

In vitro biological effects of raw and thermally treated asbestos-containing materials

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Asbestos cement, the main asbestos-containing material (ACM) manufactured in Italy in the past, is a health hazard whose elimination is a priority concern. Asbestos fibers can be transformed into potentially non-hazardous silicates by high-temperature treatment via complete solid-state transformation.

In this study human A549 cells were directly exposed to raw cement asbestos (RCA), chrysotile and cement asbestos subjected to an industrial process at 1200 °C (HT-CA) and raw commercial grey cement (GC) for 24 and 48h, or treated with conditioned culture medium up to 96 h. In our previous studies we demonstrated that the final product of heat treatment of cement asbestos was considerably more inert and had lower cytotoxic potential than the original asbestos material. However, to better evaluate the risks of interactions with the materials, further in vitro investigations were performed concerning fiber-cell superficial interactions, immuno-histochemical expression of cytochines p53, p53 homologue p73, TNF-related apoptosis-inducing ligand (TRAIL), and conditioned medium effects on cell viability. Data showed more severe cytotoxic damage by raw cement-asbestos compared to the heat treated materials and different expressions of cytochines that exert critical role in regulating the cell response to asbestos-induced DNA damage. These data should be taken in consideration for a safe recycling of thermal transformed asbestos materials.

References

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