GEOLOGY AND HEALTH: THE HIGHLY CARCINOGENIC ERIONITE MINERAL AND THE NEED FOR A RISK ASSESSMENT IN ITALY

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Erionite is a mineral belonging to the zeolite family (hydrated alumino-tectosilicates) distinguished by the dominant extra-framework cation (erionite-Ca, K and Na). A small number of zeolite species may develop asbestiform crystalline habit, for example mordenite, mazzite, roggianite, erionite and offretite. In Europe there are no systematic studies on the distribution of erionite or similar fibrous zeolites in the environment, even if some minerals of the zeolite family have been actively exploited and used in recent decades. Erionite has been classified as highly carcinogenic (Class 1) by the WHO. It is up to 800 times more carcinogenic than asbestos fibres, and in particular it can cause mesothelioma, a nearly-always fatal disease. On the other hand, little is known about the toxicity of other fibrous zeolites, commonly intergrown with erionite. In Italy the knowledge of the epidemiology of mesothelioma linked to erionite is extremely scarce; while the mesothelioma cases attributed to asbestos exposure are well known and recorded, domestic cases from exposure to airborne erionite fibers are still to be inferred. The correctly recognized erionite findings occur in volcanic deposits (pyroclastics and lavas), which have been subject to alteration processes under a specific range of P, T and pH. The mineral has been reported in a few Italian outcrops, but a systematic geological mapping of erionite-bearing deposits is still not available. We carried out first preliminary investigations and sampling in selected areas in Tertiary volcanic rocks. The first mineralogical investigations by means of XRPD, SEM-EDS and OM confirmed the presence of small amounts of erionite and abundant fibrous offretite in vugs of basaltic rocks. Intergrowths and overgrowths with other minerals are quite common and the morphological-chemical similarities among these zeolites pose a special analitycal problem with the need of combining different techniques. An effective risk assessment in Italy will require coordinated actions from governative agencies, local health authorities, Universities and research centres, in order to: i) realize an extensive mapping of the erionite occurrence in the Italian zeolite deposits; ii) carry out air monitoring in areas of intense zeolites exploitation; iii) activate a dedicated taskforce internal to the Italian mesothelioma register for epidemiologic surveillance; iv) release a sampling and determination protocol for airborne erionite.

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