

P76

Lung barrier establishment using Calu-3 cell line as an *in vitro* model to study the pulmonary effects of micro and nanoplastics

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Micro and nanoplastics (MNPLs) are contaminants of emerging concern (CEC) generated from the degradation of plastic waste and with the potential to affect the human health. Ingestion of these particles has been identified as the first route of human exposure. However, recent studies have pointed out the presence of MNPLs in the air also as an important source of human exposure by inhalation. Therefore, huge numbers of these contaminants of different sizes, chemical compositions and shapes have been identified in the air of indoor and outdoor scenarios. In addition, as a direct proof of exposure, in a recent study MNPLs were found in the different parts of the lung of the majority of tested volunteers. Despite the potential effects that these particles could cause after a prolonged exposure in the respiratory system and in the whole organism, the studies deciphering the possible effects are scarce. In this study, we propose an *in vitro* lung barrier using Calu-3 cell line as a pulmonary model to study the effects of polystyrene (PS), polyethylene terephthalate (PET), and polylactic acid (PLA) nanoparticles after long and repeated exposures. The formation of the barrier after 16 days of culture gives a more realistic model to study the toxicological effects of MNPLs by representing a pseudostratified epithelium, secreting mucus and generating microvilli. Preliminary results by using this model, showed no effects on the stability of the barrier after 1 week of repeated exposure. However, an increase in the permeability and internalization of particles were observed from the first 24 hours of treatment. Further experiments will be conducted in order to confirm the preliminary results and to assess other parameters such as the passage of the particles through the barrier.

Keywords:

Lung barrier; *in vitro* model, nanoplastic toxicity.