

## **Exposure of microplastic at levels relevant for human health: cytotoxicity and cellular localization of polystyrene microparticles in four human cell lines**

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Microplastics (MPs), which are ubiquitous in our living environment, can enter into human body via diverse pathways such as food packaging, contaminated food and bottled mineral water. Therefore, it is essential to assess the risk of MPs daily human intake. Up to date, almost all of related publications used concentrations that are much higher than likely present in these sources. Thus, investigation at levels of MPs relevant for human health exposure can help us rationally understand the threats of MPs. This study is aimed to evaluate cytotoxicity and quantify the cellular uptake and localization of MPs within the concentration range reported in bottled mineral water in human cell lines. To this aim, four types of human cell lines derived from colon (Caco-2), liver (HepG2) and lung (A549 and BEAS-2B) were exposed to 2- $\mu$ m fluorescent PS microspheres ( $1E+3$ - $1E+7$  particles/L). A series of cellular and biochemical assays (intracellular reactive oxygen species, mitochondrial membrane potential, sulforhodamine B and MTT assay) were conducted. To confirm the cellular uptake, the fluorescent cells containing PS were counted by flow cytometry to evaluate the probability of cells embedded PS under different concentrations. Furthermore, laser confocal scanning microscopy was used to observe the distribution and count the number of PS microspheres in four cell lines.

Keywords : cellular intake , cytotoxicity , human cell lines , human health , microplastics

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# Exposure of microplastics at levels relevant for human health: cytotoxicity and cellular localization of polystyrene microparticles in four human cell lines

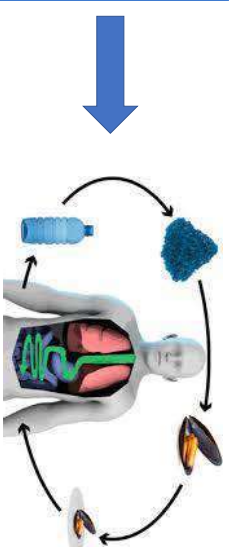
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How to rationally understand the threats of microplastics (MPs) on human health?

Table 1 Four cell lines exposed to 2- $\mu\text{m}$  fluorescent PS at levels relevant for human health ( $10^3$ - $10^7$  particles/L)

Human cell lines	Acute cellular assays	Mitochondrial membrane potential	Reactive oxygen species	Sulforhodamine B assay	MTT assay
A549	No effect	No effect	Adverse effect	No effect	No effect
BEAS-2B	No effect	No effect	No effect	No effect	No effect
Caco-2	No effect	No effect	Adverse effect	No effect	No effect
HepG2	No effect	No effect	No effect	No effect	No effect



Quantifying the cellular uptake and localization of MPs

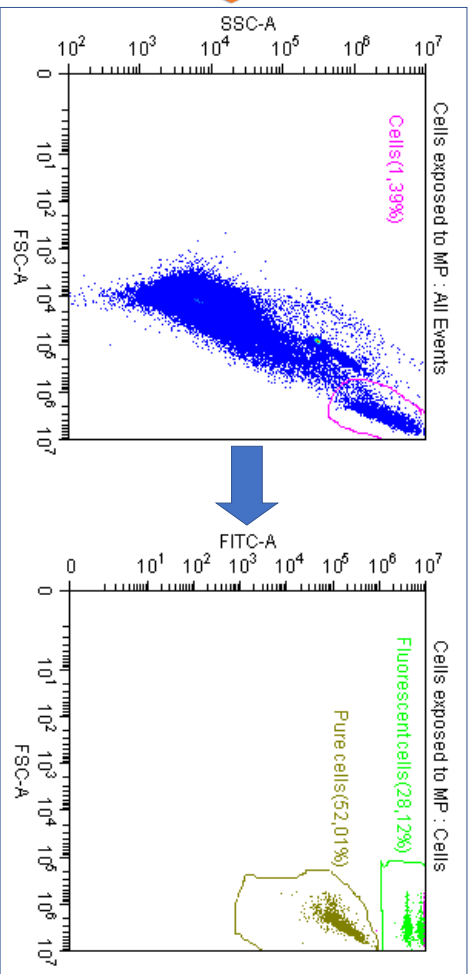


Fig. 1 The signals of human cells exposed to fluorescent MPs originated from flow cytometry.

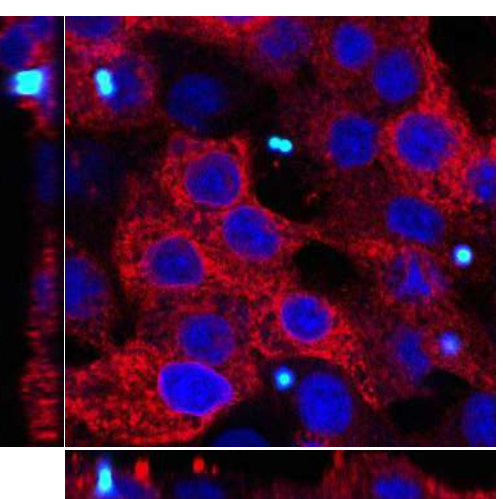


Fig. 2 Three-dimensional images of human cells exposed to fluorescent MPs taken with confocal microscopy.

MPs at levels relevant for human health can translocate into cell lines and cause certain adverse effects.



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