IN VITRO INTESTINAL TOXICITY OF MICRO- AND NANO-PLASTICS.

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Plastics are synthetic polymers that, due to their characteristics of strength and durability, are used to package and produce a variety of objects. Since its commercialization in the 1930 plastic production has been continuously increasing, moreover despite being recyclable, only a portion of plastics are recycled and a high amount of these materials is wasted in the environment. Fragmentation of plastics across their life cycle caused by atmospherics agents or other events produces debris and particles of mixed morphology, chemical composition and size, including micron and nanometer range, defined micro-nanoplastics (MNPs). MNPs represent an emerging class of contaminants that have been detected almost in every biosphere environment. Despite MNPs constitute a potential public health concern, MNPs risk assessment remains to be addressed since substantial data gaps regarding MNPs classification, detection, exposure as well as toxicity have not been clearly determined. Human exposure has been demonstrated as plastic particles have been detected in human organs, blood and in breast milk. Ingestion of MNPs from contaminated food and waters represents the main way of human intake, thus the comprehension of the impact of MNPs on the gastrointestinal system is fundamental to understand and evaluate MNPs exposure and possible harmful effects. *In vitro* intestinal systems represent a valuable approach to study intestinal toxicity and are also employed for studying MNPs intestinal impact. Intestinal absorption mechanisms, toxic effects and intestinal barrier perturbation are under investigation by using 2D intestinal differentiated *in vitro* cell line, 3D intestinal organoids as well as microfluidic systems. Although studies are still at preliminary stage, results indicate the ability of MNPs to cross intestinal epithelia by endo-, transcytosis. Potential toxic mechanisms as: oxidative stress, inflammatory challenge and perturbation of barrier functionality have been suggested and the role of different cell types residing in the intestinal mucosa has been highlighted. However experimental protocols are relatively heterogenous and results are sometimes contradictory thus the comprehension of MNPs effects on intestinal mucosa is still poorly clear and further studies will be necessary to better understand MNPs effects on intestinal systems.