

P92. Association of Pulmonary and Cardiovascular Health Metrics with Carbon Nanotube and Nanofiber Exposure Among U.S. workers: A Cross-sectional Study



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Purpose: Commercial use of carbon nanotubes and nanofibers (CNT/Fs) in composites and electronics is increasing globally; however, little is known about health effects among exposed workers. We conducted a cross-sectional study among 108 workers at 12 U.S. facilities making or using CNT/Fs. We evaluated several pulmonary and cardiovascular measures: chest symptoms or respiratory allergies since starting work with CNT/Fs; lung function; resting systolic and diastolic blood pressure (BP) and heart rate (HR).

Methods: We conducted two-day, full-shift personal breathing zone sampling to measure background-corrected elemental carbon (EC), a marker of CNT/F exposure, and microscopy-based CNT/F structure count concentrations, and collected induced sputum to measure CNT/Fs in the respiratory tract. We measured (nonspecific) ultrafine and fine particulate mass and count concentrations using direct reading instruments (DRI). We concurrently conducted physical examinations, spirometry, and sphygmomanometry. We administered a questionnaire to obtain information on occupational history, co-exposures, and covariates. We evaluated associations between two-day mean exposure metrics and outcomes using logistic regression for binary outcomes (chest symptoms and respiratory allergies) and multiple linear regression for lung function metrics, BP, and HR, adjusting for confounding.

Results: CNT/F exposures were generally low among the workers; 18% had CNT/Fs in sputum. None of the exposure metrics were associated with any of the spirometry-based metrics or chest symptoms, nor were CNT/F-specific metrics related to systolic or diastolic BP. DRI measurements were positively associated with systolic BP (p-values: 0.015–0.054). Resting HR was positively associated with EC, at both the respirable (p=0.015) and inhalable (p=0.0063) size fractions. Respiratory allergy development since starting work with CNT/Fs was positively associated with inhalable EC (p=0.016) and length of time worked with CNT/Fs (p=0.0081).

Conclusions: This small study found evidence of positive associations between CNT/F exposure and respiratory allergies and heart rate. These findings require confirmation in other exposed populations.

P93. Cane Cutting and Dysuria among male Sugarcane Workers in Nicaragua



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Purpose: A distinct form of chronic kidney disease in Central America, Mesoamerican Nephropathy (MeN), is characterized by a lack of traditional risk factors (diabetes, obesity, hypertension) and elevated prevalence among agricultural workers. In Nicaragua's sugarcane industry, cane cutters are thought to be at greatest risk for MeN. Patients with MeN may have an increased frequency of dysuria, potentially a symptom of volume depletion and muscle breakdown that may be pathophysiologically related to MeN. We examined whether cane cutters were more likely than other workers to experience dysuria.

Methods: For 187 men employed in the sugarcane industry in Northwestern Nicaragua between July 1997 and June 2010, work history and medical records were linked. Person-months worked were classified as time as a cane cutter or not. Seeking care for dysuria was included as occurring in the person-month or

not (regardless of number of dysuria visits in a month). We used logistic regression based on the generalized estimating equations method to estimate odds ratios (ORs) and 95% confidence intervals (CIs) for the association between dysuria and working as a cane cutter, controlling for age. Models also examined if the association changed with time worked cutting cane.

Results: Of 10,308 person-months, 1,935 (18.8%) were contributed by cane cutters. There were 386 medical visits with dysuria in 325 months among 113 workers; 34.5% of visit months and 35.2% of dysuria visits were from cane cutters. The odds of dysuria in cane cutters was 2.56-fold that of non-cane cutters (95% CI 1.62, 4.06, p-value<0.0001); this association did not change with time worked cutting cane.

Conclusions: Cane cutters were more likely to seek care for dysuria than non-cane cutters, although dysuria was common in both groups. Further research should examine which conditions of cane cutting specifically and work in the sugarcane industry generally may result in dysuria.

Reproductive Health

P94. The Association Between Unconventional Gas Development and Preterm Birth: Evaluating Drilling Phases and Critical Windows of Susceptibility



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Purpose: No studies of unconventional gas development (UGD) and preterm birth (PTB) have considered timing of UGD-activity during potentially sensitive windows of exposure nor potential differences in risk by UGD drilling phase.

Methods: We conducted a case-control study nested within the cohort of women with singleton births in the expansive 24-county Barnett Shale area in North Texas, between November 30, 2010–November 29, 2012. All PTB cases during this period were included (n=13,328). We selected five controls per case, individually-matched on age and race/ethnicity. We truncated each control's time-at-risk according to the gestational age achieved by the matched case. We explored two UGD-activity metrics: 1) inverse distance-weighted (IDW) sum of wells in the completion phase $\leq \frac{1}{2}$ mile of the maternal residence at birth; and 2) IDW sum of gas produced $\leq \frac{1}{2}$ mile of the residence. Metrics were categorized as: zero wells $\leq \frac{1}{2}$ mile (ref), 1st, 2nd, and 3rd tertiles of UGD-activity. We considered both trimester- and gestation-specific UGD-activity. Conditional logistic regression was used to examine associations.

Results: We found similarly increased odds of PTB in the 3rd tertiles of the UGD completion- (odds ratio (OR) 1.19, 95% confidence interval (CI) 1.05–1.35) and production- (1.15, 1.04–1.26) metrics for total gestation. Increased odds or PTB were observed in the 3rd tertiles of the UGD completion-metric for trimesters one (1.18, 1.01–1.38) and two (1.18, 1.01–1.39), but not trimester three. Increased odds of PTB were associated with production in all three trimesters, though the magnitude of the association was slightly attenuated in the 3rd trimester (3rd tertile OR's: trimester one 1.18, 1.07–1.30; trimester two 1.17, 1.06–1.29; trimester three 1.12, 1.01–1.23).

Conclusion: Our results suggest an association between maternal residential proximity to UGD-activity and PTB. Though associations were similar by drilling phase, they were slightly stronger in the first two trimesters of pregnancy.

P95. Fish consumption in South Carolina women of childbearing age



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Purpose: While fish consumption is generally considered protective with respect to individual health, the potential exposure to contaminants from consumption of recreationally caught fish may negatively impact high-risk populations. In South Carolina (SC), fish consumption (FC) frequency was compared for new mothers (NMs) and women of childbearing age (CBWs).

Methods: Data from the 2011 and 2012 SC Behavioral Risk Factor Surveillance System (BRFSS) and Pregnancy Risk Assessment Monitoring System (PRAMS) were obtained. BRFSS data were limited to non-pregnant, CBWs (ages 18–44; n=3,921). The PRAMS sample included 912 NMs. The outcome of interest was “any FC,” which for CBWs was over the past year and for NMs was during their most recent pregnancy. FC was dichotomized into none and any and was a combination of recreational and commercial fish. Demographics of