

# New study finds cancer-causing mineral in US road gravel

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As school buses drive down the gravel roads in Dunn County, North Dakota, they stir up more than dirt. The clouds of dust left in their wake contain such high levels of the mineral erionite that those who breathe in the air every day are at an increased risk of developing mesothelioma, a type of cancer of the membranes around the lungs, new research shows. Erionite is a natural mineral fiber that shares similar physical similarities with asbestos. When it's disturbed by human activity, fibers can become airborne and lodge themselves in people's lungs. Over time, the embedded fibers can make cells of the lung grow abnormally, leading to mesothelioma, a form of lung cancer most often associated with the related mineral asbestos.

Michele Carbone, M.D., Ph.D., director of the University of Hawaii Cancer Center in Honolulu, has previously linked erionite exposure in some Turkish villages to unusually high rates of [mesothelioma](#). Recently, he and colleagues turned their attention to potential erionite exposure in the U.S., where at least 12 states have erionite-containing rock deposits. His research team—which includes scientists from the National Institute of Environmental Health Sciences, Environmental Protection Agency, New York University, University of Chicago, University of Iowa, and University of Hacettepe—focused their efforts on Dunn County, North Dakota, when they learned that rocks containing erionite have been used to produce gravel for the past 30 years. More than 300 miles of roads are now paved with the gravel. The new study, reported in the July 25, 2011 issue of *Proceedings of the National Academy of Sciences (PNAS)* is the first to look at the potential hazards associated with erionite exposure in

the U.S.

The scientists compared the erionite in North Dakota to erionite from the Turkish villages with high mesothelioma rates. They measured airborne concentrations of the mineral in various settings, studied its chemical composition, and analyzed its biological activity. When mice were injected with the erionite from Dunn County, their lungs showed signs of inflammation and abnormal cell growth, precursors to mesothelioma. Under the microscope, the fiber size of the erionite from North Dakota was similar to that of the Turkish erionite. Overall, the researchers found no chemical differences between the North Dakota erionite and samples of the cancer-causing mineral from Turkey. The airborne levels of erionite in North Dakota were comparable to levels found in Turkish villages with 6-8 percent mortality rates from mesothelioma, the researchers reported.

"Based on the similarity between the erionite from the two sources," says Carbone, "there is concern for increased risk of mesothelioma in North Dakota." The long latency period of the disease—it can take 30 to 60 years of exposure to cause mesothelioma—and the fact that many erionite deposits have only been mined in the past few decades suggests that the number of cases could soon be on the rise. In addition to North Dakota, California, Oregon, Arizona, Nevada and other states have erionite deposit, but the possibility of human exposure elsewhere in the U.S. has not yet been investigated.

In contrast to [asbestos](#), which causes mesothelioma at lower rates, there are no established health benchmarks in the U.S. on safe levels of erionite exposure, because until recently, physicians thought that erionite was present only in Turkey. The new findings, however, indicate that precautionary measures should be put in place to reduce exposure to the mineral, says Carbone. In Turkey, his earlier findings led to moving villagers away from areas with high levels of erionite, into

new housing built out of erionite-free materials. "Our findings provide an opportunity to implement novel preventive and detection programs in the U.S. similar to what we have been doing in Turkey," he says. Future studies could analyze erionite levels in other areas of the U.S. and develop strategies to prevent and screen for mesothelioma. The study was funded through grants from the National Cancer Institute and the 2008 AACR-Landon Innovator Award for International Collaboration in Cancer Research to Michele Carbone.

**More information:** "Erionite exposure in North Dakota and in the Turkish Villages with mesothelioma," by Michele Carbone et al.

Provided by University of Hawaii

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