

No evidence of intestinal damage from polystyrene microplastic in the laboratory

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Researchers at the German Federal Institute for Risk Assessment (BfR) have found no evidence of damage to intestinal tissue such as oxidative stress or inflammatory signs caused by polystyrene (PS) microplastic particles. This is the most important result of the experiments conducted in the laboratory.

PS is one of the most widely used plastics worldwide. It is used, among other things, for the production of food packaging and everyday items such as bicycle helmets. Microplastic refers to small plastic particles and fibres which are increasingly detected in the environment. Initial scientific analyses show that humans also consume PS microplastics through their diet.

The aim of the study at BfR was therefore to investigate the uptake and effects of PS microplastics. This is important because only limited data are available to evaluate the potential effects of microplastics. BfR scientists used two methods: On the one hand, they used cultures of human intestinal epithelial cells (in vitro) to investigate whether PS microplastic particles of different sizes (one, four and ten micrometers [μm] in diameter) can be taken up into the cells. On the other hand, mice were fed with these particles (in vivo) for 28 days to examine the transport of microplastic particles into the gut and the response of the intestinal cells to PS microplastics.

The cell culture experiments showed that PS particles up to a diameter of about four microns can indeed be absorbed by epithelial cells of the intestinal wall. In animal experiments, however, it was found that despite the administration of very large quantities of plastic particles ranging in size from 1 to 10 μm , these could only be detected occasionally in the investigated intestinal epithelial cells. The levels administered were far above those that appear to be realistic for humans. No harmful effects were observed in the intestinal tissue or other organs of the mice.

The researchers explicitly point out that there are still large gaps in the data regarding the size and material of microplastics. For example, no conclusions can be drawn from the generated data on the effects in the intestine of microplastics made of other plastics. Therefore, further experimental studies are needed to analyse the uptake of microplastics and to perform a risk assessment.

The results of the animal study were published in the journal Archives of Toxicology:

<https://link.springer.com/article/10.1007/s00204-019-02478-7>

Further information on this subject at the BfR website...

Questions and answers about microplastics

https://www.bfr.bund.de/en/microplastics_facts_research_and_open_questions-192775.html

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the Federal Ministry of Food and Agriculture (BMEL) in Germany. It advises the Federal Government and Federal Laender on questions of food, chemical and product safety. The BfR conducts its own research on topics that are closely linked to its assessment tasks.