Study associates proximity to oil and gas development and childhood leukemia

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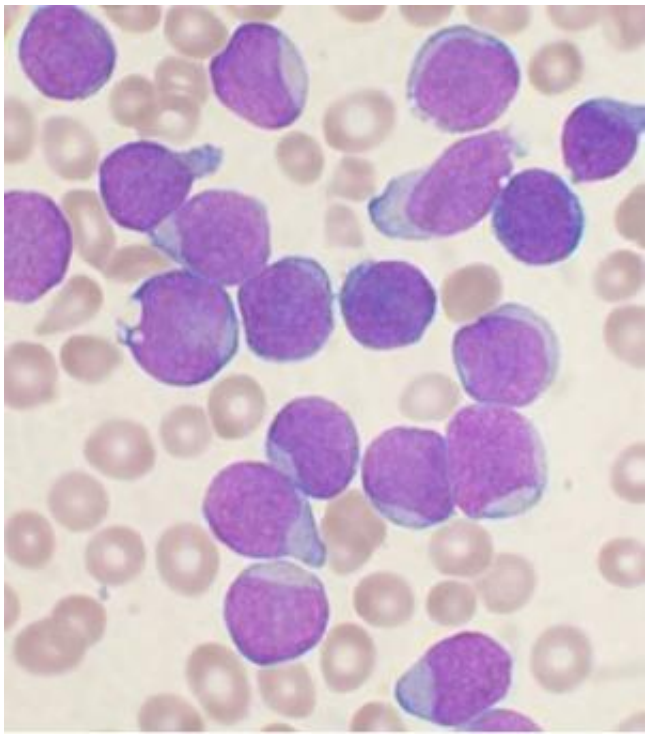

A Wright's stained bone marrow aspirate smear from a patient with precursor B-cell acute lymphoblastic leukemia. Credit: VashiDonsk/Wikipedia

Young Coloradans diagnosed with acute lymphocytic leukemia are more likely to live in areas of high-density oil and gas development compared to young Coloradans diagnosed with other types of cancer, according to researchers at the Colorado School of Public Health at CU Anschutz. The researchers observed no association between non-Hodgkin's lymphoma and high-density oil and gas development.

"Over 378,000 Coloradans and millions of Americans currently live within a mile of at least one oil and gas well, and petroleum development continues to expand into residential areas," said lead investigator Dr. Lisa McKenzie, assistant research professor at the Colorado School of Public Health. "The findings from our registry-based case control study indicate that young Coloradans diagnosed with one type of childhood leukemia are more likely to live in the densest areas of oil and gas sites. More comprehensive research that can address our study's limitations is needed to understand and explain these results."

Funded by the CU Cancer Center and published today in the journal *PLOS ONE*, the study shows children and young adults between the ages of 5 and 24 with acute lymphocytic leukemia were 4.3 times more likely to live in the densest area of active oil and gas wells than those with other cancers. The study focused on rural areas and towns in 57 Colorado counties and excluded urban areas of more than 50,000 people.

According to the report, US oil and gas development has grown rapidly over the past 15 years and this industrial activity has the potential to emit toxic substances into air and water, including carcinogens like benzene.

According to current research, over 15 million Americans now live within 1.6 kilometers (1 mile) of oil and gas development. There are hundreds of oil and gas wells within one mile of a home in Colorado's most intensive areas of oil and gas development. The study indicates that people living in areas of oil and gas development may be at an increased risk for health effects, including cancers, resultant from such industrial exposures.

The report concludes that future research should incorporate information on oil and gas development activities and production levels, as well as levels of specific pollutants of interest like benzene, near homes, schools and day care centers. It recommends such research consider specific ages and residential histories, compare cases to controls without cancer and address other potential confounders and environmental stressors.

Data for the study was obtained from the Colorado Central Cancer Registry and the Colorado Oil and Gas Information System. The study included 743 young Coloradans aged 0-24 years living in rural Colorado and diagnosed with cancer between 2001 and 2013.

Researchers used information from the Colorado Oil and Gas Information System to build a geocoded dataset with coordinates of all oil and gas wells in rural Colorado and determined dates for when each well was active.

Geocoded residential addresses of cancer patients at the time of diagnosis were linked to active well locations in the year of diagnosis and active well locations in each of the 10 years preceding the cancer diagnosis. They then took the inverse of each distance and summed the inverse distances to calculate inverse distance weighted oil and gas well counts within a 16.1 km radius of each participant's residence at cancer diagnosis for each of the 10 years prior to the date of the cancer diagnosis. The inverse distance weighted well count method gives greater weight to the wells nearer the home. Age, race, gender, income, elevation of residence and year of cancer diagnosis all were considered in the analysis.

The study was limited by the low occurrence of leukemia and non-Hodgkin lymphoma in rural Colorado, lack of specific age at cancer diagnosis and the fact that all study participants had been diagnosed with cancer. The study also was limited by the lack of information on specific activities at the well sites, place of residence before cancer diagnosis, other sources of pollution around the residence and individual characteristics such as common infections and family history of cancer.

More information: *PLOS ONE*, journals.plos.org/plosone/arti … journal.pone.0170423

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