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TPS 701: Spatial determinants of population health, Exhibition Hall, Ground floor, August 27, 2019, 3:00 PM - 4:30 PM

Background: Some evidence suggests spatially-varying environmental exposures may contribute to ovarian cancer (OC) mortality. Geographic location has been associated with OC survival among women diagnosed in advanced-stages, yet little is known about its effect in early stages or over time. Our objective was to examine spatio-temporal trends in OC survival in California (USA) among women diagnosed in all stages.

Methods: We identified women through the California Cancer Registry who were diagnosed with epithelial OC between 1996 and 2014, with follow-up through 2016. Spatio-temporal trends were examined using cox proportional hazards additive models, smoothing for residential location in six time periods that overlapped by 2 years, stratified by stage (early vs. late). All analyses were adjusted for age, socioeconomic status, insurance status, type of treatment, comorbidities, and cancer characteristics such as grade and histology. Additionally, we considered geographic access to care by including the distance traveled to receive treatment and proximity to the closest high quality-of-care hospital.

Results: During the nearly 20-year period examined, 9,734 early and 20,110 late-stage OC cases were diagnosed in California. The median survival time was 34.5 months. Geographic location was significantly associated with survival among women diagnosed in advanced-stages for each time period; however, after we adjusted for covariates, location only remained an independent predictor between 2002-2006 (global p-value: 0.005). Regions of increased risk during that time were observed in the San Francisco Bay area, southern San Diego County and southern Los Angeles County. Residing in northern Los Angeles and western San Bernardino Counties was significantly protective.

Conclusions: The extent to which women's residential location impacted survival varied throughout California. Although no significant spatial patterns were observed for women in early stages, significant geographic variations existed during one time period for those diagnosed in advanced-stages. Future research should examine potential environmental impacts during that time period.

Greenness, Obesity and Incident Breast Cancer: Evidence from the Canadian National Breast Screening Study

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.S07: Of moderators and mediators: Complex relationships between greenness, air pollution, noise, and health behaviors in driving health outcomes, Beatrix Theater, August 27, 2019, 10:30 AM - 12:00 PM

Background: Breast cancer is the most commonly diagnosed cancer among Canadian women. Environmental exposures, including air pollution, have been associated with an increased risk of breast cancer. More recently, findings from a multi-centre case-control study in Spain, and the US Nurses Health Study suggest that proximity to greenness may reduce the risk of breast cancer. Both publications highlight the need to better understand the pathways involved.

Methods: To address this gap, we investigated associations between residential greenness, obesity and the incidence of breast cancer among 89,247 participants of the Canadian National Breast Screening Study. The original aim of this randomized controlled trial was to investigate whether mammography screening reduced the mortality of breast cancer. Enrollments occurred between 1980 and 1985, and record linkage to national cancer incidence identified approximately 6500 cases of breast cancer through 2005. Estimates of the Normalized Difference Vegetation Index (NDVI) within a 500 m buffer and ambient PM2.5 were linked to the participants' place at residence at enrollment. Baseline surveys were used to collect information on risk factors for breast cancer, and measured height and weight were obtained used to derive body mass index (BMI). Cox proportional hazards models using attained age as the time scale were fit to provide estimates of the hazard ratios associated with the NDVI and BMI.

Findings: Ambient PM2.5 and the NDVI were inversely associated with each other (r= - 0.14). An interquartile range increase in the NDVI was associated with a 4% reduction in the risk of breast cancer (hazard ratio (HR)=0.96, 95% CI=0.92 – 0.99). Analyses of variance indicated that those who were obese (BMI>30) lived in areas with a lower mean NDVI (p<0.05).

Conclusions: Our findings provide further support for the hypothesis that proximity to greenness may reduce the risk of breast cancer independently of air pollution, or obesity.

Amyotrophic lateral sclerosis incidence following exposure to inorganic selenium in drinking water

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PDS 63: Chemicals and metals: health effects, Exhibition Hall (PDS), Ground floor, August 27, 2019, 10:30 AM - 12:00 PM

Background and aim. Some laboratory and epidemiologic studies have documented an association between high intake of the trace element selenium and risk of amyotrophic lateral sclerosis (ALS), a degenerative disease of the motor neurons. We aimed to further investigate this possible association.

Methods. From 1986 through 2015, we followed a community cohort in northern Italy that had been inadvertently exposed in the 1974-86 period to drinking water with unusually high levels of selenium, around 8 µg/l, in its inorganic hexavalent form (selenate). In this cohort, we previously identified a high incidence of ALS during 1986-94. Here we report extended follow-up of this exposed cohort, as well as of an unexposed cohort including over 95,000 municipal residents, for an additional 21 years. We identified incident cases through administrative sources and a specialized registry.

Results. During follow-up, 7 and 112 ALS cases were newly diagnosed in the exposed and unexposed cohorts, respectively, yielding incidence rates of 14 and 5 per 100,000 person-years. A Poisson regression analysis adjusting for age, sex, and calendar year produced an overall rate ratio for ALS of 2.8 (95% confidence interval 1.3 - 6) in the entire period of follow-up. The association was stronger earlier than later in follow-up (1986-1994 vs. 1994-2015), and among women than men. All exposed cases were of the sporadic, non-familial form for the disease.

Conclusions. Overall, results from this 'natural experiment' indicate a positive association between chronic exposure to inorganic hexavalent selenium and ALS incidence, with rates in the exposed cohort declining over time after cessation of exposure. Also taking into account the recognized neurotoxicity of this metalloid, particularly its selective toxicity on motor neurons observed in animal studies, the present study provides additional support for the hypothesis that selenium exposure increases ALS risk.