Fibrous antigorite from New Caledonia. An environmental health hazard?

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In New Caledonia (NC) ultrabasic units cover more than a third of the mainland and the country economy largely relies on Ni-ore exploitation. An increased incidence of asbestos-related diseases was observed and correlated with the natural occurrence of fibrous serpentines (chrysotile and antigorite) and tremolite-actinolite amphiboles. These minerals exhibit a great variability in morphologies, from prismatic-platy through acicular-lamellar to asbestiform [1]. Most of antigorite in NC displays an asbestiform habit, at electron microscope. Even if a limited toxicity assessment is available [2], on the basis of the precautionary principle, NC legislation (Decree No. 82/2010) includes antigorite in the list of regulated asbestos. The presence of naturally occurring asbestos (NOA) represents today a public health issue in NC. As a result of weathering in humid tropical conditions, these occurrences are subjected to pedogenetic alteration. The circulation of fluids induces elemental exchange at rock/water interface and a mechanical stress promoting the loss of cohesion of the mineral structure. Specifically, weathering may affects the surface chemistry and toxicity of asbestiform antigorite. This work aims to correlate alteration with the *in vitro* toxicity of fibrous antigorite. Three differently altered fibrous antigorites, mostly in respirable size, were compared with chrysotile in terms of their key toxicity-relevant properties. Weathering modifies the surface reactivity of antigorite. In-vitro cyto- and geno-toxicity on human epithelial cells (A549) and murine macrophages (MH-S) were assessed. Altered antigorites elicit a moderate toxic response, in all cases lower than chrysotile. However, dissolution in simulated body fluid suggests that antigorite is possibly more biopersistent than chrysotile and its hazard should not be disregarded.

[1] Laporte-Magoni et al. (2018) *CNRS-Report ABP*. [2] ANSES (2014) Report 2012-SA-0199.