSD and exhibited a significant trend (e.g., for threat to oneself, odds ratio [OR] for intermediate exposure=1.7, 95% confidence interval [CI]=1.3-2.4; for high exposure OR=4.2, CI=3.2-5.6; p-trend<0.001). As combat experiences are correlated, the effects were diminished in the model with all five groups and confounders. Notably, it is the highest but not intermediate exposure for killing (OR=1.4, CI=1.1-1.9), threats to oneself (OR=1.9, CI=1.2-2.9), death/injury of others (OR=2.5, CI=1.6-3.9) and witnessing atrocities (OR=1.7, CI=1.3-2.3) that increased the probability of PCL ≥ 50 . Fighting itself was not independently significant. The full model demonstrated a good ability to distinguish PCL ≥ 50 versus PCL<50 (area under the ROC curve = 0.718). Thus, Soldiers facing the highest levels of these 5 factors face the greatest risk of PTSD.

SUICIDAL THOUGHTS AMONG AMERICAN INDIAN/ALASKA NATIVE ADOLESCENTS. *K. Hensel (Columbia University, New York, NY, 10032).

Among youth 15-24-years-old, American Indians/Alaska Natives (AI/AN) have the highest incidence of suicide of all racial/ethnic groups. Forced sex (childhood sexual abuse (CSA) and sexual assault (SA)) are also highly prevalent among AI/AN. Understanding if forced sex increases odds of suicidal thoughts among AI/AN adolescents may help to explain the high suicide rate and provide point of access for suicide prevention by screening for suicidal thoughts when history of CSA/SA is revealed. Data from the Youth Risk Behavior Surveillance System (2001-2009), a nationally representative survey of United States high school youth, were used to evaluate the association between experiencing forced sex ever and suicidal thoughts in the past year. 17% of females and 10% of males reported ever experiencing forced sex; 12% of females and 10% of males reported seriously considering suicide in past year. Gender-stratified multivariable analysis of 752 AI/AN youth included age group, feeling sad/hopeless for >2 weeks in past year, and ever trying substances (smoking, alcohol, marijuana, illicit drugs) as covariates. Though forced sex was significantly associated with suicidal thoughts among both females (Odds Ratio: 4.94, 95% Confidence Interval: 2.36,10.32) and males (OR: 3.11, 95% CI: 1.60,6.04) in bivariable analysis, in multivariable analysis it was no longer significant in females (Adjusted OR: 2.10, 95% CI: 0.78,5.68) or males (AOR: 1.43, 95% CI: 0.33,6.12). Feeling sad/hopeless was associated with suicidal thoughts in females (AOR: 5.44, 95% CI: 2.17,13.63) and males (AOR: 8.20, 95% CI: 3.73,18.01), and ever trying illicit drugs was significant in males (AOR: 7.29, 95% CI: 2.50, 21.26). Among AI/AN youth, suicidal thoughts are most strongly associated with feeling sad/hopeless for >2 weeks.

GENERAL HOSPITAL SUICIDE RISK SCREENING: VALIDATION OF THE SAD PERSONS AND ITS IMPLICATIONS. *Chia-Yi Wu, Shen-Ing Liu, Hui-Chun Huang (National Taiwan University Hospital & Mackay Memorial Hospital, Taipei, 100&104)

Suicide and self-harm are prioritized patient safety issues and long-term public health problems. Considering specific cultural background in Asia, suicide risk screening in hospitals may prevent suicide through high-risk case finding and subsequent case management or early interventions. However, more evidence of screening in general medical settings and an efficient tool applied to it is needed. Based on literature review and multidisciplinary discussions, we identified the SAD PERSONS Scale as the tool of study. We aimed to validate the scale in general hospitals using the mixed methods and to evaluate its validity and feasibility through both the patient and nursing data to build firmer evidence. We collected 263 patients with self-harm from the Emergency Room and 263 patients without self-harm from the Family Medicine Department in one general hospital. Three nursing focus groups were performed in another general hospital to evaluate its applicability; a further 54 nurses were sampled via clustered randomization and trained to perform repeated measures on a standardized case vignette. The scale was significantly correlated with the Patient Health Questionnaire -9 ($r=0.50$), the Pierce Suicide Intent Scale ($r=0.45$) at baseline; the Beck Scale for Suicide Ideation ($r=0.47$) and the Beck Hopelessness Scale ($r=0.27$) at 6-month follow-up. The Receiver Operating Characteristic curve and qualitative data analysis towards the general nurses' opinions were also conducted. It is a short and valid tool suggested for inpatient screening for suicide risks by non-mental health professionals. Further evidence is needed in its cost-effectiveness and long-term effects on suicide risk reduction.

ASSOCIATION BETWEEN DEPRESSION AND PRE-DIABETES. *Greta Kilmer, MS; Valerie Forman-Hoffman, MPH, PhD (RTI International, Research Triangle Park, NC 27709)

Background: Adults with diabetes are at increased risk for co-morbid depression; however, it is unclear whether depression increases the risk for diabetes. Examining the association between lifetime history of depression and pre-diabetes may help elucidate the temporal relationship between depression and diabetes. Methods: The Behavioral Risk Factor Surveillance System collected information on diabetes screening and lifetime history of diagnosed pre-diabetes, diabetes, and depressive disorder among adults in 11 states via telephone interviews in 2010. Adjusted logistic regression models were used to measure the odds of pre-diabetes ($n=35,244$) and diabetes ($n=39,679$) among adults with lifetime depression vs. those without, excluding non-diabetic adults who had not received a diabetes screening in the past 3 years. Models were adjusted for age, sex, race/ethnicity, education, body mass index, health care coverage, current smoking status, and leisure time physical activity. Results: Compared to non-diabetic adults who had been screened for diabetes in the past 3 years, those with a lifetime history of depression were more likely to report a pre-diabetes diagnosis (adjusted odds ratio [OR]: 1.8; 95% confidence interval [CI]: 1.5-2.0). This was similar to the odds of reporting a diabetes diagnosis (adjusted OR: 1.8; 95% CI: 1.6-2.0). Conclusions: Adults with a lifetime history of depression are at increased odds for pre-diabetes, and the magnitude of the odds ratio is similar to the odds for diabetes. This finding suggests that adults with depression may be at increased risk for developing pre-diabetes and, subsequently, diabetes. Regardless of the temporal relationship, pre-diabetic adults may benefit from depression screenings in primary care settings.

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USING PROPENSITY SCORE SUBCLASSIFICATION TO EXAMINE THE ASSOCIATION BETWEEN NEIGHBORHOOD DISADVANTAGE AND ADOLESCENT MENTAL HEALTH. *KE Rudolph, EA Stuart, TA Glass, KR Merikangas. (Johns Hopkins, Baltimore, MD, 21205)

Neighborhood disadvantage may influence risk of mental disorder, particularly during adolescence when teens spend more time outside the home. Research into this relationship must address the challenge of self-selection into neighborhoods, which may manifest as non-exchangeable populations and structural non-positivity. Our objective was to address this challenge in examining whether neighborhood disadvantage was associated with increased prevalence of internalizing and/or externalizing disorders in adolescents. We used data from a nationally representative survey of adolescent mental health (N=10,074). We controlled for confounders with propensity score subclassification and included confounders not affected by prior neighborhood exposure as well as propensity score in the regression models. Survey-weighted logistic regression models, stratified by sex, were combined across propensity score subclasses to estimate the relative odds of disorder comparing adolescents living in disadvantaged versus non-disadvantaged neighborhoods. For adolescents in *urban* areas, living in a disadvantaged neighborhood was associated with increased relative odds of internalizing disorder (95% confidence intervals (CI): female: 1.15-2.36, male: 0.95-1.98), but was not associated with externalizing disorder. In contrast, for adolescents in *non-urban* areas, living in a disadvantaged neighborhood was associated with relative odds of externalizing disorder (95% CI: female: 1.20-3.06, male: 0.32-0.78), but was not associated with internalizing disorder. Our nationally representative results suggest that the influence of neighborhood disadvantage on mental health may depend on urbanicity and sex.

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RISK OF DELAYED DIAGNOSES OF CANCER AMONG CLIENTS OF A SECONDARY MENTAL HEALTHCARE CASE REGISTER IN LONDON, UK. C-K Chang,* RD Hayes, MTM Broadbent, M Hotopf, and R Stewart (King's College London, Institute of Psychiatry, London, United Kingdom)

There has been debate in the literature regarding whether people with mental disorders are at higher risk of receiving delayed cancer diagnosis. An electronic database from the largest secondary mental healthcare provider in Western Europe was utilized to assess the impact of major mental disorders on the risk of later stage at cancer diagnosis. An anonymised process was applied to link the case register of South London and Maudsley NHS Foundation Trust (SLAM) in southeast London to Thames Cancer Register with the coverage of London Metropolitan by their National Health Services number. All the cancer cases within the same geographic area covered by SLAM services during 2007-2008 were identified. A comparison between the cancer cases with diagnosis of major mental disorders in SLAM and the ones without was performed by logistic regressions with age, gender, type of cancer, year of cancer diagnosis, primary care trust, ethnicity, and deprivation score considered as potential confounders in the analyses. A total of 6,107 subjects aged >15 years old were identified. Among them, 668 cases have been accessed or treated in SLAM before their cancer diagnoses and 56 of them were diagnosed as serious mental illness (SMI, including schizophrenia, schizoaffective disorder, and bipolar disorder). The adjusted odds ratio (OR) of regional lymph node invasion or metastasis when the cancer was diagnosed for people with SMI was 0.94 (95% CI: 0.51, 1.71). A non-significant OR was also identified for any contact to SLAM (OR = 0.95; 95% CI: 0.79, 1.15) with confounders controlled. We found no impact of serious mental illness on stage of cancer when it was diagnosed. Further attempts by sensitivity analyses showed similar results.

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LIFE STRESS, DEPRESSION AND PARENTING STYLES ASSOCIATED WITH SUICIDAL IDEATION AMONG ELEMENTARY SCHOOL STUDENTS IN TAIWAN. *HL Lee, Yen YY, HL Huang (Kaohsiung Medical University, Kaohsiung, Taiwan 807)

Suicide is the second leading cause of death in aged 15-24 Taiwanese population. A national survey reported 36.7% junior high students had thoughts of killing themselves and 8% students tried to suicide. Stress and depression are serious problems for many teenagers; those who reported making suicide attempts were depressed. It is critical for parents and helping adults to be aware of the factors that put a youth at particular risk of suicide. The aim is to analyze the relationship between suicidal ideation and depression, life stress and parenting style of children. Multistage cluster sampling was used to obtain a representative sample (n=5,364) among 3rd to 6th graders from 65 elementary schools in southern Taiwan in 2008-2009. Suicidal ideation was measured by asking students if they had had any suicidal thoughts in the previous month. A series of multivariate regression models was used to examine the influence variables had on suicidal ideation of elementary school students. In all, 11.5% of students reported suicidal ideation within the past month; its occurrence was significantly associated with grades 5-6 (adjusted odds ratio (aOR) =1.32, 95%CI=1.08-1.62), a high level of life stress (aOR =1.99, 95%CI=1.61-2.45), high degree of depression (aOR=1.21, 95% CI=1.18-1.25) and authoritarian parenting style (aOR=1.89, 95% CI=1.41-2.55). The findings suggested that interventions aimed at preventing suicidal ideation in children need to target on those who suffer from high degree of stress and depression. In addition, it is necessary to enhance their child-parent relationships and support system at school for children.

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COGNITIVE IMPAIRMENT AND MORTALITY IN OLDER CLIENTS OF A SECONDARY MENTAL HEALTHCARE CASE REGISTER IN LONDON, UK. C-K Chang,* RD Hayes, MTM Broadbent, M Hotopf, and R Stewart (King's College London, United Kingdom)

Cognitive impairment was found related to higher mortality among the elders, especially for the ones with dementia. However, study results about declining cognitive function at earlier stages of specialist assessment or treatment to mortality for the ones without dementia were still in debate. An anonymised electronic database in South London and Maudsley NHS Foundation Trust (SLAM) covering 1.2 million population was utilised to assess the influence of cognitive impairment measured by Mini-Mental State Examination (MMSE) to survival among the clients >65 years old when firstly assessed during 2007-2010. They were followed up for survival till the end of July, 2011 by linking to the National Health Services in UK. Overall and subgroup analyses for specific diagnosis groups were done by Cox regressions and age, gender, psychiatric diagnosis, ethnicity, marital status, primary care trust, and deprivation score considered as potential confounders. A total of 7,196 subjects were identified, including 3,674 subjects diagnosed as dementia, 1,435 as depression and 492 as delirium. The adjusted hazard ratios of MMSE score in quintiles (30-28, 27-25, 24-21, 20-16 and 15-0) when firstly assessed in SLAM were 1.19, 1.36, 1.69 and 2.13 (95% CIs: 0.99-1.42, 1.15-1.62, 1.42-2.01 and 1.79-2.55) with 1st quintile as reference group (p-value of test for trend < 0.01). Except the group of delirium, analyses for all the ones but dementia excluded, within the group of depression, and within the group of depression but dementia excluded revealed similar scenarios. In current study, we identified universal effects of cognitive impairment to mortality. Declining cognitive function might reflect underlying physical conditions leading to death.

