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In vitro cell transforming capacity of different types of nano-plastics

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Nano-plastics are environmental pollutants that have received increasing interest during the last years. They are manufactured as such for specific industrial purposes or generated as secondary products resulting from the fragmentation of larger plastics. The broad distribution through the different environmental compartments makes humans susceptible to being unavoidably and continuously exposed to nano-plastics via different exposure routes. In addition, due to their persistent nature, they may bioaccumulate in different organs and tissues, raising concerns on their potential effects on human health, including the induction of carcinogenic processes.

Traditionally, short-term genotoxicity tests have been performed to assess genotoxic carcinogens, as DNA damage and mutations are key initiating events of carcinogenicity. However, carcinogenesis is a multi-stage process that involves not only initiation, but also promotion, and progression events. The latter ones cannot be detected by the genotoxicity assays. On the other hand, in vitro cell transformation assays, as the validated Bhas-42 cell transformation assay, allow the in vitro simulation of the in vivo initiation and promotion stages of carcinogenesis, thus, the detection of a broader range of carcinogenic agents.

In the present study, polystyrene (PS), polyethylene terephthalate (PET), and polylactic acid (PLA) nano-plastics were assessed using the Bhas-42 cell transformation assay. These plastic types are among the most represented in our daily life as food packages, building insulation, plastic films, etc. Preliminary results indicate the lack of PS' carcinogenic potential, in agreement with the reported literature. On the other hand, PET induces a significant promoting activity, but not initiating one, at the highest tested dose (200 µg/mL). Experiments with PLA are currently ongoing.

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