Uranium exposure linked to high lupus rates in community living near a former refinery

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High rates of systemic lupus erythematosus have been linked to living in proximity to a former uranium ore processing facility in Ohio, according to new research findings presented this week at the American College of Rheumatology Annual Meeting in Washington, D.C.

Systemic lupus erythematosus, also called SLE or lupus, is a chronic inflammatory disease that can affect the skin, joints, kidneys, lungs, nervous system, and/or other organs of the body. The most common symptoms include skin rashes and arthritis, often accompanied by fatigue and fever. Lupus occurs mostly in women, typically developing in individuals in their twenties and thirties – prime child-bearing age.

Researchers at the University of Cincinnati and Cincinnati Children's Medical Center sought to explain an excessive number of lupus cases reported in a community five miles from a former uranium plant in Fernald, Ohio, from 1990 to 2008. They used available medical data from the Fernald Community Cohort, an 18-year study of 8,788 adult volunteers living near the plant, not including any plant workers.

"What prompted us was the knowledge that lupus patients may be sensitive to sunlight and irradiation, in addition to literature hinting that miners may be at increased risk for developing lupus," says Pai-Yue Lu, MD, a pediatric rheumatology fellow at Cincinnati Children's Hospital Medical Center and the lead researcher in the study. "When we learned of the Fernald cohort, how carefully the community had been followed, and the uranium exposure data collected, we were curious whether the

frequency of lupus in those exposed was increased over those who had not been exposed. The availability of this cohort and carefully collected data provided a great setting to ask this question."

Using the data from the cohort, 24 cases of lupus were confirmed. Data collected included ICD9 medical codes associated with lupus, hydroxychloroquine (Plaquenil) prescription, and autoantibody testing. Lupus cases were confirmed using an operational definition of the disease according to ACR classification criteria and medical record documentation.

Estimated levels of uranium exposure from the plant were associated with higher rates of lupus. Among the lupus cases, 12 were in the high exposure group, seven with moderate exposure, and five in the low exposure group. Lupus was associated with the high exposure group. Typical U.S. incidence for lupus is 1.8 to 7.6 cases per 100,000 people per year, according to the Centers for Disease Control and Prevention statistics. Prevalence in this group, however, is five times higher than expected in the group exposed to higher amounts of radiation.

Although the exact connection between uranium exposure and lupus is unknown, studies in mice have shown that uranium can mimic the effects of estrogen, says Dr. Lu. "In adults, lupus is 10 times more common in women compared to men and estrogen effects have been a target of research. Also, uranium is a radioactive element, and the accompanying radiation exposure has been known to cause genetic mutations and changes in gene expression. Both genes and environment may play a role in lupus development."

Exploring which potential environmental factors may trigger or cause lupus is making slow progress, says Dr. Lu. "There are likely many contributing environmental factors. A starting place for exposure identification is the study of well-characterized cohorts such as the

Fernald cohort used in this project."

More information: Lu, P. et al., Identifying a Link Between Uranium Exposure and Systemic Lupus Erythematosus in a Community Living near a Uranium Plant.

Provided by American College of Rheumatology