Association of Environmental Toxic Chemical Releases with NHL and Breast Cancer

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Background: Environmental exposure to toxic air pollutants has been implicated in cancer risk. Industrial releases of hazardous chemicals may contribute to population-level exposure through contaminated air. Breast cancer remains a major public health concern in the United States, affecting about 1 in 8 women during their lifetime, while non-Hodgkin lymphoma (NHL) is the seventh most common cancer. However, evidence linking environmental toxic chemical releases to cancer incidence at the community level remains limited.

Objectives: We assessed the associations of Ethylene Oxide (Eto), Benzene, and Naphthalene with the incidence of breast cancer (including in situ cases) and NHL, in Louisiana from 2012 to 2021 at census-tract level.

Methods: Cancer incidence counts for breast cancer and NHL (2012–2021) were obtained from the Louisiana Tumor Registry and aggregated at the census-tract level. Mean ambient and exposure concentrations (μg/m³) of EtO, Benzene, and Naphthalene were obtained from the National Air Toxics Assessment (NATA). Covariates included mean age and the Social Vulnerability Index (SVI). Associations between pollutant concentrations and cancer counts were assessed using negative binomial regression models across 1,139 census tracts.

Results: EtO exposure concentrations were marginally associated with NHL incidence (B= 4.144, p = 0.059), while the association with ambient concentrations was positive but not significant (B= 2.889, p = 0.140). Benzene ambient concentrations were significantly associated with higher breast cancer incidence (B= 0.034, p = 0.004), whereas exposure concentrations showed a marginal association (B= 0.047, p = 0.062). Associations of benzene and naphthalene with NHL incidence require further investigation. No significant association was observed between EtO or Naphthalene with breast cancer.

Conclusions: Environmental exposure to EtO and benzene may contribute to increased NHL and breast cancer incidence at the census tract level. Further studies using individual-level data and additional confounders are needed to clarify these relationships.

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