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PREDICTORS OF PERSISTENCE OF ATTENTION DEFICIT HYPERACTIVITY DISORDER FROM CHILDHOOD TO MIDLIFE. *J Agnew-Blais (Harvard School of Public Health, Boston MA 02115), LJ Seidman (Beth Israel Deaconess Medical Center, Boston MA 02215; Harvard Institute of Psychiatric Epidemiology & Genetics, Boston MA 02115), S Buka (Brown University, Providence RI 02912; Harvard Institute of Psychiatric Epidemiology & Genetics, Boston MA 0211)

Attention deficit hyperactivity disorder (ADHD) is relatively common in childhood, affecting approximately 4-7% of the population. It is increasingly recognized that symptoms of ADHD may not resolve in childhood, but continue into adolescence and adulthood; however, few studies have investigated persistence into midlife, an issue addressed in the current study. The New England Family Study is a large, prospective cohort of subjects followed from birth to an average age of 39.7 yrs, a subset of which (N=1,971) was interviewed in adulthood about childhood and current symptoms of ADHD. 176 (9.5%) individuals met criteria for childhood ADHD, of which 35.2% reported persistence into adulthood. Combined-type was most persistent (53.9% of those with a childhood diagnosis persisting into adulthood) followed by inattentive (33.6%) and hyperactive/impulsive-type (30.4). Women were more likely than men to continue to report high levels of adult symptoms (47.1% v 28.0%). Lower childhood socioeconomic status (SES) was associated with increased risk of persistent hyperactivity (Risk Ratio (RR)=1.28, 95% Confidence Interval (CI)=1.07, 1.54), but not inattention (RR=1.08, 95% CI=0.92, 1.25). Subjects with childhood ADHD, particularly those whose symptoms persisted into adulthood, showed elevated rates of adult substance disorders, including alcohol and drug dependence. Our results suggest that women, as well as those with lower SES, may be at increased risk for continuation of ADHD into adulthood.

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ESTIMATES OF RESIDUAL DEPRESSIVE SYMPTOMS IN THE CANADIAN POPULATION. *R. Reyes & S. Patten (University of Calgary, AB, T2N 4N1)

Objective: Residual depressive symptoms (RS) are defined as symptoms present during the clinical phase of depression but persist beyond. RS are associated with a higher risk of relapse and recurrence of depression. The objective of the study was to provide the very first population estimates of RS in the general community. Methods: The Canadian Community Health Survey (CCHS 1.2.), a nationally representative cross-sectional study, was used. The Composite International Diagnostic Interview was used to identify individuals who have a history of a past major depressive episode (MDE) but not currently, as the sample of interest. RS were derived using the K10 Distress Scale, containing self-reported items similar to DSM-IV criteria for depression. Results: 3,790 individuals were identified. Symptoms reported some of the time or more frequent were identified, and six were derived from the sample (unweighted): 1) nervousness: 41.7% (95% CI: 40.2-43.3); 2) diminished energy: 54.9% (95% CI: 53.3-56.5); 3) restlessness: 36.3% (95% CI: 34.8-37.8); 4) depressed mood: 35.5% (95% CI: 34.0-37.0); 5) feelings of hopelessness/worthlessness: 22.2% (95% CI: 20.9-23.6); and 6) sleep difficulties: 73.6% (95% CI: 72.2-75.0). Of individuals who have had an MDE but are not currently depressed, 87.1% have at least one of the above symptoms present (95% CI: 86.0-88.2), and 48.4% having three or more (95% CI: 46.9-50.0). Conclusion: These results represent the first attempt at quantifying the prevalence of RS among the general population. In national population of Canada, the weighted estimated prevalence of individuals with RS is 8.7%; a significant proportion of individuals potentially at high risk of a subsequent MDE. The results have the potential to impact preventive efforts in depression.

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PREVALENCE OF DEPRESSION AND ANXIETY AMONG UNITED STATES ADOLESCENTS: ROLE OF BODY MASS INDEX. *S Shakya, VK Cheruvu (Kent State University, Kent, Ohio)

Adolescent obesity in the United States has increased considerably in recent years and poses a serious risk for mental health, particularly, depression and anxiety. Body Mass Index (BMI) is known to be associated with poor health outcomes among adolescents. However, the risk for combined depression and anxiety (clinically diagnosed) in adolescents with varying BMI remains unclear. This research seeks to provide new insights in understanding the association between adolescent BMI and current mental health disorders. Cross-sectional data from the 2007 NSCH were used to estimate the prevalence of clinically diagnosed depression and anxiety (combined) in adolescents (13 to 17 years of age, sample size = 31,001). Multinomial logistic regression modeled the probability of depression and anxiety in relation to four groups of BMI (underweight, normal weight, overweight, and obese). Data were analyzed in 2011 and accounted for the complex sampling design of the NSCH. The prevalence of depression and anxiety was 1.7% (95% Confidence Interval (CI): 1.5 – 2.0). After controlling for all potential confounders, obese adolescents were at a significantly higher risk (Odds Ratio (OR): 1.6, 95% CI: 1.1 – 2.3), whereas, overweight adolescents were not at a significantly higher risk, for combined depression and anxiety (OR: 1.3, 95% CI: 0.9 – 2.0), compared to normal weight adolescents. These results provide new evidence for a link between obesity and mental health. The transition from overweight to obese may be a time of increased mental health distress and highlight an ideal time for intervention for both body weight and mental health.

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A LATENT CLASS ANALYSIS TO EMPIRICALLY EXAMINE EATING DISORDERS THROUGH DEVELOPMENTAL STAGES. *S Swanson, N Horton, R Crosby, N Micali, K Sonnevile, K Eddy, A Field (Harvard, Boston, MA 02115)

The current eating disorder definitions under the Diagnostic and Statistical Manual (DSM) do not allow us to study the causes, consequences, and correlates of these disorders adequately: more than half of those seeking treatment are left in the heterogeneous “not-otherwise-specified” (EDNOS) category because they do not meet criteria for anorexia or bulimia nervosa. To address this shortcoming, we fit a series of latent class (LC) models among the 9039 girls in the Growing Up Today Study, a cohort followed from 1996 to examine empirically-derived classifications of disordered eating at different developmental stages, and assess how these LCs predict adverse outcomes. Mplus and R were used to fit LC models during preadolescence (ages 9-12), early and late adolescence (13-15; 16-18), and two periods of young adulthood (19-22; 23-26) that accounted for repeated measures and within-family clustering. We found solutions with five to seven LCs, depending on the age group, with one being a large asymptomatic LC and another endorsing only weight/shape concerns. Other stable LCs included: overeating without loss of control; binge eating; purging; and binge eating and purging (i.e., bulimia nervosa). LCs generally grouped behaviors irrespective of DSM frequency thresholds. Variability in the relative size of LCs was observed through development. LC membership was associated with incident drug use, frequent binge drinking, and high depressive symptoms, with LCs resembling subtypes of EDNOS often having the highest risk. Results suggest expanding DSM categories and cut-offs (e.g., including lower frequencies of behaviors) may improve classification and identify targets for prevention and consequences of disorders.

INTIMATE PARTNER VIOLENCE AGAINST ADULT WOMEN AND ITS ASSOCIATION WITH MAJOR DEPRESSIVE DISORDER, DEPRESSIVE SYMPTOMS AND POSTPARTUM DEPRESSION: SYSTEMATIC REVIEW AND META-ANALYSIS. H.A. Beydoun* (Eastern Virginia Medical School, Norfolk, VA 23507); M.A. Beydoun (National Institutes on Aging, Baltimore, MD 21224); J.S. Kaufman (McGill University, Montreal, Quebec H3A 1A2, Canada); B. Lo (Eastern Virginia Medical School, Norfolk, VA 23507); A.B. Zonderman (National Institutes on Aging, Baltimore, MD 21224).

Intimate partner violence (IPV) can be conceptualized as a risk factor, correlate or outcome of depression. In this systematic review and meta-analysis, the authors summarized the extant literature and estimated the magnitude of the association between IPV and key depressive outcomes (elevated depressive symptoms, diagnosed major depressive disorder and postpartum depression). PubMed (January 1, 1980-December 31, 2010) searches of English-language observational studies were conducted. Most of the selected 37 studies had cross-sectional population-based designs, focused on elevated depressive symptoms and were conducted in the United States. Most studies suggested moderate or strong positive associations between IPV and depression. Meta-analysis suggested two to three-fold increased risk of major depressive disorder and 1.5 to 2-fold increased risk of elevated depressive symptoms and postpartum depression among women exposed to IPV relative to unexposed women. If the association is interpreted causally, a sizable proportion (9%-28%) of major depressive disorder, elevated depressive symptoms, and postpartum depression can be attributed to lifetime exposure to IPV. In an effort to reduce the burden of depression, continued research to identify the direction of causal effects between these variables is needed.

IMMIGRANT WOMEN AND MATERNAL MORTALITY IN WESTERN EUROPE: A META-ANALYSIS OF OBSERVATIONAL STUDIES. G.S. Pedersen*, A. Grontved, L.H. Mortensen, A-M.N. Andersen, J.W. Rich-Edwards. (Department of Epidemiology, Institute of Public Health, Denmark).

Western Europe have some of the lowest maternal mortality rates in the world, however recent progress within and between countries has been uneven, and inequity continues to exist. We undertook a meta-analysis of observational studies from Western European countries comparing the risk of maternal mortality between the immigrant and majority population. Electronic databases and reference lists were searched for eligible papers published 1970-2011 in Western European countries. All observational studies comparing maternal mortality risk between a majority population and a defined immigrant (foreign-born) population reporting relative risks (RR) or odds ratios (OR) with 95% confidence intervals (CIs) or data to calculate these were included. We performed a random-effects meta-analysis, and assessed statistical heterogeneity by the I² statistics. This meta-analysis of seven studies, including more than 37 million women and 3469 maternal deaths showed that immigrant women in Western European countries have a doubled risk of dying during or after pregnancy when compared with indigenous born women. The pooled risk estimate (RR) of 2.15 [1.68-2.75] corresponded to a risk difference of 10 additional maternal deaths per 100,000 deliveries per year. The relative risk of maternal mortality among immigrant women increased from 1.76 [1.21-2.55] in 1969-1990 to 2.41 [1.76-3.32] in 1991-2006. This meta-analysis provides strong evidence that immigrant women in Western European countries have an excess risk of maternal mortality. Time trends also showed a less favourable decline in mortality rates among immigrant as compared with non-immigrant women.

PATTERNS OF USE OF INSULIN-SENSITIZING AGENTS AMONG WOMEN IN THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEYS. H. Beydoun* (Eastern Virginia Medical School, Norfolk, VA, 23507); L. Stadtmauer (Eastern Virginia Medical School, Norfolk, VA, 23507); M. Beydoun (NIA/NIH/IRP, Baltimore, MD, 21224).

A cross-sectional study was conducted to investigate the demographic, socioeconomic, lifestyle and reproductive characteristics that may distinguish users and non-users of insulin sensitizing agents among U.S. diabetic, borderline diabetic and non-diabetic women. Secondary analyses of interview data on 19579 women 18-85 years of age (3882 diabetic, 387 borderline diabetic and 15310 non-diabetic) from the 2001-2006 NHANES waves were performed. Overall, 2% of women in the study sample (11.6% of diabetics and 0.2% of borderline and non-diabetics) were users of insulin-sensitizing agents, including metformin, rosiglitazone and pioglitazone. Diabetics were considerably more likely to be users of insulin sensitizers than either borderline diabetics or non-diabetics. Multivariate logistic regression models were constructed for predictors of insulin-sensitizer use according to diabetic status. In the overall sample, being younger or diabetic were the only factors associated with an increased odds of using insulin-sensitizing agents, after adjustment of confounders. Among diabetics, use of insulin-sensitizing agents was inversely related to age, but not other factors in the multivariable model. Among borderline and non-diabetics, body mass index was the only predictor that remained significantly associated with use of insulin-sensitizing agents after controlling for confounders. In conclusion, the main predictors of insulin-sensitizer use are young age and diabetic status in all women, young age in diabetic women and high body mass index in borderline and non-diabetic women.

OBESITY AND SEXUAL FUNCTIONING AMONG MIDLIFE WOMEN. *L. Gallicchio, SR Miller, H Zacur, JA Flaws (Mercy Medical Center, Baltimore, MD 21202)

Purpose. To examine whether obesity is related to sexual functioning in midlife women. Methods. Analysis of baseline data from a cohort study of 602 women aged 45 to 54 years was conducted. At a baseline clinic visit, a questionnaire was administered that ascertained information on demographics, menopausal symptoms, health, and quality of life. Height and weight were also measured and a blood sample was collected and assayed for estradiol. Sexual functioning was measured using the Short Personal Experiences Questionnaire; a score of 7 or less indicated sexual dysfunction. Obesity was defined as a body mass index of 30kg/m² or greater. Logistic regression models were used to examine the association between obesity and sexual dysfunction adjusted for age, menopausal status, and estradiol levels. Analyses were stratified by age. Results. Overall, 32.2% of the women in the cohort were categorized as obese at baseline. Approximately 77% reported being in an intimate relationship and, of these women, 16.2% were categorized as having sexual dysfunction. Obesity was significantly associated with sexual dysfunction among women aged 45 to 49 years [odds ratio (OR) 2.13; 95% confidence interval (CI): 1.05, 4.33], but not among women aged 50 to 54 years (OR 0.79; 95% CI 0.28, 2.25). Conclusions. Findings from this study show that obesity is associated with sexual dysfunction among younger, but not older midlife women, suggesting that obesity may be a factor in sexual functioning prior to or early in the menopausal transition but not post-menopause. This study was funded by the National Institute of Aging (AG018400).

