Metabolomics application to characterize environmental pollutant toxicity and disease risks

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Background: (max 50 words)

Ingestion and accumulation of polystyrene particles can contribute to human diseases such as gastrointestinal, cardiometabolic and cancer pathologies. Although the ecological impact of plastic contamination is well known, to date, there are no studies indicating how exposure to micro- and nano-polystyrene particles can induce metabolic disruptions leading to metabolic diseases.

Methods and Results: (max 100 words)

Here, using a systems biology approach, we first evaluate the effects of polystyrene particles on a normal human intestinal cell model *in vitro*. Next, we assess whether chronic exposure can induce metabolic alterations *in vivo* in both the large and small intestine, as well as in other organs such as the liver and heart. Evidence suggests that once absorbed into the bloodstream, plastic particles migrate to distant organs and contribute to metabolic alterations in those organs over time.

Indeed, our results show that exposure to polystyrene can induce oxidative stress, mitochondrial dysfunction and alterations in glucose metabolism.

Conclusions and Significance: (max 50 words)

Taken together, our results show that while polystyrene itself is not metabolized by the body, exposure to micro and nano-plastics from polystyrene can interfere with metabolic processes, and we provide new evidence that chronic NPs and MPs polystyrene exposure could act as a disease factor for human health.

Keywords: (max 5)

Metabolomics, Metabolic Disease, Plastic, Pollution, Environmental Risk Factor

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