



**microONE**  
**Microplastic Particles: A Hazard for Human Health?**

Programme: COMET – Competence Centers for Excellent Technologies

Programme line: COMET-Module

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## CAN PLASTIC FASTING AFFECT OUR MICROPLASTIC EXPOSURE?

IN ORDER TO ANALYZE THE PREVIOUSLY LITTLE RESEARCHED IMPACT OF MICROPLASTICS ON HUMANS, VOLUNTEERS WERE RECRUITED WHO, BY ABSTAINING FROM PLASTIC, MADE A VALUABLE CONTRIBUTION TO CLARIFYING THIS QUESTION.



The image shows “plastic fasting” package for a week that participants of the study received

Image: © Vanessa Stadlbauer-Köllner (CBmed)

The impact of microplastics on humans is still very unclear and large studies are lacking. Microplastics have already been detected in human stool and

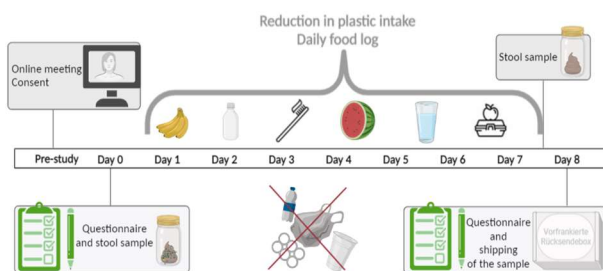
animal models show that the negative impact on the gut microbiome should not be underestimated. However, the behaviour of these particles in the human body has hardly been researched. In order to gain scientific knowledge and to evaluate the risk for humans, the FFG-funded COMET module **microONE** was launched. In the course of this project, a study was conducted in which healthy volunteers were asked to abstain from food potentially contaminated with microplastic for one week.

Since microplastics have now been detected in a wide variety of foods, the participants were asked, for example, to avoid sea food and the use of plastic utensils in everyday life. For this purpose, all participants were provided with a full package

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including for example glass drinking bottles, plastic-free toothbrushes or metal snack boxes to facilitate this fasting week. At the beginning and at the end of the week, volunteers were asked to provide a stool sample. Cross-checks with comprehensive questionnaires can identify additional sources of microplastics and determine personal plastic exposure.

### Remote studies as a model for success



The figure shows the schematic flow of the plastic fasting study.

Image: © Christian Pacher; created with BioRender.com

In order to make study participation as flexible as possible and to be able to guarantee execution even in pandemic times, the design was entirely a remote study: Participants were recruited via flyers and the educational interviews to obtain "informed consent" were conducted online, while volunteers could comfortably collect their samples at home and send them to the study centre. Because of the straightforward process, the study was successfully completed in 55 subjects within only 7 months. Therefore, we conclude that this type of study conduct could also increase willingness to participate in future clinical trials or basic research studies.

### Project coordination (Story)

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### Influence of plastic fasting

It is not yet known how the plastic behaves in the body. It is unclear to what extent it is absorbed into the bloodstream and whether and how quickly it gets excreted.

The reduction of plastic uptake will help to understand how the particles behave in the human body. Is it even possible to avoid this issue by reducing dietary intake? If after one week of fasting there are already clear differences in the plastic load, this could indicate that the plastic only remains in the body for a short time and is quickly excreted again. No reduction, on the other hand, could indicate that the microplastic is also absorbed from many other sources than food and/or remains in the intestine for longer time. Particles that are in the air, for example, can very easily enter our circulation via the lungs.

In addition to analysing how many and which plastic particles are found in the stool samples, the composition of the microbiome in the stool samples is also analysed in the next step. In this way, it can be found out whether possible changes in the plastic amount can already trigger a difference in the bacterial colonization of the intestine. Numerous studies show that the gut microbiome can have an enormous impact on our health, and if it is confirmed that microplastics negatively affect the composition of the microbiome, solutions to this problem will need to be considered. This study will shed light onto these yet unknown factors and helps to create public awareness. The interest in participating in the study was large and shows that the topic is of high public interest.

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### Project partners

- Medical University of Graz, Austria
- National Cancer Center, Lithuania
- Institut Allergosan, Austria
- Winclove Probiotics, The Netherlands

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