COMET FACTSHEET

COMET MODULE

MICROONE – MICROPLASTIC PARTICLES: A HAZARD FOR HUMAN HEALTH?

Main location: Graz (Styria)
Other locations: Vienna (Vienna), Leoben (Styria)
Thematic area: Life Sciences
(according to *www.ffg.at/comet/netzwerk)*

Thematic focuses

- microplastics
- cancer
- microbiome

Planned realisation and outcomes

Micro- and nanoplastic particles (MNP) have been found in recent years in all parts of the world and in various organisms. In the human body MNP have been detected e.g. in stool, placenta, kidney or lungs - not surprising considering that we consume on average up to 5 grams (!) of MNP per week. Until now, the health effects of this exposure to MNP are almost completely unexplored, especially regarding tumor development, growth and dissemination. microONE was designed to fill this substantial knowledge gap within a multinational, multidisciplinary, cross-sectorial approach. It aims to provide scientific evidence on whether – and if so, how – different particles influence tumor development and spread by using colorectal cancer (CRC), one of the most frequent tumor entities and prone to contact with MNP in the gut, as an example.

Hence, major objectives are: (1) to determine the possible effects of MNP on the development/severity of CRC and the surrounding environment (microbiome); (2) to investigate the interaction of MNP with drug targets and targeted drugs; (3) to establish predictive biomarkers that allow a direct risk assessment; and (4) to develop recommendations for a safe use of plastics in the future.

Briefly, interactions between MNP and primary tumor cells obtained directly from CRC patients will be explored, and a suitable medium-to-high-throughput method for the detection and characterization of MNP will be established and optimized. Supported by supercomputing, the MNP interactions with molecular targets (e.g. proteins) and targeted drugs (against CRC) will be simulated. The effects of exposure to MNP on the microbiome and possible 're-balancing' effects of probiotics to MNP-induced changes will be explored in specific murine tumor models and human biospecimens. The application of radioactive or fluorescence-labeled MNP in vitro and in vivo (specific tumor models) will help to determine the mechanisms how MNP influence cell growth, primary tumor formation and spontaneous metastasis. For the latter experiments, suitable primary, secondary and weathered MNP will be prepared and physico-chemically characterized. With the newly established analytics, tissue sections of CRC patients will be screened for MNP load in addition to standard immunohistochemical staining. Integrating these data will allow for direct assessment of molecular events and biological risk caused by plastic particles. MNP must be seen as a public health concern and it is important to identify actionable steps, identified in the course of this project, to prevent disease.

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Selected company partners (max. 10)**:**

1. Agilent Technologies Austria GmbH
2. Austrian Association of Gas and Water
3. Institut AllergoSan pharm. Produkte Forschungs- und Vertriebs GmbH
4. Purency GmbH
5. THP Medical Products Vertriebs GmbH
6. TissueGnostics GmbH

Selected scientific partners (max. 5)**:**

1. Medical University of Graz
2. Medical University of Vienna
3. Montanuniversität Leoben
4. RECENDT – Research Center for Non Destructive Testing GmbH
5. University of Vienna

Selected international[1] partners (max. 5)**:**

1. Universita degli Studi di Brescia, Italy
2. University Medical Center Hamburg-Eppendorf, Germany
3. University of Cambridge, UK
4. Winclove B.V., The Netherlands
5. Yantai Institute of Coastal Zone Research, Chinese Academcy of Sciences, PR of China

Duration:	01.01.2022 – 31.12.2025 (4 years)
Staff employment:	13.4 FTE, thereof 8.6 scientists (according to planning)
Management:	Assoc.-Prof. Dr. Wolfgang Wadsak, functional lead microONE Prof. Dr. Lukas Kenner, scientific lead microONE
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www.ffg.at/comet

[1] Partners with headquarters outside Austria