RACE AND PHYSICAL FUNCTIONING AMONG BREAST CANCER SURVIVORS. *L Gallicchio, C Calhoun, K Helzlsouer; (The Prevention and Research Center, Mercy Medical Center, Baltimore, MD)

Purpose. To compare physical functioning between African-American (AA) and Caucasian breast cancer survivors. Methods. A self-administered survey was mailed to cancer survivors identified through a hospital-based cancer registry and diagnosed between 1996 and July 2007. Surveys were returned by 121 AA and 730 Caucasian breast cancer survivors. Physical functioning was assessed using 9 questions from the 2011 National Health Interview Survey. Self-reported treatment data were verified using medical record review. Associations between race and physical functioning adjusted for potential confounders (age, body mass index (BMI) and treatment) were examined using polytomous logistic regression. Results. The majority of respondents were more than 5 years past their diagnosis (AA: 68.6%; Caucasian: 72.5%). AA and Caucasian survivors had similar treatments and were of similar current age and age at diagnosis. AA survivors had significantly higher mean BMI compared to Caucasians (31.6 kg/m² versus 27.2kg/m²; p<0.01). Overall, AA breast cancer survivors had impaired physical functioning compared to Caucasian survivors; adjustment for confounders, especially BMI, attenuated the risk estimates. For example, AA breast cancer survivors were more likely than Caucasians to report difficulty with walking a quarter of a mile [unadjusted odds ratio (OR): 3.42; 95% confidence interval (CI): 2.27, 5.16; adjusted OR: 1.96; 95% CI: 1.23, 3.12]. Conclusions. AA breast cancer survivors are more likely than Caucasian survivors to report difficulties with physical functioning; this increase in risk is due partially to higher BMI among AAs compared to Caucasians. This study was funded by a Susan G. Komen for the Cure Career Catalyst Grant.

AN EXAMINATION OF THE ROLE OF RACE/ETHNICITY IN THE LINK BETWEEN GESTATIONAL WEIGHT GAIN AND HYPERTENSIVE DISORDERS IN PREGNANCY. Liu J,* Gallagher A, Torres ME, Moran R, Mazzoli C (University of South Carolina, Columbia, SC 29208)

Introduction: We studied the role of race/ethnicity in the relationship between excessive gestational weight gain (GWG) and hypertensive disorders in pregnancy (HDP) by: 1) examining racial/ethnic differences in the prevalence of HDP and inappropriate GWG and 2) exploring whether racial/ethnic differences in HDP are explained by differences in GWG. Methods: Live, singleton births from the 2004-6 South Carolina birth certificates were used (n=44,274 non-Hispanic black, 12,401 Hispanic, 79,004 non-Hispanic white women). HDP includes gestational hypertension and preeclampsia cases. The ratio of observed to expected GWG based on the 2009 IOM recommendations was used to define GWG as inadequate, adequate, or excessive. Results: HDP was least prevalent among Hispanic women (3.5%) and similar in black (6.3%) and white (5.8%) women. Excessive GWG was most prevalent among white women (52%). Black and Hispanic women had 16%-54% lower odds of gaining excessive weight than white women. The odds of inadequate weight gain, however, was ~50% higher in black and Hispanic women whose pre-pregnancy body mass index (BMI) was <25 compared to white women in the same weight category. Excessive GWG was associated with higher odds of HDP, as expected. Black and Hispanic women with a BMI ≥30 had lower odds of HDP than white women in the same weight category, which remained after adjusting for GWG. Conclusions: Efforts focusing on curbing excessive GWG in white women are warranted. Contrarily, underweight and normal weight, black and Hispanic women may benefit from programs that emphasize the hazards of inadequate GWG. Excessive GWG does not appear to fully explain racial differences in HDP.

WOMEN'S HEALTH AFTER GESTATIONAL HYPERTENSION IN NORTHERN FINLAND BIRTH COHORT 1966. *T Männistö, P Mendola, M Väärämäki, A Pouta, M-R Järvelin, A-L Hartikainen, and E Suvanto (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD, 20852)

Hypertensive disorders of pregnancy are associated with long-term cardiovascular morbidity. Whether cardiovascular and other chronic disease risks vary with severity of hypertension during pregnancy is unknown. Northern Finland Birth Cohort 1966 includes all expected births from two provinces. Hypertension during pregnancy and other prospective data came from prenatal care records and questionnaire for 10,179 mothers. Diagnoses were ascertained from registries (average follow-up 40.6 years). Hazard ratios (HRs) estimated disease risks comparing hypertensive and normotensive mothers. Any hypertension in pregnancy resulted in higher risk of subsequent cardiovascular disease. Mothers with chronic hypertension and superimposed preeclampsia had high risk, but gestational hypertension also increased risks for ischemic heart disease (HR=1.44, 95% confidence interval (CI) 1.28-1.62), myocardial infarct (MI) (HR=1.71, 95%CI=1.37-2.13), MI death (HR=2.89, 95%CI=1.92-4.35), heart failure (HR=1.71, 95%CI=1.38-2.12), ischemic cerebrovascular disease (HR=1.58, 95%CI=1.38-2.02), kidney disease (HR=1.99, 95%CI=1.22-3.24), hypertension (HR=2.46, 95%CI=2.20-2.75) and diabetes (HR=1.48, 95%CI=1.19-1.85). We also found increased risks for women with isolated systolic or diastolic hypertension, and in otherwise healthy women (nulliparous, under 35, normal weight, nonsmoker, no diabetes) with gestational hypertension. Hypertension during pregnancy increased women's risk of cardiovascular, cerebrovascular and kidney disorders as well as diabetes later in life. History of gestational hypertensive disorders should be a key women's health indicator.

A SUSTAINED DECLINE IN POSTMENOPAUSAL HORMONE USE: RESULTS FROM NHANES 1999-2010. *B. Sprague, A. Trentham-Dietz, and K. Cronin (University of Vermont, Burlington, VT 05401)

Short term declines in postmenopausal hormone use were reported in numerous study populations following the Women's Health Initiative trial results in 2002. While criticisms and concerns about the trial's generalizability have been expressed in the ensuing years, long term trends in hormone use are not well understood. We sought to evaluate trends in the prevalence of hormone use in a nationally representative sample, with particular attention to variation by type of formulation and patient characteristics. Data were obtained on 10,107 women aged 40 years and older from the 1999-2010 National Health and Nutrition Examination Survey (NHANES). In 1999-2000, the prevalence of oral postmenopausal hormone use was 22.4% (95% CI: 19.0, 25.8) overall, 16.8% (95% CI: 14.2, 19.3) for estrogen only, and 5.2% (95% CI: 3.6, 6.8) for estrogen plus progestin. A sharp decline in use of all formulations was observed in 2003-2004, when the overall prevalence dropped to 11.9% (95% CI: 9.6, 14.2). Hormone use continued to decline through 2009-2010, when the prevalence was 4.7% (95% CI: 3.3, 6.1) overall, 2.9% (95% CI: 2.1, 3.7) for estrogen only, and 1.5% (95% CI: 0.5, 2.5) for estrogen plus progestin. Substantial declines in hormone use were observed across all age, race/ethnicity, education, and income groups evaluated, as well as among women with and without a hysterectomy. Patient characteristics positively associated with current hormone use in 2009-2010 include history of hysterectomy, non-Hispanic white race/ethnicity, and higher income levels. Use of postmenopausal hormones in the United States has declined in a sustained fashion to very low levels across a wide variety of patient subgroups.

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RETINOL BINDING PROTEIN 4 AND THE RISK OF GESTATIONAL DIABETES. *DF Abetew, C Qiu, N Fida, M Dish, K Hevner, MA Williams, DA Enquobahrie (Swedish Medical Center, Seattle, WA 98104)

Objective: We investigated associations of early pregnancy retinol binding protein 4 (RBP4), a novel adipokine related to insulin resistance, with risk of gestational diabetes mellitus (GDM). **Methods:** Study participants (173 GDM cases and 187 controls) were selected among participants of a pregnancy cohort study in Seattle, WA. Serum RBP4 concentration was measured in early pregnancy (16 weeks gestation, on average) using ELISA based immunoassay. Logistic regression was used to estimate adjusted odds ratios (aOR) and 95% confidence interval (95%CI). **Results:** Mean serum RBP4 was significantly higher among GDM cases (47.1 vs. 41.1 $\mu\text{g/ml}$, p -value <0.05). Participants in the highest quartile for serum RBP4 had a statistically significant 1.54-fold higher risk of GDM compared with participants in the lowest quartile (aOR: 1.54, 95%CI: 0.82-2.90). Among women who were ≥ 35 years old, women in the highest quartile had a 2.4-fold increase in risk of GDM compared with women in the lowest quartile (aOR: 2.39, 95%CI: 0.91-6.29, trend p -value = 0.03). This relationship, however, was not observed among women < 35 years old (trend p -value=0.94) (interaction p -value=0.02). Further, women who were ≥ 35 years old and had high RBP4 (≥ 38.3 $\mu\text{g/ml}$, the median) had a 2.3-fold higher risk of GDM compared with women who were < 35 years old and had low RBP4 (aOR: 2.31, 95%CI: 1.26-4.23). **Conclusion:** Higher serum levels of RBP4 in early pregnancy may be associated with GDM risk. Advanced maternal age appears to modify this association. Age associated body fat distribution and renal function changes may account for these differences. Further studies are warranted to explore these relationships.

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ASSOCIATIONS OF MATERNAL METABOLIC GENES WITH PLACENTAL ABRUPTION. A Moore*, DA Enquobahrie, SE Sanchez, CV Ananth, P Pacora, MA Williams (Department of Epidemiology, University of Washington, Seattle, WA 98195)

Objective: Placental Abruption (PA), an adverse outcome of pregnancy, has complex multifactorial etiologies that include genetic susceptibilities to metabolic traits. However, few studies have investigated genome wide associations of metabolic maternal genetic variations with risk of PA. **Methods:** We conducted a genome-wide association study among 253 PA cases and 258 controls in Lima, Peru. Variants in cardiovascular and metabolism genes were characterized using >200,000 Single Nucleotide Polymorphisms (SNPs) represented on the Illumina Cardio-Metabo Chip. Genetic associations were evaluated using independent chi-squared tests corresponding to each SNP. We also performed a secondary data analysis examining associations of PA with SNPs (N=45) on a priori identified genes involved in candidate pathways. **Results:** After correction for multiple testing, there were no statistically significant associations with PA at the genome-wide level (lowest p -value 5.7e-6). In the candidate SNP analysis, 4 SNPs on KDR (p -value=0.007), AGT (p -value=0.010), F2 (p -value=0.03), and THBD (p -value=0.04) were significantly associated with PA, without correction for multiple testing. **Conclusion:** While we did not find significant associations at the genome-wide level, in this moderately sized study, we found evidence for suggestive associations of SNPs on candidate genes with PA. Future studies with larger sample sizes are warranted to replicate our findings and/or identify other genetic susceptibility risk factors.

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ASSOCIATION OF EARLY MENARCHE AND MENSTRUAL CHARACTERISTICS WITH ADULTHOOD ASTHMA AMONG REPRODUCTIVE AGE WOMEN. *N Fida, MA Williams, DA Enquobahrie (Center for Perinatal Studies, Swedish Medical Center, Seattle, WA 98101).

Objective: To evaluate associations of early age of menarche and menstrual characteristics with adulthood asthma among reproductive age women. **Methods:** Study participants were selected from among women enrolled in a pregnancy cohort study in Seattle, WA. Information on age at menarche, menstrual characteristics, and history of asthma diagnosis was collected using interviewer-administered questionnaires. Adulthood asthma was defined as asthma first diagnosed after onset of menarche. Women who had no available information on asthma and menarche were excluded. In addition, women with a diagnosis of asthma before menarche were excluded. A total of 3,461 women comprised the analytic population. Logistic regression was used to estimate adjusted relative risk (aRR) and 95% confidence intervals (95% CI). **Results:** Mean age of menarche was 12.8 years (standard deviation=1.46). 7.5% of women received a diagnosis of asthma after the onset of menarche. After controlling for potential confounders (including age, race, pre-pregnancy body mass index, and socio-economic status), women who had early menarche (<11 years old) had 60% higher risk of being diagnosed with asthma in adulthood as compared with women who did not have early menarche (≥ 11 years old) (aRR: 1.56, 95% CI: 1.17 – 2.07). Menstrual irregularities or cycle length were not associated with risk of adulthood asthma. **Conclusion:** Early age at menarche is associated with a higher risk of developing adulthood asthma. Mechanisms for this association are potential areas of future research that may help in preventive activities to reduce risk of developing adulthood asthma.

