

## Dietary exposure to microplastic via shellfish and the importance of the edible shellfish tissue measurements

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Shellfish are believed to be the major food source of micro- and nano plastics (MNPs) originating from the food chain. Therefore, consumption of shellfish carries a risk of exposure to MNPs and their cargo (organic and inorganic pollutants and pathogens), but also allergens as MNP cargo, potentially influencing sensitization and allergic response. To estimate the exposure to MNPs it is necessary to have developed and standardised analytical methods. This will consequently lead to comparable exposure assessment and risk characterisation for humans. Particularly in this study we are pointing out the impact of the metrics selection (shellfish tissue quantity) on the estimation of exposure assessment.

Shellfish (clams (n= 83) and mussels (n=47)) were collected from food markets in Belgium, Croatia, Serbia and South Korea. MPs were isolated from shellfish samples using an optimized digestion protocol followed by counting and characterization by  $\mu$ FTIR. Number of MPs was expressed per individual and per gram of soft (edible) wet tissue (EWT). Hence, before digestion, mass of total shell content (including EWT and intra-valvular liquid) was measured for every individual.

EWT represented around 50-70% of the whole shellfish content. A range of 0.13-0.20 MPs per g of shell content vs 0.19-0.33 MPs per g of EWT was determined. Based on the average adult consumption of 225 g of mussels [1] and combined with the quantified MPs in this study, the exposure estimates (deterministic approach) would range from 0.41- 0.64 MP per kg bw/day expressed per total shell content to 0.61-1.06 MP per kg bw/day when expressed per EWT. In other words, standardization of the exposure metrics may reduce uncertainty by 30-40% resulting in a more relevant and less biased outcome. Moreover, preliminary hazard identification had shown that polystyrene and polypropylene were the most frequent types of MPs, and prevalence data showed presence of MP in about 50% of tested samples.

Provided all of the above, it is critical that the number of MP particles is isolated correctly and efficiently. The notable observation is that MP particles could be expressed per g of wet tissue (consumed part) which represents 50-70% of the shellfish content and it may impact the exposure metrics by 30-40%.

**Keywords:** microplastic particles, shellfish, exposure assessment, exposure metrics

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### References

EFSA Consumption Database. <https://www.efsa.europa.eu/en/data-report/food-consumption-data>