

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

Programme: COMET – Competence Centers for Excellent Technologies

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## MICRO- AND NANOPLASTIC INCREASES INFLAMMATORY PROCESSES IN THE GUT

MICRO- AND NANOPLASTIC PARTICLES HAVE BECOME A UBIQUITOUS INGREDIENT IN OUR DAILY LIFE. A RECENT STUDY SHOWS THE AGGRAVATING EFFECTS OF THESE PLASTIC PARTICLES IN GASTROINTESTINAL INFLAMMATORY DISEASES.

Humans consume micro- and nanoplastic particles (MNP) on a daily base. It is estimated that every person in central Europe ingests up to 5 g of plastic particles per week in average. In a recent study, plastic was found in every examined human stool sample. Since 2022, the research partners around CBmed have been studying the effects of these particles on human health and are raising awareness about the associated risks.

The gastro-intestinal tract is one of the most important entry points with an extraordinary high MNP load. CBmed together with numerous partners from medical research and industry want to resolve the effects of this ubiquitous plastic particles on human health in the multifaceted FFG-funded project *microONE*.

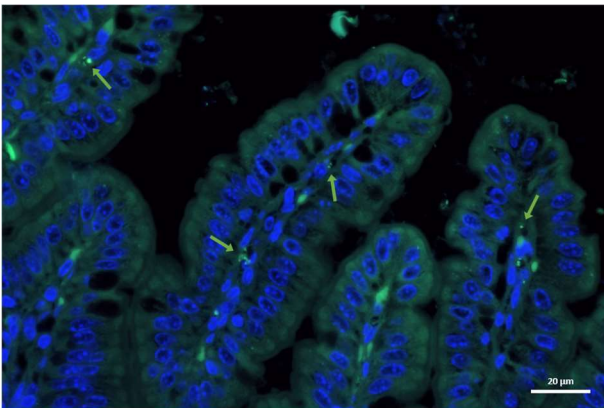
### Follow the trace of micro- and nanoplastic particles

The researchers in this project are trying to track the movement of plastic particles through the gastrointestinal (GI) tract in a non-invasive way. They are using specifically labeled plastic particles that can be tracked using either fluorescent light or radioactivity. These techniques are already commonly used in clinical settings. The researchers are applying MNP to in vivo models and using a comprehensive experimental setup to see how much of the plastic particles are excreted, migrate into the bloodstream, and potentially accumulate in certain tissues.

## SUCCESS STORY

### Inflammation increases the migration into the blood stream

With increasing numbers of GI diseases, such as inflammatory bowel disease, the team around CBmed examines two different set-ups, firstly the healthy and secondly the inflamed GI tract. A healthy intestinal lining is luckily able to excrete the majority of plastic particles within a short period of time.



The image shows the uptake of fluorescence labeled micro- and nanoplastic particles into the intestinal lining of the small intestine. Accumulations of nanoplastic particles (0.25μm) within the tissue are indicated with green arrows.

Figure: © Verena Kopatz (CBmed)

However, the study clearly shows that micro- and nanoplastic particles within the inflammatory model might be taken up from the GI tract to a higher extent and also aggravate colitis and cause more severe signs of inflammation in the colon.

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### Impact and effects

Although plastic is literally all around us, data on micro- and nanoplastic particles and their effects on human health is still limited. The evidence is already mounting that these particles have significant effects on our environment and our bodies. The first results originated from microONE clearly indicate that micro- and nanoplastic particles may have a more pronounced effect and even aggravate the health situation of patients suffering from gastrointestinal inflammatory diseases. With increasing numbers of gastrointestinal diseases worldwide, the interplay of inflammation and micro- and nanoplastics will now be investigated in more depth.

#### Project coordination (Story)

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- University of Nottingham, UK
- University Clinics Hamburg-Eppendorf, Germany
- INAM Forchheim, Germany
- THP, Austria
- TissueGnostics, Austria

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