Microplastics and proteins interplay in food and environment

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The presence of tiny plastic particles (micro- and nanoplastics) in various environments pose a threat to food security, food safety, and human health. Solid data on the prevalence of microplastics particles in the environment are limited due to the analytical challenges of extraction, characterization, and quantification from complex environmental matrices. Microplastics found in the diet can be derived from food additives (salt, sugar), drinking water, microplastics incorporated into the food chain or released from plastic packaging during food processing. Reusable plastic bottles have also been identified as a source of microplastics. Apart from their physical presence as environmental pollutants, concerns have been raised regarding binding of the other components to microplastics, in which case, an interplay of contaminants can results in the outcomes that are not easy to predict. For instance, there is a substantial lack of knowledge on binding of allergenic proteins to microplastics and influence on the development of allergy and processes relevant for allergen degradation and presentation to the immune system (i.e. digestibility and bioavailability). We aim to understand the effect of micro- and nanoplastics combined with allergens adhering to their surfaces throughout their way into the human body. Our findings support impact of microplastics on digestion of (allergenic) food proteins and their degradation pattern. Interplay of digestive enzymes and proteins bound in corona (particularly high affinity binding partners) make a significant impact on the digestion profiles of allergenic proteins and profiles of epitopes to which we can be exposed and their survival in the digestive tract.