Actual and potential hazard represented by Naturally Occurring Erionite (NOE)

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ABSTRACT

The zeolite erionite belongs to the realm of mineral fibres as it commonly displays a fibrous-asbestiform crystal habit (Gualtieri, 2023). It is formed as a product of diagenetic alteration of sediments or as a hydrothermal alteration product. Erionite extraframework ion chemical variability allows the recognition of three distinct species: erionite-K, erionite-Ca and erionite-Na (Gualtieri et al., 1998). This mineral fibre is classified by the International Agency for Research on Cancer (IARC) as a Group 1 carcinogen (IARC, 2012). Diagenetic erionite is the culprit of an unprecedented epidemic of malignant mesothelioma that struck villages of the Cappadocia region in Turkey (Carbone et al., 2007). Carbone and Yang (2012) have shown that erionite fibres induce necrotic cell death with the resultant release of HMGB-1 in the extracellular space, causing a chronic inflammatory response. Although the reasons why erionite is mesothelioma-genic in both rats and humans is still under scrutiny, a number of factors are known to play a role in explaining the toxicity/carcinogenicity potential of erionite: size, biodurability, iron, exchangeable toxic metals other than iron, and possibly cation exchange. Besides the chemical-physical parameters, genetic susceptibility is invoked to explain the high potency of erionite in inducing malignant mesothelioma in humans. Naturally occurring erionite (NOE) is becoming a global issue as this mineral fibre is ubiquitous worldwide. It is important to map the presence of erionite in the environment and assess its nature (volcanic or diagenetic origin) so that an evaluation of the potential hazards and risks can be made. In this frame, a long-term project is in progress to study the occurrence, crystal chemistry and potential toxicity of erionite from New Zealand.

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