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FACTORS ASSOCIATED WITH CHLAMYDIA POSITIVITY AMONG MINNESOTA FEMALES IN THE INFERTILITY PREVENTION PROJECT. *J. Misialek, C. Hadsall, A. LaPointe, R. Ghebrey, R. Nguyen (University of Minnesota, Minneapolis, MN 55414)

Background: Utilizing the Minnesota Infertility Prevention Project (MIPP) data, this study sought to examine factors associated with Chlamydia (CT) positivity among females ages 15-25. **Methods:** Serial cross-sectional analysis from 2006-2009 was performed using 58,199 CT test results of sexually active Minnesota women ages 15-25 who were tested at MIPP clinics. Trends in distribution and CT positivity for age, race, district, and specimen site were examined. Multivariate logistic regression was used to identify independent factors associated with CT positivity. Potential interactions by race and district on age were evaluated. **Results:** After adjustment, the prevalent odds of CT were 50% higher (95% CI: 1.38-1.63) in the 15-18 age group than in the 22-25 age group. African Americans (Odds Ratio [OR]=1.95, 95% CI: 1.78-2.13), American Indians (OR=2.05, 95% CI: 1.62-2.59), Asian/Pacific Islanders (OR=1.43, 95% CI: 1.17-1.75), and unknown race (OR=1.49, 95% CI: 1.26-1.76) had significantly higher odds of CT compared to whites. District was a significant factor of higher CT odds in the southwest (OR=1.48, 95% CI: 1.22-1.79) and unknown district (OR=1.39, 95% CI: 1.11-1.73) compared to the Metro. Also, the age-CT infection association was modified by geographic area, with the Metro having the highest prevalent odds of CT for the 15-18 age group (OR=1.94, 95% CI: 1.71-2.20). **Conclusions:** As the largest study to examine CT positivity of sexually active women in Minnesota, this analysis identified race and district as significant factors for CT infection. Also, an interaction between district and age revealed younger females in the Metro having higher odds of CT infection.

PREGNANCY COMPLICATIONS AND ULTRASOUND MEASURES OF CARDIOVASCULAR RISK. EW Harville,* JSA Viikari, OT Raitakari, M Juonala (Tulane University, New Orleans, LA, 70112)

Little is known about the relationship between endothelial function or carotid intima-media thickness prior to pregnancy and pregnancy outcome, nor the effects of pregnancy on these markers of cardiovascular risk later in life. Data from the Cardiovascular Risk in Young Finns Study were linked with birth registry data for 852 women. Maximum flow-mediated dilatation was measured as the Maximum change in the left brachial artery diameter after rest and hyperemia. Intima-media thickness of the carotid artery bulb and of the posterior wall of the left carotid artery were measured. Preterm birth (<37 weeks), low birthweight (<2500 g), small-for-gestational-age (weight <10th percentile for gestational age), hypertensive disorders of pregnancy, and gestational diabetes were examined as predictors of later flow-mediated dilatation/intima-media thickness using multivariable linear regression with adjustment for confounders. Flow-mediated dilatation/intima-media thickness measurements prior to the pregnancy were also examined as predictors of pregnancy complications. Low birthweight was associated with modest reductions in flow-mediated dilatation, as were hypertensive disorders of pregnancy. Higher pre-pregnancy flow-mediated dilatation was associated with gestational age, but gestational age did not predict flow-mediated dilatation after pregnancy. Intima-media thickness was generally not related to pregnancy outcome. Pregnancy complications have limited relationships with flow-mediated dilatation and intima-media thickness.

ALCOHOL AND UNPROTECTED SEX AMONG WOMEN: IMPLICATIONS FROM DAY-LEVEL, MONTH-LEVEL, AND PERSON-LEVEL ASSOCIATIONS. *B.W. Weir and C.A. Latkin (Johns Hopkins University, Baltimore, MD, 21205)

Multiple theoretical perspectives have been proposed to account for the association between alcohol use and risky sexual behavior among women, including alcohol myopia, alcohol expectancies, drinking in sexual courtship, personality traits, social network, and stressful life circumstances. These perspectives suggest different relationships between multi-level measures of alcohol use and sexual behavior (operationalized separately as intercourse and as condom use). *Methods:* Among 530 women participating in an HIV prevention study, daily alcohol use and sexual behavior were measured during four 30-day intervals over one year. Day-level intercourse and day-level condom use (on days with intercourse) were modeled separately as functions of alcohol use measured at the day-level (any vs. none), month-level (days with alcohol use per 30 days), and person-level (days with alcohol use per 120 days). *Results:* Intercourse was independently associated with alcohol use at the day-level (odds ratio [OR] = 3.16; 95% confidence interval [CI] = 2.69, 3.72), month-level (OR = 1.09; 95% CI = 1.05, 1.12), and person-level (OR = 1.02; 95% CI = 1.01, 1.03). Condom use was not significantly associated with any measure of alcohol use. *Discussion:* In this sample, alcohol use was associated with unprotected intercourse through changes in the likelihood of intercourse but not through changes in the likelihood of condom use. Alcohol myopia, alcohol expectancies, and personality trait theories are incongruent with the lack of an association between condom use and alcohol use. Associations between intercourse and alcohol use are consistent with courtship, place-based, social network, and stressful life circumstance perspectives.

INTER- AND INTRA-RATER RELIABILITY IN THE DIAGNOSIS AND STAGING OF ENDOMETRIOSIS. *K. Schliep, J. Stanford, Z. Chen, B. Zhang, J. Dorais, E. Johnstone, A. Hammoud, M. Varner, G. Buck Louis, M. Peterson (University of Utah, Salt Lake City, UT 84108)

While endometriosis staging systems have been used for decades in clinical practice and research, few studies have adequately evaluated their reliability. Limitations of prior studies include restricting the study population to women previously diagnosed with endometriosis, small numbers of assessments, and restricting assessors to one hospital. We randomly sampled 148 women (36%), stratified on endometriosis diagnosis and image quality, from the Endometriosis: Natural History, Diagnosis and Outcomes Study. Eight experienced surgeons, from a variety of clinical centers, reviewed operative images and gave an endometriosis diagnosis and, if present, disease severity rating using the revised American Society for Reproductive Medicine (rASRM) staging criteria. The inter-rater reliability for endometriosis diagnosis among the surgeons was substantial: Fleiss $\kappa = 0.69$, 95% Confidence Interval (CI): 0.64–0.74. Surgeons agreed on rASRM endometriosis staging criteria in a majority of cases (mean=61%, range: 52–75%) with fair inter-rater reliability: Fleiss $\kappa = 0.44$, 95% CI: 0.41–0.47. The intra-rater reliability for reviewer assessment of staging versus computer-generated rASRM staging was almost perfect (mean weighted $\kappa=0.95$, range: 0.89–0.99). Findings suggest that reliability in endometriosis diagnosis is not greatly altered by location or composition of surgeons, supporting the conduct of multi-site studies or compilation of endometriosis data across clinical centers. While surgeons appear to be skilled at assessing endometriosis stage, how accurate the clinical staging of disease correlates with clinical outcomes remains to be developed.

MISSING DATA IN A MOBILE PHONE DAILY DIARY STUDY OF ADOLESCENTS. *P. Sander, S. Chung, J. Ellen, P. Matson (Harvard School of Public Health, Boston, MA, 02115)

Research on attitudes, risk behaviors, and sexually transmitted disease acquisition over the course of adolescence requires detailed longitudinal data. Mobile phones, the preferred communication method of adolescents, are data collection and retention tools that may improve completion, timeliness and accuracy of study questionnaires. We analyze data completeness in a study of 122 urban females (median age: 18 (interquartile range (IQR): 15-19); 96% African-American) recruited at sexually transmitted disease clinics and adolescent serving venues in Baltimore, Maryland between 2008 and 2011 with a planned follow-up period of one year. Each participant received a mobile phone on which she was to complete questionnaires daily. We modeled predictors of daily diary non-response and study continuation using logistic regression. Participants completed an average of 2 (IQR: 0-4) daily diaries per week. Sixty-one percent discontinued participation before one year (median follow-up: 120 days (IQR: 51-217)). Missing diaries were more likely on Fridays and Saturdays compared to other days of the week (Odds Ratio (OR)): 1.22; 95% Confidence Interval (CI): 1.15, 1.26) and among children of women with less than a high school education (OR: 2.02; 95% CI: 1.45, 2.82). Weak predictors of study continuation included no history of syphilis or herpes at study enrollment and self-reported homosexual experiences. These findings highlight the difficulties of collecting and retaining high risk adolescents in longitudinal research studies even with the assistance of mobile technologies and suggest that additional methods for retaining and motivating study populations are needed.

COMPLEX SYSTEMS DYNAMIC MODELING APPROACHES TO POPULATION HEALTH: PROMISE FOR A CELLS-TO-SOCIETY ANALYTIC APPROACH?
*George Kaplan (University of Michigan, Ann Arbor, MI)

The past two decades have witnessed an explosion of knowledge concerning the complex social and economic determinants of health among populations and inequalities in health within populations, and how these determinants “get under the skin”. However, the dominant analytic techniques in population health are poorly suited to utilize this data fully and to help us understand how factors at multiple levels of influence (e.g., genes, cells, organs, individuals, families, neighborhoods, states) interact dynamically to shape population health. The tools and theories of complex systems dynamic modeling provide conceptual and analytic strengths in addressing complex multilevel phenomena with extensive feedback and non-linearity and therefore may help contribute to our understanding of the multi-factorial construction of population health and identify potential avenues for intervention. Application of these methods to population health questions however presents challenges for epidemiologists. These include primarily our need (a) to develop greater facility with simulated data, (b) to develop models that accurately represent well-documented epidemiologic associations, and (c) to incorporate both realistic time parameters and life course approaches, with varying relations over time, into these models. This symposium will present examples of complex system models and their applications to population health questions. Speakers will also touch on what we can and cannot expect these models to successfully address and problems of implementation. Our hope is to demonstrate the utility of such models in epidemiologic theory and practice, thus encouraging SER members to explore further this emerging area.

Speakers:

An agent-based model linking neighborhood, social network, life course, and socio-economic factors to disparities in diet and BMI
George A. Kaplan, University of Michigan
A Quasi-Theoretical Agent-Based Model of the Connections Between Social and Health Inequalities
Michael Wolfson, University of Ottawa
Representing socio-economic and health behavior differences in large-scale agent-based models
John Grefenstette, University of Pittsburgh
Sensing-Informed Computational Epidemiology
Nathaniel Osgood, University of Saskatchewan

TEACHING EPIDEMIOLOGIC METHODS. *Richard MacLehose and George Maldonado (University of Minnesota, Minneapolis, MN)

Courses in epidemiologic methods serve as the backbone of any doctoral sequence in epidemiology. The theoretical models used in these courses, however, varies widely between Universities as well as between teachers within universities. Many courses use modern counterfactual theory as their theoretical basis, while others take a more traditional statistical approach to epidemiologic concepts. While the merits of these approaches has been hotly debated among epidemiologists, of more interest to us is how these different techniques are used in teaching epidemiologic methods to graduate students. Our proposed symposium will have speakers who have been teaching epidemiologic methods using these various theoretical approaches for many years. The purpose is not to revisit the current debate of which approach is theoretically better but rather, the strengths and weaknesses the exhibit as pedagogical tools.

Speakers:

Teaching Directed Acyclic Graphs (DAGs): A Report from the Trenches
Penelope Howards, Emory University
Experiences in Teaching Potential Outcomes to Epidemiology Students
Charles Poole, University of North Carolina
Teaching Biostatistics and Epidemiologic Methods - A Personal Perspective
David Kleinbaum, Emory University

Discussant

George Maldonado, University of Minnesota

MENDELIAN RANDOMIZATION IN EPIDEMIOLOGY: METHODOLOGICAL CHALLENGES AND PROGRESS. *Brandon L. Pierce(University of Chicago, Chicago, IL) and M. Maria Glymour (Harvard School of Public Health, Boston, MA)

Mendelian Randomization (MR) is a method for assessing the effect of an exposure on a disease outcome by using data on genetic determinants of the exposure as instrumental variables (IVs). While the use of MR in epidemiological studies is relatively new, our knowledge of genetic factors that influence human biomarkers and behavioral exposures of interest is growing rapidly, often due to discoveries arising from genome-wide association studies. As we learn more about genetic determinants of exposures with public health relevance (e.g., body size, smoking, and disease-related biomarkers) and their biological mechanisms, MR will likely become a more feasible and common design in epidemiology. This symposium will address several critical methodological issues related to design, analysis, and interpretation of MR studies. For example, what strategies can we use to construct IVs from genetic data and evaluate those IVs? How should analyses and interpretation be modified for binary and time to event outcomes? Speakers will also provide updates on ongoing MR-related research efforts to evaluate the potential effect of alcohol consumption on cardiovascular disease risk and the potential effect of BMI on anxiety. This symposium will bring needed attention and scrutiny to MR-related methods and applications, while providing attendees with a foundation for utilizing state-of-the-art MR methods and an awareness of the strengths, limitations, and feasibility of MR.

Speakers:

Implementation of the First Mendelian Randomization Study of Alcohol Use and Cardiovascular Disease: Issues and Solutions
Mary Schooling, CUNY School of Public Health at Hunter College
Genetic instrumental variable with polygenic scoring from external samples: Effects of BMI on anxiety
Stefan Walter, Harvard School of Public Health
Instrumental variable methodology for a failure time outcome: an application to Mendelian Randomization studies
Eric J Tchetgen Tchetgen, Harvard School of Public Health
What is an odds ratio and why does it matter in Mendelian Randomization?
Stephen Burgess, University of Cambridge

DISCUSSANT: Duncan Thomas, University of Southern California

TOWARD AN EPIDEMIOLOGY OF GLOBAL MENTAL HEALTH. *Ezra Susser (Columbia University, New York, NY) and J Jaime Miranda (CRONICAS - Center of Excellence Chronic Diseases, Universidad Peruana Cayetano Heredia)

This symposium will highlight new developments in the epidemiology of mental health that follow from adopting a global perspective. The first speaker (Dr. Galea) will discuss how causes differ across contexts, and how we can take this into account in epidemiologic studies of mental health that span different regions of the globe. The second speaker (Dr. Burns) will discuss the distinctive approaches required to measure disparities in mental health in an African context (KwaZulu Natal, South Africa). The third speaker (Dr. Rojas) will discuss the relation of epidemiologic studies to mental health policy, using the example of Chile, the country that arguably has the best record of application of epidemiologic research to improve mental health services. The discussant (Renato D. Alarcon) will tie these presentations together by noting common themes and explaining the historical context for these new developments in mental health epidemiology.

