

Food Safety Research and Risk Assessment of Submicro- and Nanoplastics

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The topic of microplastics has been increasingly researched due to the growing public interest in plastic waste and its possible transfer into the human food chain with unknown impact on human health. Microplastics is defined as polymer particles of different materials in a size range between 1 µm (0.001 mm) and 5 mm. Although, methodological challenges still exist for these particles, there have been scientific investigations, to get a clearer view on its intestinal toxicity. Particles bigger than 1.5 µm are unlikely to be bioavailable and effects are only detected in overload situations, decades above realistic exposure scenarios. The situation for particles smaller than 1 µm, however, is much more challenging.

The BfR conducts research projects to compare microplastic particles of food-relevant materials (polyvinylchloride, melamin resin, metacrylate, polylactic acid, polystyrene) with particles with sizes below 1 µm, down to 25 nm. Cellular particle uptake and transport over the intestinal barrier as well as toxicological mechanisms are investigated using human *in vitro* cell models. Aim is the quantification of cellular uptake and the investigation of possible mechanisms which could have an impact on human health, to achieve a better understanding of the risks which could be caused by submicron- and nanoplastic particles. A special focus lies on the material differences between the broad spectrum of different plastic materials.

According to experiences from nanotoxicology, an increased uptake and biodistribution can be possible for smaller particles in the submicron- and nano-range. While no intentionally produced nanoplastics are known, it is plausible that these particles can emerge from bigger plastic particles by weathering and decomposition, although quantitative investigations are very limited due to insufficient analytical methods for these small polymer particles. The fate of such particles remains still unclear, making it necessary to investigate particles below 1 µm in size in toxicological approaches. This talk will give an overview about micro- and

nanoplastics research, the state of knowledge and the approaches for risk assessment.