IN VITRO GENOTOXICITY OF POLYETHYLENE MICROPARTICLES IN HUMAN HEPATOMA (HEPG2) AND ADENOCARCINOMA (A549) CELL LINES

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The extensive use of plastics has raised ecological concerns, as they can persist in the environment for many centuries. Plastics may degrade into microparticles, and among MPs found in the environment, one of the most common is polyethylene microparticles (PE-MPs) [1]. Therefore, the potential negative impact of PE-MPs on human health should be explored.

This study aimed to assess the cytotoxicity and genotoxicity of polyethylene microparticles (1 µm) in human hepatoma (HepG2) and alveolar adenocarcinoma (A549) cells *in vitro*. The cellular uptake and levels of reactive oxygen species generated by PS-NPs were evaluated using the fluorescent, oxidant-sensitive dye 2,7-dichlorodihydrofluorescein diacetate (H_2DCFDA). Cytotoxicity was assessed using a mixture of acridine orange and ethidium bromide, based on cell integrity. Potential primary DNA damage under PE-MP exposure was tested by the alkaline comet assay, and potential induced oxidative DNA damage was tested by an enzyme-modified comet assay.

Flow cytometry analysis of HepG2 and A549 cells exposed to PE-MPs showed efficient uptake of these microparticles. The tested PE-MP concentrations were not cytotoxic to either cell line, but they did induce both primary and oxidative DNA damage.

These findings indicate that polyethylene microparticles can be effectively absorbed and possess genotoxic potential, raising concerns about plastic safety.

[1] J. Martín, J. L. Santos, I. Aparicio, and E. Alonso, “Microplastics and associated emerging contaminants in the environment: Analysis, sorption mechanisms and effects of co-exposure,” Trends in Environmental Analytical Chemistry, vol. 35, p. e00170, Jun. 2022, doi: 10.1016/j.teac.2022.e00170.