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Abstract

Acute exposure to ambient air pollution and suicide risk as modified by familial effects

Gene-environment interactions likely play a central role in the etiology of suicide. University of Utah researchers recently identified short-term air pollution exposure as a risk factor for suicide among suicide completers in Salt Lake County, Utah including exposure to PM$_{2.5}$ and NO$_2$ on the two to three days preceding a suicide. A strong association has been identified between suicide and pulmonary disease suggesting that shared genetic risk factors may underlie both conditions. In this study, we propose to further our work exploring the role of ambient air pollution as a risk factor for suicide, and to look for evidence of gene-environment interactions for suicide. We will compare the exposure-suicide relationship between suicide decedents belonging to high-risk pedigrees vs. those with no increased familial risk of suicide, controlling for personal, social, seasonal and meteorological factors. Suicides occurring in Utah from 2000-2012 will be identified by the Utah Department of Health’s Office of the Medical Examiner. Pedigree structure and familial risk of suicide and suicide/lung disease will be determined by linking to the Utah Population Database. Criteria, hazardous and traffic-related air pollutant exposures will be assigned based on residential address at the time of death. We will use a time-stratified case-crossover design to measure the strength of the relationship between acute exposure to ambient air pollution and suicide risk as a function of the suicide decedent’s familial risk of suicide. Further we will examine the air pollution-suicide relationship separately for those in pedigrees at high familial risk for both suicide and pulmonary disease. Our study has three specific aims. **Aim 1:** Estimate the association between exposure to ambient air pollutants and completed suicide controlling for meteorological, seasonal, social and individual factors. **Aim 2:** Determine if the observed association between ambient air pollution and suicide is modified by membership in a high-risk suicide pedigree. **Aim 3:** Determine if the observed association between ambient air pollution and suicide is modified by membership in a high-risk suicide/pulmonary disease pedigree. Study findings will provide cutting-edge, novel data to support large studies examining the mediating influences of a person’s phenotype and genotype on suicide risk as posed by exposure to ambient air quality.