Speakers:

Causes in Context. Complicating Causal Thinking in Global Mental Health
Sandro Galea, M.D., Dr. PH, Columbia University
Integrating Mental Health into Primary Care: the case of Chile
Graciela Rojas, M.D., University of Chile
Measuring Mental Health Disparities in an African Context: Epidemiological Challenges
Jonathan Burns, M.D., University of KwaZulu-Natal

Discussant: Renato D. Alarcon, MD, MPH, Universidad Peruana Cayetano Heredia, Lima, Peru.

A PROSPECTIVE STUDY OF ARSENIC EXPOSURE, ARSENIC METHYLATION CAPACITY, AND RISK OF CARDIOVASCULAR DISEASE IN BANGLADESH. *F Wu, YChen, M-L Liu, F Parvez, V Slavkovich, M Eunos, A Ahmed, S Segers, M Argos, T Islam, M Rakibuz-Zaman, R Hasan, G Sarwar, D Levy, JH. Graziano, and H Ahsan (New York University School of Medicine, New York, NY)

Arsenic exposure from drinking water has been linked to elevated risks of cardiovascular disease (CVD). However, the role of individual susceptibility to CVD due to variability in arsenic methylation capacity is unclear. We conducted a case-cohort study to prospectively evaluate the association of arsenic exposure from drinking water and arsenic methylation capacity with risk of CVD. The study included 369 incident fatal and non-fatal cases of disease of circulatory system, including 211 cases of heart disease and 148 cases of stroke, respectively, and a subcohort of 1,109 subjects randomly selected from the 11,224 participants with available baseline data on water and urinary arsenic exposure level in the Health Effects of Arsenic Longitudinal Study. Well arsenic concentration at baseline was positively associated with risk of fatal and nonfatal disease of circulatory system, especially heart disease. The adjusted hazard ratio (HR) for heart disease was 1.19 (95% confidence interval [CI] 1.04-1.36) for each standard deviation increase in well arsenic (112 µg/L). MMA% in urine was significantly positively associated with heart disease risk. The adjusted HRs for heart disease in increasing MMA% tertiles were 1.00 (reference), 1.62 (95% CI 1.05-2.50), and 1.53 (95% CI 1.00-2.34), respectively. Participants with a secondary methylation index (SMI, ratio of urinary DMA to MMA) of ≥ 7.2 had a significant 38% (HR = 0.62; 95% CI 0.41-0.93) and 42% (HR = 0.58; 95% CI 0.36-0.93) reduction in risk of disease of circulatory system and heart disease, respectively, compared with those who had a SMI of ≤ 4.8 . The data also suggest a synergistic interaction between higher MMA% and cigarette smoking in risk of heart disease (relative excess risk for interaction = 0.85; 95% CI -0.51-2.21). Our data suggest that incomplete methylation capacity of arsenic may be adversely associated with risk of heart disease, especially among smokers.

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DAYTIME SLEEPINESS AND RISK OF STROKE AND VASCULAR DISEASE: FINDINGS FROM THE NORTHERN MANHATTAN STUDY. *E.T. Roberts, B. Boden-Albala, C. Bazil, Y. Moon, J. De Rosa, M.S.V. Elkind, T. Rundek, M.C. Paik, R.L. Sacco (Columbia University, New York, NY, 10032)

Recent studies suggest poor quality and diminished quantity of sleep may be independently linked to vascular events, though prospective and multiethnic studies are limited. This study explored the relationship between daytime sleepiness and the risk of ischemic stroke and vascular events in an elderly, multi-ethnic, prospective cohort. As part of the Northern Manhattan Study, the Epworth Sleepiness Scale (ESS) was collected during the 2004 annual follow-up. Daytime sleepiness was trichotomized using previously reported cut points of “no dozing,” “some dozing,” and “significant dozing”. Subjects were followed annually for a mean of 5.1 years. Cox proportional hazards models were used to calculate hazard ratios (HR) and 95% confidence intervals (95% CI) for stroke, MI and death outcomes. We obtained the ESS on 2088 community residents. The mean age was 73.5 ± 9.3 yrs; 64% were women; 17% white, 20% black, 60% Hispanic, and 3% other. Over 44% of the cohort reported no daytime dozing, 47% reported “some dozing” and 9% “significant daytime dozing.” Compared to those reporting no daytime dozing, individuals reporting significant dozing had an increased risk of ischemic stroke [HR=2.74 (95% CI 1.38-5.43)], all stroke [3.00 (1.57-5.73)], the combination of ischemic stroke, MI and vascular death [2.38 (1.50-3.78)], and all vascular events [2.48 (1.57-3.91)] adjusting for medical comorbidities and demographics. We found no evidence supporting heterogeneity of the effect of daytime sleepiness on our outcomes by race. Daytime sleepiness is an independent risk factor for stroke and other vascular events.

INCIDENT ISCHEMIC HEART DISEASE AND OCCUPATIONAL EXPOSURE TO PARTICULATE MATTER IN ALUMINUM MANUFACTURING WORKERS. *S Costello, EA Eisen, D Brown, SK Hammond, and M Cullen (University of California, Berkeley, CA, 94720)

Increased risk of ischemic heart disease (IHD) caused by particulate matter (PM) in air pollution is a public health concern. Although exposure to particulates can occur at levels up to 100-1000 fold higher in US workplaces, evidence for an association between PM exposure and IHD in the workplace is scant. This is the first report of a prospective cohort study of occupational exposure to PM and diagnosed ischemic heart disease in an active workforce of 11,942 US aluminum manufacturing workers. Incident IHD was identified from 1998 to 2008 using medical claims. Individual level quantitative exposure metrics for past and current total PM and PM_{2.5} were developed. IHD was weakly associated with current PM_{2.5} with modest elevations in all exposure categories. In analysis restricted to exposures estimated with the highest confidence, the hazard ratio increased to 1.67, with confidence intervals that excluded the null in the first two quartiles. Based on splines, the association was more striking in smelters than fabrication facilities with a linear exposure-response and narrow confidence bands. There was no evidence of increased IHD risk with cumulative PM_{2.5} or total PM. Consistent with the air pollution and cigarette smoke literature, current exposure to PM_{2.5} in the workplace appears to increase the risk of IHD incidence. The stronger association in smelters provides evidence that particle composition may play an important etiologic role.

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DIETARY AND SUPPLEMENTAL CALCIUM INTAKE AND CARDIOVASCULAR MORTALITY. * Xiao Q, Murphy R, Houston D, Harris T, Chow WH, Park Y (National Cancer Institute, Bethesda, MA, 20892)

Calcium intake has been promoted due to its proposed benefit on bone health, particularly among the elder population. However, concerns have been raised about the potential effect of high calcium intake on cardiovascular health. We assessed dietary and supplemental calcium intakes at baseline in the National Institutes of Health - American Association of Retired Persons (NIH-AARP) Diet and Health Study (567169 men and women, aged 50 to 71). Supplemental calcium intake includes calcium from multivitamins and individual calcium supplements. Cardiovascular deaths were ascertained using the National Death index. A multivariate Cox Proportional hazard model was used to estimate relative risks (RRs) and 95% confidence intervals (CIs). During an average of 12 years of follow-up, we identified 7904 cardiovascular deaths in men and 3874 in women. Calcium supplements were used by 51% of men and 70% of women. Among men, an elevated risk of cardiovascular death was linked to supplemental calcium intake (>1000 vs. 0 mg/day: RR=1.20, 95% CI, 1.05-1.36; P trend, <.001), daily use of individual calcium supplements (daily use vs. non-use: RR=1.10, 95% CI, 1.02-1.18), and total calcium intake from both diet and supplements (Q5 vs. Q1: RR =1.12, 95% CI, 1.04, 1.20; P trend, <.001). In contrast, no association was observed in women, with corresponding risks of 1.06 (95% CI, 0.96-1.15; P trend, 0.14), 1.00 (95% CI, 0.92-1.10), and 1.02 (95% CI, 0.92-1.14; P trend, 0.38), respectively. Dietary calcium intake was not associated with risk of cardiovascular death in both men and women. Our finding suggests that high intake of supplemental calcium is associated with an excess risk of cardiovascular death in men, but not in women.

Apolipoprotein E epsilon 4 allele interacts with gender and cognitive status to influence all-cause and cause-specific mortality among US older adults. Beydoun MA^{1,*}; Beydoun HA²; Kaufman JS³; An Y.¹; Resnick SM¹; O'Brien R⁴; Ferrucci L¹; Zonderman AB¹ (¹ National Institute on Aging, NIA/NIH/IRP, Baltimore, MD.; ² Graduate program in Public Health, Eastern Virginia Medical School, Norfolk, VA.; ³ Department of Epidemiology, Biostatistics, and Occupational Health, McGill University, Quebec, Canada.; ⁴ Department of Neurology, Johns Hopkins University, Baltimore, MD.)

Apolipoprotein E ε4 (ApoE4) genotype, sex and cognitive impairment may interact to affect all-cause and cardiovascular mortality risk. We investigated associations of ApoE genotypes, gender and time-dependent cognitive status with mortality risk, and assess biological synergism in these associations in a cohort of community-dwelling US adults. Data from the Baltimore Longitudinal Study of Aging (BLSA) were used. Of n=3,047 (First-visit Age:17-98y, 60.1% men), we selected a sample with complete genetic data and with ≥1 visit at age≥50y (n=1,461). Main outcome measures included time-to-death from all, cardiovascular or non-cardiovascular causes. Survival probability was lower for participants with at least 1 ε4 allele (ApoE4+), particularly at oldest ages. Cox proportional hazards model for all-cause mortality yielded a hazard ratio (HR) for ApoE4+vs.ApoE4- of 1.31,95% CI:1.02-1.68, a positive association also found for cardiovascular mortality. Time-dependent all-cause dementia (HR=1.73, 95%CI:1.33-2.26) and mild cognitive impairment (HR=1.95,95% CI:1.42-2.67) increased all-cause mortality risk, positive associations also detected for non-cardiovascular mortality. When individuals were free of cognitive impairment, a dose-response relationship with ε4 alleles was found for all-cause mortality (HR=1.40,95%CI:0.94-2.07 for 1 ε4, and HR=2.61; 95%CI:1.12-6.07 for 2 ε4). Beyond Alzheimer's Disease-type (AD) dementia onset, ApoE4+ increased all-cause mortality risk by ~82% compared to ε3/ε3. ApoE4+also increased all-cause mortality risk in men and interacted synergistically with time-dependent AD to increase the risk of this outcome (RERI=2.15; 95% CI:1.22-3.07). In conclusion, we found that ApoE4+ status is a risk factor for all-cause and cardiovascular mortality, and that it interacts synergistically with time-dependent AD-type dementia to affect all-cause mortality.

THE EFFECT OF TAS2R38 HAPLOTYPE ON THE ASSOCIATION BETWEEN PROP INTENSITY AND TASTE INTENSITY. *ME Fischer, JS Pankow, N Pankratz, A Pinto, CR Schubert, KJ Cruickshanks (University of Wisconsin, Madison, WI 53726)

The sense of taste likely contributes to food preferences and consumption with resulting health implications. Sensitivity to 6-n-propylthiouracil (PROP) is related to the TAS2R38 gene and perceived PROP intensity has been proposed as a marker for perceived intensity of salt, sweet, sour, and bitter. This study evaluated how TAS2R38 haplotype influences the association between PROP and the 4 basic tastes in the Beaver Dam Offspring Study. Haplotypes were determined from 3 single-nucleotide polymorphisms: rs713598 (alanine/proline), rs1726866 (valine/alanine), and rs10246939 (isoleucine/valine). Taste intensities were measured using filter paper and a general labeled magnitude scale (0-100). Of 1670 subjects (mean age=54.4 years), 32% were homozygous AVI (nontaster), 17% homozygous PAV (taster), 43% heterozygous PAV/AVI, and 8% other. There was a significant ($P < 0.001$) association of haplotype with PROP intensity (mean intensity: AVI/AVI=14.4, PAV/AVI=46.5, PAV/PAV=60.1). TAS2R38 haplotype modified the relationships between PROP and the 4 tastes. As perceived PROP intensity increased, the perceived intensity of each taste increased at a significantly ($p < 0.01$) greater rate in the taster haplotype group than in the heterozygotes (Taster: B(PROP) - salt=0.4, sweet=0.3, sour=0.5, bitter=0.7; Heterozygote: B(PROP) - salt=0.2, sweet=0.2, sour=0.2, bitter=0.4). The nontaster group was associated with a significantly ($p < 0.05$) greater rate of increase for sweet (Nontaster: B(PROP)=0.3) as compared to the heterozygotes. The distribution of the TAS2R38 gene in a study group affects how well PROP serves as a surrogate for the 4 basic tastes influencing food selection and consequently health.

