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Hazard assessment of different-sized polystyrene nanoplastics in a human B-lymphoblastoid cell line

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The environmental presence of micro/nanoplastics (MNPLs) is an environmental and human health concern. Such MNPLs can result from the physicochemical/biological degradation of plastic goods (secondary MNPLs) or can result from industrial production at that size, for different commercial purposes (primary MNPLs). Independently of their origin, the toxicological profile of MNPLs can be modulated by their size, as well as by the ability of cells/organisms to internalize them.

To get more information on these topics we have determined the ability of three different sizes of polystyrene MNPLs (50, 200, and 500 nm) to produce different biological effects in human B-lymphoblastoid cells (Raji-B).

The results show that none of the three sizes was able to induce toxicity (growth ability) in the tested cell type; Although transmission electron microscopy and confocal images showed cell internalization and their quantification by flow cytometry demonstrated an important uptake by Raji-B cells. This uptake was negatively associated with the size. Interestingly, when the loss of mitochondrial membrane potential was determined, dose-related effects were observed. These effects were observed for the three different sizes. Finally, when oxidative stress induction was evaluated, no clear effects were observed for the different tested combinations.

Our conclusion is that size and biological endpoints, are aspects modulating the toxicological profile of MNPLs.

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