



# CANCER RESEARCH

Epidemiology

## Abstract 2305: Residential airborne heavy metal concentrations and breast cancer characteristics

Jacob K. Kresovich, Serap Erdal, Maria Argos, Hua Yun Chen, Peter H. Gann, and Garth H. Rauscher

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### Abstract

**Background:** Ambient air metal concentrations have recently been implicated in the etiology of breast cancer. Previous studies have shown airborne concentrations of arsenic and cadmium are associated with the development of estrogen receptor-negative tumors. This study aims to replicate these findings and examine the role of other toxic and essential heavy metals.

**Methods:** Participants were women who were diagnosed with breast cancer in Chicago between 2005 and 2008. We examined estrogen and progesterone receptor-negative (ER-/PR-) and high-grade tumors as markers of aggressive breast cancer, and estimated 15-year markers of exposure of 11 heavy metals. Exposures were calculated using census tract-level airborne concentrations from the National-scale Air Toxics Assessment and participants' residential histories. We adjusted all models for socioeconomic status and reproductive factors.

**Results:** We found that prevalent ER-/PR- tumors were associated with increased residential exposure to airborne concentrations of antimony (Q4 vs Q1: OR= 1.81; 95% CI: 0.95, 3.44;  $P_{\text{trend}} = 0.04$ ), cobalt (Q4 vs Q1: OR= 2.37; 95% CI: 1.26, 4.45;  $P_{\text{trend}} < 0.01$ ), manganese (Q4 vs Q1: OR= 2.55; 95% CI: 1.24, 5.24;  $P_{\text{trend}} = 0.04$ ), and selenium (Q4 vs Q1: OR= 1.85; 95% CI: 1.03, 3.29;  $P_{\text{trend}} = 0.05$ ), and also identified marginally significant trends for arsenic ( $P_{\text{trend}} = 0.06$ ), chromium ( $P_{\text{trend}} = 0.08$ ), lead ( $P_{\text{trend}} = 0.08$ ), and mercury ( $P_{\text{trend}} = 0.07$ ). We did not identify any overall associations with high-grade tumors, however when stratifying by menopausal status we found that

antimony (Q4 vs Q1: OR= 6.97, 95% CI: 1.61-30.19) and arsenic (Q4 vs Q1: OR= 6.97, 95% CI: 1.61-30.19) were associated with prevalent high-grade tumors in premenopausal women only.

Discussion: This study found further support for a role of airborne arsenic concentrations, and novel evidence implicating other airborne estrogen-pathway disrupting metal concentrations, in the development of aggressive breast cancer subtypes. Additionally, this is the first study to implicate heavy metal exposure in the etiology of high-grade tumors. These results suggest that long-term, low-dose exposures to certain heavy metals play a role in the etiology of aggressive breast cancer characteristics. Airborne exposures have the ability to affect large populations and findings from this and similar studies have large public health implications.

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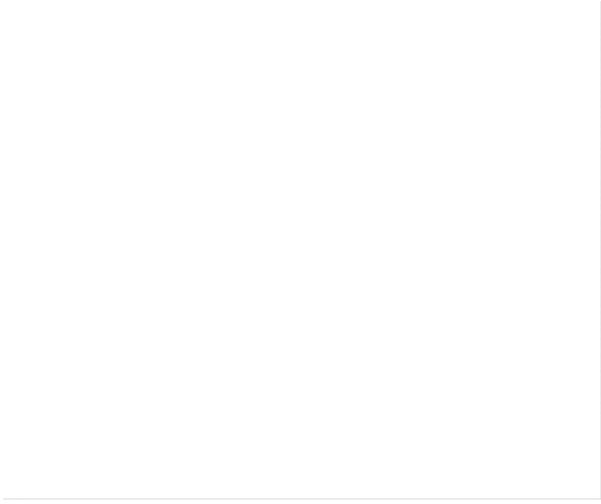
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