

Biological effects and comparative cytotoxicity of thermal transformed asbestos-containing materials in a human alveolar epithelial cell line

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Asbestos fibres can be transformed into potentially non-hazardous silicates by high-temperature treatment via complete solid-state transformation.

A549 cells were exposed to standard concentrations of raw cement asbestos (RCA), chrysotile and cement asbestos subjected to an industrial process at 1200°C (Cry_1200 and KRY·AS respectively), raw commercial grey cement (GC). Cell growth rate and viability (MTT test) were detected *in vitro*. RCA and KRY·AS subjected to comprehensive microstructural study by electron microscopy were further *in vitro* assayed to compare their cytotoxic potential by morphostructural studies, proliferation index (Ki-67 antigen), apoptosis induction (AO/EB staining) assays and detection of intracellular reactive oxygen species (ROS) with the fluorescent DCFA dye. More severe cytotoxic damage was induced by RCA than by KRY·AS after each incubation period. Exposure to KRY·AS and GC resulted in comparable cell growth rates and cytotoxic effects. Cells incubated with RCA showed greater apoptotic induction and ROS production and a lower cell proliferation index than those exposed to KRY·AS. Chrysotile asbestos and RCA subjected to heat treatment underwent complete microstructure transformation. The final product of heat treatment of cement-asbestos, KRY·AS, was considerably more inert and had lower cytotoxic potential than the original asbestos material in all *in vitro* tests.