

Estimated Daily Intakes of microplastics <10 µm for adult and children through food. A new point of view for the risk assessment.

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Introduction

The risk posed by microplastics (MPs) for human and environment, has become a hot topic. The quantification of microplastics in the environment is not an easy matter and, especially for microplastics < 10 µm, their detection methods are not yet harmonized.

Aims

Aim of study was to investigate the presence of MPs (<10 µm) in common agrifoods (fruit and vegetables) and bottled mineral water, to estimate the EDIs (Estimated Daily Intakes) for adults and children.

Materials and methods

The method used for MPs extraction both for vegetables and PET bottled waters, has been patented nationally and internationally (PCT/IB2019/051838 of 03/07/2019, Italian patent number 102018000003337 of 03/07/2018). The identification, counting and measurement of diameters of particles was carried out by SEM-EDX.

Results

Apples were the most contaminated fruit samples (223,000, 52,600–307,750), while carrot (97,800, 72,175–130,500) was the most contaminated vegetable. The smallest particle was found in the carrot samples (1.51µm), while the biggest ones were found in the lettuce (2.52µm). The highest adults' (4.62 E+05) and children's (1.41 E+06) EDIs are due to the ingestion of apples, instead the lowest are due to the of carrots (adults: 2.96 E+04; children: 1.15 E+05). About bottled waters the average of of MPs was 5.42E+07 p/L. The lowest measured diameter was 2.44 µm. The EDIs for mineral waters were 1.5E+06 p/kg-BW/day and 3.4E+06 p/kg-BW/day for adults and children respectively.

Conclusions

Our data are the first data available in the literature about MPs < 10 µm in food. The child is highly exposed through diet. Results of PET bottled waters are related to packaging. These data will open new scenarios, now in epidemiology for the hypothesized interactions with human cells.