Long-term exposure of BEAS-2B bronchial cell line to PET nanoplastics

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Nanoplastics (NPLs) are ubiquitous emerging pollutants with great facility to cross through body barriers and bioaccumulate in different tissues. Inhalation is a major way of human exposure, and little is known of NPLs hazard effects in lung. The aim of this study is to evaluate if long-term exposures to NPLs are able to induce carcinogenic effects, simulating a more realistic scenario. To achieve this goal, BEAS-2B bronchial cells were treated with 50 µg/ml of polyethylene terephthalate (PET) NPL for 30 weeks. In order to assess potential harmful effects, genotoxicity, carcinogenicity and gene expression were evaluated through a battery of *in vitro* assays and transcriptomic analyses at three time points: 24 h, 15 weeks, and 30 weeks of exposure. Results showed no genotoxic nor carcinogenic effects after 24 h or 15 weeks, however, after 30 weeks of exposure genotoxic damage, invasive ability and anchorage-independent growth potential were increased. Transcriptomic analyses showed significant alterations in terms of gene expression: differentially expressed genes (DEGs) increased progressively along the time of exposure and gene set enrichment analysis (GSEA) revealed altered pathways after treatment, including epithelial to mesenchymal transition, myogenesis, inflammation pathways, xenobiotic metabolism, cholesterol metabolism and estrogen response. In addition, the identification of potential biomarker candidates was carried out, and 8 genes were selected as candidate targets to detect transformation progression. In conclusion, long-term exposure of BEAS-2B cells to PET-NPLs, and potentially other NPLs, can induce genotoxic, carcinogenic and transcriptomic alterations.

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