

Disparities in toxic heavy metal exposures correlated with increased risk of breast cancer among minority populations

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Among women in Chicago, African Americans and Hispanics were exposed to higher levels of ambient toxic heavy metals compared with

non-Hispanic whites, and this increased exposure correlated with increased incidence of breast cancer, according to results presented at the [12th AACR Conference on The Science of Cancer Health Disparities in Racial/Ethnic Minorities and the Medically Underserved](#), held Sept. 20–23.

"While some prior studies have shown that [exposure](#) to toxic heavy metals in air pollution is associated with breast cancer risk, results have been mixed," said Garth Rauscher, Ph.D., associate professor of epidemiology at the University of Illinois at Chicago School of Public Health. "Previous studies in this area have tended to include mostly non-Hispanic white women; our study included a more diverse population with extended follow-up, allowing time for breast cancer to develop."

Rauscher, Ph.D. student Alpana Kaushiva, and colleagues examined ambient concentrations of 11 toxic heavy metals at the census-tract level among women enrolled in the Metropolitan Chicago Breast Cancer Registry between 2003 and 2007. Women were followed until the time of breast cancer diagnosis or Dec. 31, 2014.

A total of 211,674 women were included in this study; more than 25 percent of these women were African American, and almost 10 percent were Hispanic. After a mean follow-up time of 10 years, 6,579 women were diagnosed with breast cancer.

Compared with non-Hispanic white women, African American women were more likely to live in census tracts with higher levels of beryllium, cadmium, chromium, lead, manganese, or mercury. Similarly, Hispanic women were more likely to live in census tracts with higher levels of beryllium, cadmium, chromium, lead, manganese, mercury, or nickel compared with non-Hispanic white women.

Minority populations are more likely to live near industrial sites,

manufacturing facilities, plants that emit hazardous air pollutants, or near centers of traffic with high levels of automobile emissions, Rauscher noted.

Compared with women living in census tracts with the lowest quartile of ambient concentrations of nickel or lead, women living in census tracts with the highest quartile of these heavy metals had a 24 percent and 18 percent increased incidence of breast cancer, respectively; those exposed to the highest quartile of antimony, beryllium, or cadmium concentrations had a slightly (7 to 9 percent) increased incidence of breast cancer.

The authors also stratified the participants by estrogen receptor (ER) and menopausal status. Compared with women living in census tracts with the lowest quartile of ambient concentrations of nickel, lead, or beryllium, women living in census tracts with the highest quartile of these heavy metals had a roughly 10-20 percent increased risk of ER-positive postmenopausal breast cancer. Higher ambient concentrations of antimony or cadmium were associated with roughly 10-20 percent [increased risk](#) of ER-negative breast cancer for both premenopausal and postmenopausal women.

"These preliminary findings suggest that ambient toxic heavy metals may affect different biological pathways to contribute to the incidence of a specific subtype of [breast cancer](#)," noted Rauscher. "Some metals may have a stronger ability to mimic estrogen and contribute to ER-positive disease, while other metals may affect estrogen-independent mechanisms that contribute to ER-negative disease."

Rauscher noted that the associations observed are based on preliminary analyses and could be the result of other risk factors not controlled for in this study, such as hormonal/reproductive factors and socioeconomic status, in addition to potential exposure misclassification.

"The most direct way to reduce our exposures to these heavy metals is to affect policy change at the state and national levels," Rauscher said.

"Paying attention to local air quality alerts and avoiding outdoor activity when air pollutant levels are high are ways to reduce our exposures in a day-to-day capacity," he added.

More information: 12th AACR Conference on The Science of Cancer Health Disparities in Racial/Ethnic Minorities and the Medically Underserved: www.aacr.org/Meetings/Pages/MeetingItem.aspx?EventItemID=183

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