IS GENETIC RISK FOR EARLIER AGE AT MENARCHE ASSOCIATED WITH PERI-PUBERTAL BODY MASS INDEX? William Johnson, Joanne E Curran, Audrey C Choh, Stefan A Czerwinski, Claire Bellis, Thomas D Dyer, John Blangero, Bradford Towne, Ellen W Demerath* (University of Minnesota, Minneapolis, MN)

It is unclear whether or not earlier age at menarche is association with higher body mass index (BMI) because they share a common genetic underpinning. We investigated the impact of single nucleotide polymorphisms (SNPs) influencing menarche timing on peri-pubertal BMI. For 556 Fels Longitudinal Study children (277 boys / 279 girls) born 1928-1992, a genetic risk score (GRS₄₂) was computed as the sum of the number of risk alleles in 42 putative menarche SNPs. Serial BMI Z-scores within ±6.99 years from each individual's age at peak height velocity (Age@PHV) were grouped into seven time points (-6yrs, -4yrs, -2yrs, Age@PHV, +2yrs, +4yrs, +6yrs). Heritabilities ranged from 0.53 to 0.85 across the time points. The effect of GRS₄₂ on BMI Z-scores at each time point was modeled using variance components-based procedures. GRS₄₂ had a significant ($p < 0.05$) effect at every time point; an increase of one risk allele was associated with an increase of 0.03-0.08 BMI Z-scores. A separate score (GRS₃₅) was computed that excluded seven of the menarche SNPs previously documented to also influence adiposity; significant effects were observed at Age@PHV+2yrs and +6yrs. These findings support a causal effect of advanced sexual development on peri-pubertal BMI. Significant positive GRS₄₂ (or GRS₃₅)-by-birth year interactions indicate that some genetic influences on BMI have amplified over the 20th century. This gene-by-environment interaction also suggests that children with a genetic predisposition to earlier sexual development might avoid elevated BMI through alteration of their nutritional environment.

APPLYING INVERSE PROBABILITY WEIGHTING TO ESTIMATE RISK RATIOS WHEN GENOTYPING DATA ARE AVAILABLE IN A SUBSET. *QE Harmon, SM Engel, MC Wu, A Stuebe, CL Avery (UNC Gillings School of Global Public Health, NC)

For efficiency, genetic studies are often nested within existing cohorts. Only a subset of individuals with multiple phenotypes and a single "disease-free" control group is genotyped. For each phenotype, a case-control design using the common control group is then employed. This approach relies on estimates of odds ratios which may be inappropriate for common outcomes, ignores additional genotyping data from controls with other outcomes, and is not directly generalizable to the underlying cohort. Inverse probability weighting (IPW) provides an opportunity to use all available genotyping data and estimate risk ratios (RR) standardized to the entire population. In the context of a candidate gene analysis in a pregnancy cohort, we compared two models (logistic and log-linear risk with IPW) and three variance estimators for change in estimate, precision, and computational efficiency. Outcomes of varying prevalence were included: preterm birth, gestational hypertension and preeclampsia. Weighting was based on the probability of being selected into the genotyped sample among the population who consented to genetic analysis. We explored three methods of calculating the variance for the RR: naïve, robust and bootstrapped. RR estimates for common outcomes were attenuated 5-10% compared to ORs. Robust and bootstrapped variances improved precision with confidence limit ratios decreasing 5-10% compared to logistic models. Naïve variance estimators were conservative relative to robust estimators. Bootstrapping was computationally intensive and did not alter estimates or improve precision. IPW is an efficient method to analyze nested case-control genetic data that can be standardized back to a larger cohort.

USING LATENT CLASS GROWTH ANALYSIS TO DEFINE NEIGHBORHOOD POVERTY TRAJECTORIES OVER 4 DECADES IN CALIFORNIA. Jina Jun, MA and *Catherine Cubbin, PhD (University of Texas at Austin, Austin, TX, 78712)

Neighborhood poverty has been found to have independent effects on a wide range of health indicators. However, measuring neighborhood poverty only at one point in time does not capture the dynamic nature of neighborhoods (e.g., gentrification, decline, long-term poverty) which may have important implications for health. The purpose of this study is to examine growth trajectories of neighborhood poverty in California using latent class growth analysis (LCGM). Data are from the Neighborhood Change Database and the 2005-2009 American Community Survey at the census tract level, normalized to census 2000 boundaries. Tract-level poverty rates were calculated as the proportion of residents with income below the federal poverty level. LCGM was used to define poverty trajectories at the tract level. To validate classes, multinomial logistic regression was used to examine differences in neighborhood SES (education, unemployment), racial/ethnic composition (white, black, Hispanic/Latino), family structure (single-headed household with children), and housing characteristics (renters) between latent classes. The LCGM results indicated three distinct poverty trajectories: long-term concentrated affluence (N= 4,602), long-term low/moderate poverty (N=1,845), and long-term concentrated poverty (N=602). Compared with neighborhoods in the other two classes, neighborhoods in the long-term concentrated poverty class had higher rates of (1) unemployment, (2) blacks and Hispanics/Latinos, (3) single-headed households with children, (4) and renters; and lower education levels. These results should help guide researchers on measuring neighborhood poverty dynamically in studies of neighborhood environments and health.

MODELING LONGITUDINAL COUNT DATA WITH EXCESS ZEROS IN AN EPIDEMIOLOGICAL STUDY. Resmi Gupta*, MS Rhonda D Vandyke, PhD, Maurizio Macaluso, DrPH, (Cincinnati Children's Hospital, Cincinnati, OH)

Counts are often modeled with a Poisson distribution, but overdispersion due to excess zeros is common. This problem also hampers treatment of repeated measures. Longitudinal zero-inflated Poisson (ZIP) models are mixtures of Logistic and Poisson models where the logistic portion models structural zeros, and the Poisson portion models the mean non-zero count. The model can account for within-subject correlation and can be fit with standard software. We compared a ZIP model with a traditional Poisson model using data on problems with condom use reported by women at high risk of sexually transmitted diseases (STDs). These were mainly African American (84%), 18-35 years old, with high school education and low income; 57% reported no problems with condom use. The ZIP model provided better fit than the traditional model (Bayesian information criterion: 2608 vs. 2912). The ZIP model also produced richer observations than the traditional model: the odds of reporting no problems increased with age [Odds Ratio (OR)=1.1, 95%CI:1.0-1.3, p=0.02] in the longitudinal ZIP model but not in the traditional model. The odds of no problems with female condom use increased over time [OR=2.9, 95%CI:1.6-4.0, p<0.01]. Strong belief in the benefits of condom use decreased the odds of repeat problems [OR=0.9, 95%CI:0.8-0.9, p=0.03]; women with no reported STDs at baseline were less likely to report new failures than those who reported STDs [OR=0.7, 95%CI:0.6-0.8, p=0.03]. Repeat problems decreased during follow-up [OR=0.8, 95%CI:0.7-0.9, p<0.01]. With increasing use of female condoms, reports of problems increased [OR=1.1, 95%CI:1.0-1.1, p<0.01]. The longitudinal ZIP model provided better fit and additional insight into the determinants of condom failure.

TRANSITIONS THROUGH STAGES OF PROBLEM DRINKING AMONG WOMEN WITH MOOD AND ANXIETY DISORDERS: A LATENT TRANSITION ANALYSIS. *L. La Flair, B. Reboussin, K. Green, C. Storr, A. Alvanzo, L. Pacek, R. Mojtabai, B. Goggins, and R. Crum (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205)

Little is known about whether mood and anxiety disorders alter transitions through stages of problem drinking, particularly for women. Study objectives were to 1) identify stages of women's alcohol involvement, 2) examine probability of transitions in alcohol involvement, and 3) evaluate the impact of mood and anxiety disorders on these transitions. Data are from 11,785 women identified as current drinkers in Wave 1 (2001-2002) and followed up in Wave 2 (2004-2005) of the National Epidemiological Survey on Alcohol and Related Conditions. Latent class analysis identified stages of alcohol involvement using 11 DSM-IV abuse/dependence criteria. Latent transition analysis was used to model transition probabilities between stages across waves. Impact of lifetime diagnoses of major depressive disorder (MDD) and generalized anxiety disorder (GAD) on transitions was examined, adjusting for potential confounders. Three stages of drinking were identified: severe (prevalence: 1.2-1.5%), moderate (9.7-11.6%), and no problems (89.0-86.9%). Women with GAD were more likely to transition from no problems at Wave 1 to severe at Wave 2 compared to women without GAD (adjusted odds ratio; AOR 3.56, 95% CI 1.46-8.69). Women with GAD in the severe class were also less likely to recover to no problems (AOR .20, 95% CI .04-.94). Depressed women were more likely to advance from no problems to severe (AOR 2.85, 95% CI .90-9.01) and less likely to transition from severe to moderate compared non-depressed (AOR .288, 95% CI .10-.86). These findings support both MDD and GAD as drivers of progression in women's problem drinking.

AN ALTERNATIVE APPROACH FOR FITTING MODELS FOR DOUBLY-CLUSTERED HIERARCHICAL DATA: AN APPLICATION TO LONGITUDINAL MEASURES OF MEDICATION SAFETY IN AMBULATORY CARE PRACTICES. *PJ Nietert, AW Wessell, RG Jenkins, LS Nemeth, CB Litvin, V Ramakrishnan (Medical Univ of South Carolina, Charleston, SC 29425)

Background: Generalized linear mixed models (GLMMs) are often used for modeling longitudinal data in epidemiological research, and typically random effects are used to handle dependence of observations within clusters and within subjects over time. With large numbers of subjects, model convergence may require computing resources beyond the ability of many desktop computers. We propose a strategy using a resampling approach that is computationally less demanding, and we apply our findings to measures of medication safety gathered over time on patients in PPRNet®, a U.S.-based practice based research network. Methods: The novel strategy estimated the degree of change in a binary outcome (prescription for any "inappropriate" medication) obtained monthly on 25,713 patients within 20 PPRNet® practices, over a 2-year period. The strategy involved repeatedly drawing subsamples of patients with replacement, constructing a full model with 2 random effects for each subsample, and pooling results across models. The novel strategy was then compared to the traditional GLMM. Results: Our sampling technique yielded unbiased parameter estimates, with estimated standard errors within 5% of the standard errors from the complete 2-level GLMM. Conclusions: Our strategy for modeling clustered longitudinal data is a promising alternative. When limited computational resources preclude using a full GLMM with 2 or more random effects, our strategy renders a solution. This simplified technique could foster improvements in modeling high-dimensional data in epidemiological research and assessment of public health interventions.

L01

WAIST CIRCUMFERENCE AND ENDOTHELIAL FUNCTION IN POLICE OFFICERS. *P. Baughman, D. Fekedulegn, M.E. Andrew, P.N. Joseph, J.M. Dorn, J.M. Violanti, C.M. Burchfiel (National Institute for Occupational Safety and Health, Health Effects Laboratory Division, Morgantown, WV 26505)

Rationale: Police officers represent 706,900 workers in the U.S. and have high rates of cardiovascular disease (CVD). Given associations between obesity and CVD, we evaluated a less well-established association between waist circumference and brachial artery reactivity (BAR), a measure of endothelial function and early CVD risk. **Methods:** Demographic, anthropometric, and risk factor data were collected during 1999–2000 in the Buffalo Cardio-Metabolic Occupational Police Stress Study. BAR was measured during 2001–2003 using standardized noninvasive ultrasound scans and was calculated as percent increase in brachial artery diameter after blood pressure cuff release. Gender-stratified regression models adjusted for age, smoking, and physical activity were used to examine trends in mean BAR across waist circumference tertiles. Due to limited sample size, effect modification by several factors was evaluated among all officers combined. **Results:** The study included 70 officers (57.1% men) with a mean age of 40.9 years. Adjusted mean BAR decreased (5.96%, 4.26%, 3.37%; $P = 0.06$) across increasing waist tertiles (80–89.4, 89.5–97.9, 98–126 cm) among men, but not women. Alcohol use was an effect modifier; officers who had intake above the median had a significant decline in adjusted mean BAR (5.56%, 5.20%, 2.12%; $P = 0.01$) across increasing waist tertiles, whereas those with lower intake did not. Further adjustment for gender attenuated this association. **Conclusion:** Results indicate larger waist circumference may be associated with reduction in BAR. Larger sample size and longitudinal study are needed to confirm this relationship.

L03

AMBIENT AIR POLLUTION AND AUTISM RISK IN LOS ANGELES COUNTY, CA. T. Becerra, M. Wilhelm, *B. Ritz (University of California, Los Angeles, Department of Epidemiology, Los Angeles, CA, 90095)

The prevalence of Autistic Disorder (AD), a serious developmental condition, has been rising dramatically over the past two decades but population based research addressing etiology is still limited. We assessed the influence of exposures to traffic-related air pollution during pregnancy on the development of autism relying on data from air monitoring stations and a land use regression (LUR) model we previously developed. Children of mothers living in Los Angeles County with a primary diagnosis of AD at ages 3-5 years were identified through the California Department of Developmental Services during 1998-2009 and linked to 1995-2006 California birth certificates. We matched 7,603 autistic children to 10 controls each by sex and gestational age. Addresses provided on birth certificates were mapped and linked to nearest monitoring stations and our LUR modeled data. Using conditional logistic regression and adjusting for maternal, paternal, and perinatal characteristics including indicators of SES, we estimated odds of AD per inter-quartile (IQR) increase in monitoring and LUR data-based pregnancy exposures. We observed 5% increases in odds of autism for O₃ [Odds Ratio: 1.05 95% Confidence Interval: (0.99, 1.11)] and PM_{2.5} [OR: 1.05 (95% CI: 0.97, 1.12) and 2-3% increases for NO₂. Furthermore, we estimated 4-9% increases in odds per IQR increase in NO, NO₂ and NO_x LUR measures. Exposures during the first-trimester seemed most important and LUR-NO₂ associations with AD were largest for children of mothers with less than a high-school education [OR: 1.13 (0.95, 1.35)]. This is the first study ever to suggest associations between autism and air pollution using a sophisticated LUR model and air monitoring data.

