SUCCESS STORY

microONE
Microplastic Particles: A Hazard for Human Health?

Programme: COMET – Competence Centers for Excellent Technologies

Programme line: COMET-Module

Type of project: Labeling–Evaluation–Model Systems,01/2022-12/2025, multi-firm

DETECTION OF MICROPLASTIC PARTICLES IN HUMAN URINE

USING FLUORESCENCE MICROSCOPY, IT WAS POSSIBLE TO DETECT MICROPLASTIC PARTICLES IN HUMAN URINE. THE EXACT ORIGIN OF THE PARTICLES AND THE INFLUENCE OF HYGIENE PRODUCTS AND CLOTHING, AS WELL AS FOOD, ARE THE FOCUS OF FUTURE PROJECT STEPS.

It is now known that micro- and nanoplastic particles can enter the human body via the food chain. The particles have already been detected in faeces and even in blood by various research groups.

Urine is a previously neglected body fluid that a research team from the FFG-funded **microONE** project, led by CBmed GmbH, has now focussed on. Fluorescence microscopy is to be used to find out whether plastic particles are present in human urine. Comprehensive questionnaires, for example on the material of the clothing worn, hygiene products used and other possible influences from the intimate area, will be used to identify where the particles could have come from.

Understanding these relationships in more detail is essential in order to assess the potential dangers of plastic, draw attention to them and, if necessary, make suggestions for remedying the problem.

Recruiting volunteers to take part in the study was relatively easy, as the topic of microplastics is now highly publicised and many people show a personal interest in it and enthusiastically took part in the study.

The urine samples were taken directly at the research institute, which ensured that all samples were given in the same way and that no plastic contamination from outside falsified the samples.

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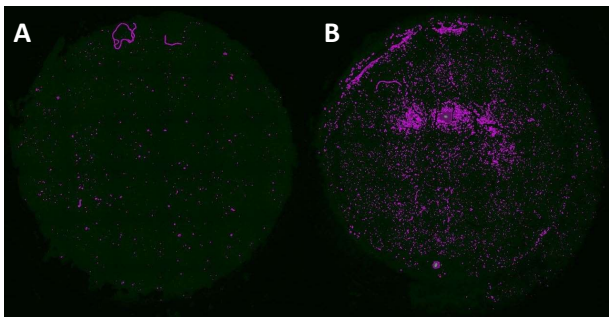
Detection by fluorescence

Detecting the microscopically small particles in human urine is anything but trivial. In order to make them visible, the particles had to be labelled with a special fluorescent dye after a prior purification process. The samples were then filtered and concentrated on a small area to enable microscopic images to be taken. The particles were then visualised by exciting them with a specific wavelength and measured using an algorithm.



The figure shows two urine samples from the same female participant. The particles marked by the algorithm are shown. A: outside the period; B: during the period.
Graphic: © Christian Pacher (CBmed)

Influence of hygiene products

With the help of this set-up, plastic particles could be detected in urine samples. However, there appear to be strong variations between different people; whether there are also such strong differences within different samples from the same person is currently being investigated. Initial results also indicate that there could be strong sex-specific differences. The use of period products showed a particularly strong influence on the plastic load in urine within the female participant group. This in turn could be an indication that a large proportion of the plastic particles found enter the urine, i.e. the bladder, via the urogenital tract and do not leave the body via the kidneys. In order to better understand and retrace this variability, all participants are currently being asked to provide an additional urine sample, with particular attention being paid to ensuring that women provide one sample during their period and one sample outside of it.

Public interest

The next step in the study is to analyse the microbiome of the collected urine samples. Possible correlations between the amount of plastic and the composition of the urinary microbiome are still completely unexplored and could yield interesting results.

There is certainly public interest in this topic, as can be seen from numerous detailed media reports (e.g. Falter 45/23 - author: Benedikt Narodoslawsky), and concrete research results are needed in order to be able to work on solutions to the plastic problem.

Project coordination (Story)

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