Extensive characterization of mineral fibres dispersed in the water system from a naturally occurring asbestos (NOA)-rich area

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In Naturally Occurring Asbestos (NOA)-rich areas, fibres dispersion from rocks/soil may occur induced by natural reasons, such as weathering and erosion, or by anthropogenic activities (often also combined). Consequently, migration through different matrices (soil/rocks, water, air) is likely to occur in these areas resulting in a non-negligible fibres presence in the water system.

Asbestos is carcinogenic to humans when respired (IARC, 2012) and, therefore, it is mainly monitored in air. Nowadays, waterborne asbestos is gaining attention since it can constitute a non-conventional exposure cause. As surface and groundwater resources are exploited for agricultural and industrial activities and as source for tap water, water contamination by asbestos could pose two main risks: i) possible water-to-air migration of fibres, thus constituting a secondary source of airborne asbestos (Avataneo et al., 2022), and ii) possible ingestion (noxiousness still debated), particularly if present in tap water.

Therefore, asbestos in water could represent a problem for human health and environment and should be monitored. In North Westerns Alps (Italy), where NOA and other Elongated Mineral Particles (EMP) containing rocks and sediments are widespread (Belluso et al., 2019), possible asbestos diffusion in water has been recently considered as a consequence of interactions between water system and NOA containing rocks and sediments. Two sampling campaigns were settled on the water system (surface and groundwater) of the Lanzo Valleys and Balangero Plain (NW Italy). The results of an extensive electron microscopy study (SEM-EDS and TEM-EDS-SAED) regarding waterborne mineral fibres found in the area will be presented, supported by hydrochemical and geological data, to define how many and which type of fibres are found in water, which are the releasing mother rocks and what could be their path in the environment. Good practices to effectively analyse waterborne fibres will be discussed highlighting differences between surface and groundwater samples. This is to better characterize and monitor asbestos (and EMP) occurrence in surface and groundwater flowing in NOA-rich areas.

The results of this study are expected to have high impact on regulatory aspects, helping in the definition of a shared method to analyse water samples in support of environmental protection agencies.

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