

TITLE

Childhood Cancer and Traffic-Related Air Pollution Exposure in Pregnancy and Early Life

AUTHOR(S)

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ABSTRACT

Background:

Childhood cancer is a relatively rare disease (less than 1% of all cancers diagnosed in the United States each year), and overall survival rates have improved over the past few decades. However, cancer is the second leading cause of death in youth under 15 years of age, after injury, and the leading cause of disease-related childhood death in the United States. In addition, incidence rates have increased by more than 20% since 1975. A convened panel of experts in pediatric oncology, epidemiology, and environmental medicine estimated that pure genetic factors account for no more than 20% of all childhood cancers. They further estimated that depending on the type of cancer, anywhere between 5% - 90% may be attributable, in whole or in part, to environmental factors, including those likely arising from gene-environmental interactions (Landrigan PJ et al, 2002). This suggests that a potentially large percentage of childhood cancers may be preventable. The literature on traffic-related air pollution and childhood cancers is inconclusive, and little is known on rarer cancer types. However, two previous studies reported that living near gas stations or auto repair garages was associated with acute lympho-blastic leukemia (ALL) and acute myeloid leukemia (AML).

Objective:

This study examined associations between childhood cancers and traffic-related pollution exposure.

Methods:

The study participants, all under six years of age, included 3,590 children identified in the California Cancer Registry and 80,224 controls selected randomly from California birth records. Estimates of carbon monoxide (CO), nitrogen oxides (NO_x), and particulate matter ≤ 2.5 μ m in aerodynamic diameter (PM_{2.5}) (markers for traffic-related pollution) exposure were calculated for each trimester of pregnancy and in the first year of life at the address indicated on each participant's birth certificate using air pollution dispersion models. The authors of this study checked their findings by additionally examining associations with PM_{2.5} pollution measured by community-based air pollution monitors, and with a simple measure of traffic density.

Results:

A per interquartile range increase in exposure to traffic-related pollution during the first trimester was associated with acute lymphoblastic leukemia (ALL); germ cell tumors, particularly teratomas; and retinoblastoma, particularly bilateral retinoblastoma. Retinoblastoma was also associated with average PM_{2.5} concentrations during pregnancy, and ALL and teratomas were associated with traffic density near the child's residence at birth.

Conclusion:

This study provides new evidence suggesting that exposure to traffic-related pollution in pregnancy and early childhood may increase the risk for ALL, retinoblastoma, and germ cell tumors.

POLICY IMPLICATIONS

This study contributes to existing evidence for association of traffic-related air pollution and childhood cancers. More than 50 million people live, work, or go to school near high traffic roads in the United States (U.S.), and the average American spends over an hour a day traveling along these major roads. Urban areas, in particular, can have large populations living near major roads. For example, 43.6% of Los Angeles County residents live within 500 meters of an expressway or 100 meters of a major road (Health Effects Institute, 2012). Often low income and minority neighborhoods are adjacent to the maximum zone of impact of traffic-dense highways. Despite vehicle emissions regulations and fuel standards established by the U.S. Environmental Protection Agency (EPA), many of these residents are chronically exposed to unhealthy levels of traffic-related air pollutants.

As part of a plan to address this serious public health issue, the EPA has proposed stronger vehicle emissions standards for passenger cars and trucks which would begin to take effect in 2017. The proposed new standards would significantly reduce motor vehicle emissions, including nitrogen oxides (NO_x), direct particulate matter (PM_{2.5}), carbon monoxide (CO) and air toxics. More information can be found here: <http://www.epa.gov/otaq/documents/tier3/420f13016a.pdf>.

Improving and expanding the pollution monitoring network and improving regulation compliance, especially in the communities where our most vulnerable populations reside, may reduce the risk of certain childhood cancers along with decreasing the risk for and exacerbation of other childhood health and developmental problems. It is also imperative that public health concerns are considered and addressed when planning for regional growth. Designing walk-able and bike-able neighborhoods and cities and improved and expanded transit systems are some strategies that can help to decrease vehicle miles travelled as well as reduce harmful traffic emissions.

REFERENCE

Article available in [Environmental Health Perspectives](#).

KEY WORD(S)

[Air pollution](#), [Childhood Cancer](#)