

Sub-lethal *in vitro* effects of nanoplastics (PET and PS) in primary human nasal epithelial cells (HNEpC) - Role of the autophagy pathway

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The potential effects of released micro-nanoplastics (MNPLs) into the environment from various sources, as emerging pollutants, arouse considerable interest in the scientific community. It is now established from various studies that they do pose a possible human health risk when we come into contact with them. One of the potential routes of exposure to humans could come from inhalation, due to their widespread presence in the air. Our present study aimed to understand the toxic effects of two types of MNPLs, such as nanosized polyethylene terephthalate (nPET) and nanopolystyrene particles (PS 80 and 430 nm), in human primary nasal epithelial cells (HNEpC), the first line of cells acting as a barrier to MNPLs in the respiratory system. For this, we chose several endpoints such as estimation of cell viability, generation of iROS, and intracellular localization of these MNPLs. Besides, we evaluated the role of the autophagy pathway which is a normal cellular process involved in the recycling of damaged organelles, aged proteins, and oligosaccharides into simpler forms for cell survival, as a potential toxic mechanism of the selected MNPLs.

Our data revealed there was no significant decrease in cell viability due to different concentrations of PET and PSs (from 0.5 to 100 µg/mL) in comparison to untreated control after 24 h. Furthermore, there were no significant increases in the induction of ROS when cells were treated with both PET and PSs (100 µg/mL) as compared to the control after 24h. However, we observed an increase in cellular internalization of both PET and PSs as compared to untreated control using flow cytometry and confocal microscopy. Nevertheless, there seemed to be an increase in the autophagy markers LC3II and P62 in western blotting after the treatment of the cells with both PET and PSs at exposures lasting for 24 h, suggesting the possible induction and blockage of the autophagy pathway by the tested MNPLs. This seemed to indicate a ROS independent effect induction, as well as insufficient autophagy in the treated cells.

Furthermore, this study envisages the potential of present MNPLs to cause mitochondrial damage due to loss of mitochondrial membrane potential and induction of mitophagy as subcellular effects.

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