L02

ECUADORIAN CUT-FLOWER INDUSTRY: ENVIRONMENTAL ASSESSMENT OF RESIDENTIAL PESTICIDE EXPOSURE. A.J. Handal, *A. McGough-Madueno, M. Páez², K. Turqueres², W.F. Waters², S.D. Harlow, A.S. Rowland, D.B. Barr, R.A. Fenske (University of New Mexico, Albuquerque, NM, 87131; ²Universidad San Francisco de Quito, Quito, Ecuador)

Background- Cut-flowers are Ecuador's fourth most important export. Adverse working conditions and poor pesticide hygiene on the flower farms have become a growing public health concern. **Objectives-** To characterize residential pesticide exposure to people living in a flower-growing region of Ecuador. This is part of a pilot study of the effects of pesticide and work stress exposure on the children of female rose farm workers. **Methods-** We developed a visual assessment tool from the baseline questionnaire used in the pilot study and current literature. We collected data on residential quality, proximity to flower farms and domestic crops, and patterns of residential pesticide exposure. **Results-** Data are complete on 16 rose workers and 10 non-rose worker controls. When compared to controls, rose workers tended to reside closer to flower farms (1.7 km versus 0.9 km; $p = 0.20$) and were more likely to use discarded farm materials (OR=3.3 95% C.I. 0.6- 17.16 $p = 0.07$). GPS data and baseline reports of distance to nearest farm correlated at 0.65. Eighteen percent of rose workers reported use of discarded materials but we observed discarded materials in 65% of homes suggesting that workers may underestimate this potential source of exposure. **Conclusions-** Residential exposures may increase pesticide exposure among the children of rose workers. Visual assessment is a useful tool for learning about residential exposure patterns among families living near flower farms.

L04

CHILDHOOD INFECTION AND ADULT HEIGHT IN MONOZYGOTIC TWIN PAIRS. *Hwang AE, Mack TM, Hamilton AS, Gauderman J, Bernstein L, Cockburn MG, Zadnick J, Rand KA, Hopper J, Cozen W. (University of Southern California, Los Angeles, CA 90089)

Adult height is determined by genetics and modified by childhood nutrition, but deleterious childhood experiences, particularly infections, may also play a role. Height is a known predictor of mortality, is linked to increased risks of Hodgkin lymphoma, breast cancer, and leukemia, and is inversely associated with cardiovascular disease and stomach cancer. Monozygotic twins are matched on genome and are advantageous in examining environmental determinants. In a case-control study, the relative childhood health history was compared between members of 140 healthy monozygotic pairs selected from the California Twin Program who differed in adult height by at least 1 inch. Interviews were conducted with the mothers of the twins to validate reported childhood infections and growth patterns. Conditional logistic regression matched on twin pair was used to examine the relationship between childhood infections and adult height. Measures of childhood infection were highly correlated ($r = 0.4-0.8$, $P < 0.05$). More episodes of febrile illness were associated with shorter stature within twin pairs (odds ratio: 2.0, 95% confidence interval: 1.2, 3.4). The association was strongest for measures of infections in the toddler years (ages 1 to 5; odds ratio: 3.3, 95% confidence interval: 1.5, 7.6) and was similar among twin pairs of the same birth length. Childhood infection appears to retard growth, independent of birth length and genome. The well-established association between height and adult diseases may be partially explained by the early childhood infection history and its long-term impact on adult disease susceptibility.

L05

THE USE OF DISTRIBUTED-PROTOCOL PROSPECTIVE META-ANALYSIS OF OBSERVATIONAL STUDIES TO ASSESS ADVERSE DRUG EFFECTS: PROTON-PUMP INHIBITORS AND THE RISK OF HOSPITALIZATION FOR COMMUNITY-ACQUIRED PNEUMONIA. *K.B. Filion, D. Chateau, C. R. Dormuth, A. Gershon, L. E. Targownik, M. Durand, H. Tamim, G.F. Teare, P. Ravani, P. Ernst, and the CNODES Investigators (Lady Davis Institute/McGill University, Montreal, Quebec, H3T 1E2)

Late-preterm births are both the fastest growing and largest subgroup of preterm births in North America and therefore constitute a growing public health concern. Often comparable in birthweight and appearance to term infants, they lag in development across a number of domains rendering them medically vulnerable. This study examined the impact of late preterm birth on breastfeeding practices as well as maternal anxiety, depression, stress, and parenting morale at 4 months postpartum. We used a sample of 1227 women participating in the All Our Babies Study, a prospective pregnancy cohort in Calgary, Alberta (2008-2011). We compared mothers of late-preterm infants (n=77) with mothers who delivered at term (n=1150). Late preterm infants were significantly more likely than term singleton infants to be in the low birth weight category (p<0.001), experience a longer median length of stay in hospital (p<0.001), have a higher re-hospitalisation rate (p<0.001), and to manifest breastfeeding difficulties (p<0.001). Multivariable analyses showed that mothers of late-preterm infants were more likely to report excessive anxiety at 4 months postpartum than mothers of term infants (OR=2.07, 95% CI=1.08-3.98), however late-preterm status was not found to be a significant risk factor for depression, stress, or parenting morale, controlling for other variables. Our findings suggest that late-preterm infants are a vulnerable population, impacting both infant and maternal health. Further research is required to examine longer-term outcomes in order to best support their specific maternal and infant needs.

L07

THE EFFECTS OF SOY CONSUMPTION BEFORE DIAGNOSIS ON BREAST CANCER SURVIVAL: THE MULTIETHNIC COHORT STUDY. *S.M. Conroy, G. Maskarinec, S.Y. Park, L.R. Wilkens, B.E. Henderson, L.N. Kolonel (Alberta Health Services-Cancer Care, Calgary, AB, T2S3C3; University of Hawaii Cancer Center, Honolulu, HI, 96813; Keck School of Medicine, University of Southern California, Los Angeles, CA, 90033)

Despite the potential beneficial effects, the observed stimulatory effects of soy on breast cancer cells have received considerable attention. The present study examined whether pre-diagnostic soy intake was associated with all-cause and breast cancer-specific mortality in the Multiethnic Cohort (MEC) study. Female MEC participants who completed a detailed quantitative food frequency questionnaire, were free of breast cancer, aged ≥ 50 years at cohort entry, and diagnosed with primary invasive breast cancer during follow-up were included in the analyses (n=3,842). Cox proportional hazards regression was used to estimate hazard ratios (HR) and 95% confidence intervals (CI) with years since diagnosis as the time metric. During a mean follow-up of 6.2 ± 3.8 years, there were 804 deaths including 376 breast cancer-specific deaths. The median daily intakes per 1,000 kcal were 0.7g (range:0-328) for soy products and 3.7mg (range:0-107) for isoflavones. After adjustment for known clinical and lifestyle factors, soy intake was unrelated to all-cause mortality (HR=1.03; 95% CI:0.81-1.33 for soy products and HR=0.99; 95% CI:0.82-1.20 for isoflavones for the highest versus the lowest tertile). Similar estimates were observed for breast cancer-specific mortality. The associations did not differ according to hormone receptor status or tumor stage and there was limited evidence of ethnic-specific differences. Our findings are consistent with the literature that soy consumption does not adversely affect breast cancer survival in women.

L06

PROSPECTIVE EVALUATION OF BASELINE SERUM SARCO-SINE AND RISK OF INCIDENT PROSTATE CANCER IN THE PROSTATE, LUNG, COLORECTAL AND OVARIAN CANCER SCREENING TRIAL. *Koutros S, Meyer TE, Veenstra TD, Fox SD, Issaq HJ, Huang WY, Albanes D, Chu LW, Hsing AW, Berndt SI (Division of Cancer Epidemiology and Genetics, National Cancer Institute, Rockville, MD 20852)

A recent report on the application of metabolomics in the discovery of a potential new prostate cancer biomarker identified sarcosine, a derivative of the amino acid glycine, as a metabolite to pursue. Thus, we prospectively examined the association between baseline serum sarcosine and risk of prostate cancer in 1,122 cases and 1,112 controls in the Prostate, Lung, Colorectal and Ovarian cancer screening trial. Logistic regression was used to calculate Odds Ratios (OR) and 95% Confidence Intervals (CI) for the association between sarcosine and risk of prostate cancer. We observed a significantly increased risk of prostate cancer with increasing levels of sarcosine (OR for the highest quartile of exposure (Q4) versus the lowest quartile (Q1) = 1.30, 95% CI: 1.02, 1.65; P-trend 0.03). When we stratified by disease aggressiveness we observed a stronger association for nonaggressive cases (OR for Q4 vs. Q1 = 1.44, 95% CI: 1.11, 1.88; P-trend 0.006) but no association for aggressive prostate cancer (OR for Q4 vs. Q1 = 1.03, 95% CI: 0.73, 1.47; P-trend 0.89). Interestingly, for men who reported having diabetes, which is typically associated with decreased prostate cancer risk, the risk of prostate cancer was 3 times as likely in those with the highest levels of sarcosine (OR for Q4 vs. Q1 = 3.02, 95% CI: 1.26, 7.25; P-trend = 0.02; P-interaction=0.01). Temporal analyses indicate that risks are stronger when sarcosine was measured closer to diagnosis suggesting that sarcosine may be an early biomarker of disease; however, this needs to be examined further.

L08

PROTECTION VERSUS RISK OF PSORIASIS WITH USE OF CROHN'S DISEASE BIOLOGIC AGENTS: AN ANALYSIS OF THE FDA ADVERSE EVENT REPORTING SYSTEM (AERS). *K. Kip (University of South Florida), J. Swoger, University of Pittsburgh, L. Grandinetti, University of Pittsburgh, J. Swoger, University of Pittsburgh, A. Barrie III, University of Pittsburgh, J. Greer, University of Pittsburgh, M. Regueiro, University of Pittsburgh)

Crohn's disease (CD) is a chronic inflammatory, relapsing, and progressive condition that leads to bowel damage and subsequent structuring or penetrating complications. Biologic therapy (e.g. infliximab) can achieve sustained complete mucosal healing in CD. However, an intriguing paradox exists as to whether CD biologic agents (TNF antagonists) can also be used to treat psoriasis, or alternatively, actually confer increased risk when used in the setting of CD. Data from the FDA Adverse Event Reporting System (AERS) were downloaded for the period 2004 through September, 2011. Adverse event reports for the CD biologic agents infliximab, adalimumab, and certolizumab were reviewed. Similarly, primary "control" drugs examined included the non-CD drugs, propranolol and lithium, due to their suspected relationship with increased risk of psoriasis, as well as the non-biologic CD drug mesalazine. Proportional reporting ratios (PRRs) for psoriasis adverse events were calculated for CD biologic agents versus control drugs. From more than 13 million reports in AERS, the biologic group included 5,432 reports with psoriasis listed (infliximab=1,789; adalimumab=3,475; certolizumab=168) compared to just 88 psoriasis reports for the control group (propranolol= 24; mesalazine=24; lithium=40). Compared to control drugs, the psoriasis PRR's for CD biologic agents were: infliximab (6.61), adalimumab (12.13), and certolizumab (5.43) (P<0.0001 for all PRRs). The aggregate "class" PRR for all CD biologic agents versus control drugs was 9.24 (P<0.0001). Similar results were observed when psoriasis reports were compared between CD biologic agents and other drugs used to treat CD, including azathioprine, 6-mercaptopurine, methotrexate, solumedrol, and ciprofloxacin. Data from the FDA AERS suggest that contemporary biologic agents used in the treatment of CD may actually increase the risk of psoriasis adverse events.

L09

PRETERM BIRTH AND SUBSEQUENT RISK OF TYPE 2 DIABETES IN BLACK WOMEN. *T.M. James-Todd, D.A. Boggs, J.W. Rich-Edwards, L. Rosenberg, J.R. Palmer. (Brigham & Women's Hospital/Harvard Medical School, Boston, MA 02120)

Background: Aside from gestational diabetes, little is known as to whether other common pregnancy complications are related to risk of type 2 diabetes (T2DM). We evaluated the association between history of preterm birth and subsequent risk of T2DM in a large prospective cohort of black women. Methods: Women enrolled in the Black Women's Health Study in 1995 by completing mailed questionnaires; they have been followed by biennial questionnaire since then. A total of 31,101 participants were parous and had provided data on preterm birth and incident T2DM. Length of gestation was categorized as ever preterm (<37 weeks), moderate preterm (32-<37 weeks), very preterm (<32 weeks), and term (38+ weeks). Incident cases of T2DM through 2009 were self-reported on follow-up questionnaires. Cox proportional hazards models were used to calculate hazards ratios (HR) and 95% confidence intervals (CI), adjusting for potential confounders. Results: A total of 19% of births were preterm, with 3% classified as very preterm. Over 10% of the population reported having T2DM. Ever having had a preterm birth was associated with an increased risk of T2DM (HR 1.24, 95% CI 1.14-1.34). HRs were 1.23 (95% CI 1.12-1.34) for having had a moderate preterm birth and 1.29 (95% CI 1.08-1.54) for a very preterm birth. Among women without a history of either gestational diabetes or preeclampsia, the HR for ever having a preterm birth was 1.18 (95% CI 1.05-1.32). Conclusion: In this cohort of black women, preterm birth was associated with an increased risk of T2DM. It may be advisable to recommend blood glucose screening for those who have experienced a preterm delivery.

