INDUCTION OF AUTOANTIBODIES AND IL-17 IN C57BL/6 MICE BY ERIONITE

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Background: Erionite has similar chemical and physical properties to amphibole asbestos, which induces autoantibodies in mice. Current exposures are occurring in rural North Dakota due to the use of erionite-contaminated gravel. While erionite is known to cause mesothelioma and other diseases associated with asbestos, there is little known about its effects on the immune system.

Objectives: We performed this study to determine whether erionite evokes autoimmune reactions in mice.

Methods: Bone marrow derived macrophages (BMDM) were used to measure toxicity and reactive oxygen species induced by erionite. Cytokine production by BMDM and splenocytes of C57Bl/6 mice was examined by bead arrays and ELISA following exposure to erionite, amphibole and chrysotile. Wild type C57BL/6 mice were exposed to saline, erionite, amphibole asbestos (Libby 6-Mix) or chrysotile through intratracheal instillations at equal mass (60 mg/mouse). Seven months after exposure, sera were examined for anti-nuclear antibodies (ANA) and IL-17. Immunohistochemistry was used to detect immune complex deposition in kidneys.

Results: Erionite and tremolite caused increased cytokine production belonging to the TH17 profile including IL-17, IL-6, TGFβ, and TNF-a. The frequency of ANA was increased in mice treated with erionite or amphibole compared to saline-treated mice. IL-17 and TNF-a were elevated in the sera of mice treated with erionite. The frequency of immune complex deposition in kidneys increased from 33% in saline-treated mice to 90% with erionite.

Implications: These data demonstrate that both erionite and amphibole asbestos induce autoimmune responses in mice, suggesting a potential for adverse effects in exposed communities and the need for screening in these rural areas.

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