L11

REVIEW OF STUDIES OF LONG-TERM EXPOSURE TO AMBIENT AIR POLLUTANTS AND RISK OF STROKE. *Huibler, KA (UNC-Chapel Hill, NC 27599), Cheung, K and Chen, JC (USC, Los Angeles, CA 90089)

Background: In 2010, the American Heart Association concluded that a causal relationship exists between PM_{2.5} exposure and cardiovascular disease, but the report did not fully address long-term cerebrovascular effects. We conducted a systematic review of the literature on ambient air pollution and stroke incidence and mortality. Methods: We searched PubMed to identify original articles studying long-term effects of exposure to non-occupational, outdoor air pollution or vehicular traffic on fatal and non-fatal stroke, published in English after 1966. We examined study methods, including differences in design, population, exposure and outcome assessment, and covariate adjustment. Results of comparable studies were pooled to assess inter-study heterogeneity using Cochran's Q test. Results: Of the 24 articles published between March 1984 and January 2012, ecologic studies (n=10) were likelier than individual-level studies (n=14) to report positive associations. Results from the individual-level studies did not consistently support adverse effects on stroke mortality (n=9) or incidence (n=6). We found heterogeneity in the effects on mortality for PM_{2.5} (n=4; p=0.01), NO₂ (n=4; p<0.0001) and proximity to roadways (n=4; p=0.02). Methodological limitations of the individual-level studies included: exposure assessment with few monitors or poorly defined models, potential confounding by noise, not distinguishing between stroke subtypes, and not accounting for death associated with air pollution. Conclusion: Epidemiologic evidence for long-term effects of air pollution on stroke is accumulating, but conclusions depend on future studies that can address these limitations.

L10

DISPARITIES IN TIME TO HOSPITALIZATION, DIAGNOSIS, AND TREATMENT FOR ACUTE STROKE IN A MULTI-ETHNIC COHORT. *Tefera Gezmu, Dona Schneider, Kitaw Demissie, Yong Lin and Martin Gizzi (UMDNJ, School of Public Health, Piscataway, NJ)

This study examines the association between time of stroke onset, arrival at the hospital, the initiation of diagnostic and treatment services, and discharge outcomes by stroke type and patient characteristics (race/ethnicity, gender and insurance status). Between 2006 and 2011, 3290 patients were admitted for acute stroke to a regional comprehensive stroke center serving a multi-ethnic population in northern New Jersey. Twice the proportion of patients between 18 and 44 years suffered hemorrhagic stroke as compared to ischemic stroke (8.6 and 4.0%, respectively). The proportion of uninsured racial/ethnic minorities (12.4% African Americans, 17% of Hispanics and 23% of South Asians) was higher than for whites (3%). Utilization of emergency medical services (EMS) as the principal mode of arrival to the emergency department (ED) following stroke symptom recognition was less common among racial/ethnic minorities than whites, while the inverse was true for the use of private transport to the ED. While there were no racial/ethnic differences in the elapsed time from arrival at ED to the provision of diagnostic services, fewer African American and South Asians ischemic stroke patients (6%) were given intravenous tissue plasminogen activator (IV tPA) as compared to the 9% whites and Hispanics. Overall, hemorrhagic and ischemic stroke patients had a longer length of stay (LOS) than TIA patients, but no racial/ethnic differences in LOS were observed. Language barriers and lack of knowledge about how or when to utilize EMS services may also contribute to delay in receiving diagnostic and treatment services for stroke, possibly worsening both stroke severity and its outcomes among racial/ethnic minorities.

L12

THE USE OF DISTRIBUTED-PROTOCOL PROSPECTIVE META-ANALYSIS OF OBSERVATIONAL STUDIES TO ASSESS ADVERSE DRUG EFFECTS: PROTON-PUMP INHIBITORS AND THE RISK OF HOSPITALIZATION FOR COMMUNITY-ACQUIRED PNEUMONIA. *K.B. Fillion, D. Chateau, C. R. Dormuth, A. Gershon, L. E. Targownik, M. Durand, H. Tamim, G. F. Teare, P. Ravani, P. Ernst, and the CNODES Investigators (Lady Davis Institute/McGill University, Montreal, Quebec, H3T 1E2)

The Canadian Network of Observational Drug Effect Studies (CNODES) uses a prospective, distributed protocol meta-analytic approach to assess adverse drug effects. Using this approach, we examined the association between the use of proton-pump inhibitors (PPIs) and the risk of hospitalization for community-acquired pneumonia (HCAP). To minimize confounding and protopathic bias, we examined this association in a restricted cohort of new users aged ≥ 40 years of non-steroidal anti-inflammatory drugs (NSAIDs) in 8 databases (Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Nova Scotia, MarketScan, and the GPRD - source population > 70 million). Patients receiving a PPI on the same day as the NSAID were considered exposed. Patients were permitted to enter the cohort on multiple occasions and were followed for 6 months. Database-specific estimates, obtained via logistic regression with generalized estimating equations and high-dimensional propensity scores, were pooled using fixed-effects models. A total of 2.3% of the 4,197,119 included observations were exposed to PPIs. PPIs were not associated with an increased risk of HCAP (adjusted odds ratio = 1.03; 95% confidence interval = 0.87, 1.21). Similar results were obtained when patients were only permitted to enter the cohort once. Analyses of the association between histamine-2 receptor antagonists and HCAP yielded similar results. Our study does not support the proposition of an association between gastric acid suppressors and the risk of HCAP.

L13

CERVICAL CANCER SCREENING: BEFORE AND AFTER INTRODUCTION OF THE HPV VACCINE *Bertha Hidalgo, MPH. (University of Alabama at Birmingham. Birmingham, AL. 35294)

Introduction: The introduction of the human papillomavirus (HPV) vaccine has prompted speculation about the potential decreases in cervical cancer screening rates. This study aims to identify trends in cervical cancer screening before and after FDA approval of the HPV vaccine in a sample of white, black and Hispanic women using Behavioral Risk Factor Surveillance System (BRFSS) data. **Methods:** Nationally representative data were obtained for years 1995-2010. Median percentage frequencies were calculated for each year as well as for all races. Cochran-Armitage Trend tests were performed to calculate trend P-values. Wilcoxon rank-sum tests were performed to assess median differences between years and races. Additional analyses included comparisons racial comparisons stratified by age. **Findings:** In all races combined, cervical cancer screening median percentages decreased from 85.9% in 2004 to 81.0% in 2010. This trend was statistically significant ($P < 0.05$). There did not appear to be a statistically significant decrease in cervical cancer screening individually by race however. Median percentages before and after vaccine introduction were significantly different by race as well as in all the races combined. Hispanic women experienced particularly significant decreases in cervical cancer screening. **Conclusions:** Cervical cancer screening rates decreased after the introduction of the HPV vaccine in 2006. Decreases in cervical cancer screening merits further attention in light of recent evidence demonstrating low rates of HPV vaccine uptake and even lower rates of vaccine series completion. Special attention is needed to address low screening rates in Hispanic and black women, where cervical cancer incidence and mortality rates remain high.

L15

RACE/ETHNIC DISPARITIES IN PEDIATRIC DISCHARGES FROM ALL US COMMUNITY, NON-REHABILITATION HOSPITALS FOR RESPIRATORY SYNCYTIAL VIRUS (RSV) AMONG CHILDREN ONE YEAR OF AGE OR YOUNGER. *V. Perez and D.A. Alexander (Exponent Inc., Center for Epidemiology, Chicago, IL 60661)

Respiratory syncytial virus (RSV) is the most prevalent cause of bronchiolitis and pneumonia in children younger than one year of age in the US, with 75,000-125,000 hospitalizations estimated yearly in this population (www.cdc.gov). Previous work shows that infants of ethnic minority status are more vulnerable to severe RSV disease compared to non-ethnic minorities (Pediatrics, 113, 2004, 1758-64). We used the 2006 Kids' Inpatient Database to quantify racial disparities for RSV hospitalization risk among children one year of age or younger at the time of admission. Discharge records with an ICD-9-CM code of 079.6 (RSV), 466.11 (RSV acute bronchiolitis), and 480.1 (RSV pneumonia) in any diagnosis field were analyzed. Findings were weighted to produce national estimates and associations were evaluated using PROC SURVEYLOGISTIC. Controlling for seasonality, we found that Native American infants were at increased risk for RSV hospitalization compared to non-Hispanic white infants (odds ratio [OR] and 95% confidence interval [CI] 1.50 (95% CI: 1.23-1.83)). In contrast, Asian/Pacific Islander infants had a 53% reduced odds of hospitalization than did white infants (OR: 0.47 (95% CI: 0.40-0.55)). No significant differences between black, Hispanic, and white infants were observed. Further control for primary payer type weakened our findings. In conclusion, the odds of RSV hospitalization in 2006 were highest among Native American infants and lowest among Asian/Pacific Islander infants. Partial confounding by payer type suggests that access to medical care likely explains some of the observed race/ethnic disparities.

L14

RISK FACTORS AND OUTCOMES ASSOCIATED WITH SURGICAL SITE INFECTIONS (SSI) AFTER CRANIOTOMY AND CRANIECTOMY (CRANI). *H-Y. Chiang, J. Pottinger, J. Greenlee, A. Kamath, and L. Herwaldt (The University of Iowa, Iowa City, IA52246)

Few studies have assessed risk factors and outcomes for SSI after crani. We performed a nested case-control study in patients having crani during 01/2006-12/2010 at the University of Iowa Hospitals to identify risk factors for SSI and to evaluate 1-year postoperative (postop) outcomes associated with SSI. We identified 104 patients with SSI (cases) and 312 controls. Of 104 SSIs, 89% were deep incisional or organ space infections, 70% were identified after discharge, and 32% were caused by *S. aureus*. The significant factors identified by multivariable logistic regression were: preoperative (preop) steroid use (odds ratio [OR], 0.4; 95% confidence interval [CI], 0.2, 0.7), preop length of stay \geq 1 day (OR, 2.4; 95% CI, 1.3, 4.2), preop glucose \geq 100 mg/dL (OR, 2.1; 95% CI, 1.1, 3.9), Gliadel wafer use in patients with tumors (OR, 10.7; 95% CI, 3.2, 35.4), and having ventricular or subgaleal drains (OR, 3.0; 95% CI, 1.2, 7.4). We used linear regression or Cox proportional hazard models to evaluate 1-year postop outcomes. After adjusting for preop length of stay, age, comorbidity score, reason for procedure, severity of illness score, and procedure month, patients with SSIs were more likely to: have longer postop hospitalizations ($P=0.0004$), die (hazard ratio [HR], 3.3; 95% CI, 1.8, 5.8), be readmitted (HR, 4.1; 95% CI, 2.9, 5.8), and have reoperations (HR, 56.6; 95% CI, 38.1, 84.0). In conclusion, most of these risk factors are modifiable. Thus, surgeons could use the risk factors to predict patients' risk of SSI and they could modify some processes of care to lower the risk of SSI. Preventing SSIs after crani could improve patient outcomes and decrease healthcare utilization.

L16

LATENT EFFECTS OF LOW-DOSE ASPIRIN ON CANCER: FURTHER FOLLOW-UP OF THE WOMEN'S HEALTH STUDY. *N. Cook, I. Lee, S. Zhang, and J. Buring (Harvard, Boston, MA 02215)

Observational studies and meta-analyses have suggested a latent effect of daily aspirin on cancer, particularly colorectal cancer. No long-term trials have examined aspirin's effect on cancer as a primary endpoint. The Women's Health Study was a randomized trial of the effects of 100 mg of alternate day aspirin on cancer and cardiovascular disease among 39,876 women aged 45 and over that ended in 2004 after an average 10 years of follow-up. Women were followed up for an additional 7 years with continued ascertainment of study endpoints. A total of 4,724 cancer cases were confirmed, including 1,949 breast, 427 colorectal, 395 lung cancers, and 1,326 cancer deaths. There was no overall effect of aspirin on total (hazard ratio (HR) = 0.96, 95% confidence interval (CI) = 0.90-1.02, $p=0.15$), breast (HR=0.97, 95% CI = 0.88-1.06, $p=0.46$) or lung (HR=1.00, 95% CI = 0.82-1.21, $p=0.97$) cancer. Incidence of colorectal cancer was lower in the active group (HR=0.82, 95% CI = 0.68-0.99, $p=0.039$), primarily due to a reduction in proximal colon cancer (HR=0.72, 95% CI = 0.54-0.96, $p=0.027$), with the effect emerging after 10 years of follow-up. The post-trial reduction in colorectal cancer was 43% (HR=0.57, 95% CI = 0.40-0.82, $p=0.002$). There was no extended effect on cancer deaths or on the development of colon polyps. There were more reported gastrointestinal bleeds (HR=1.14, 95% CI=1.06-1.22, $p=0.0004$) and peptic ulcers (HR=1.17, 95% CI=1.09-1.27, $p<0.0001$) in the aspirin group. Thus, a protective effect of low-dose aspirin every other day on colorectal cancer emerged after extended follow-up past 10 years. Mechanisms for this effect remain to be determined.