Mikroplastik,
eine Gefahr für unsere Gesundheit.

Lukas Kenner & Wolfgang Wadsak

MICRO ONE FOR HUMAN HEALTH

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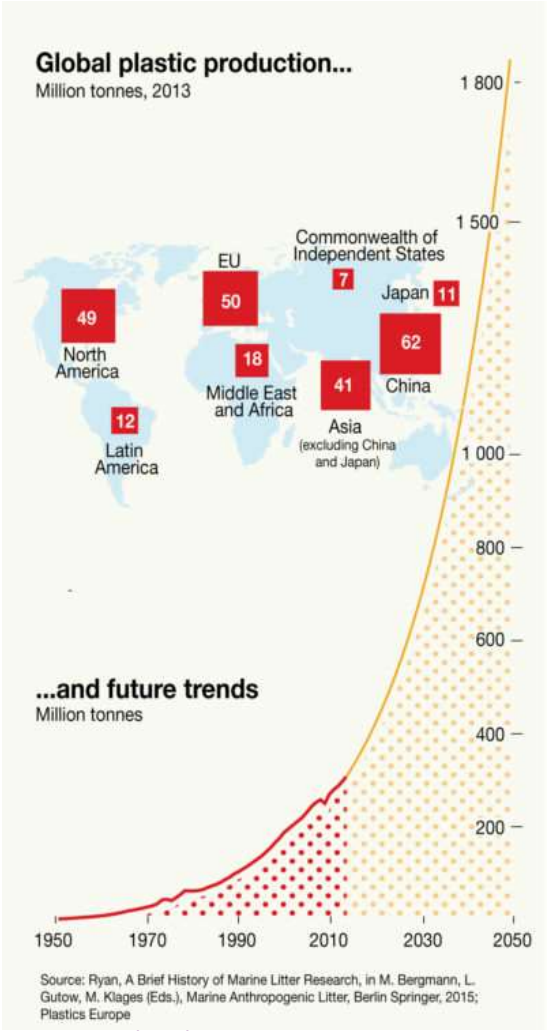
Mikroplastik Partikel – ein globales Thema !



Review > Maturitas. 2018 Sep;115:64-68. doi: 10.1016/j.maturitas.2018.06.010. Epub 2018 Jun 20.

Plastic contamination of the food chain: A threat to human health?

R H Waring [1], R M Harris [2], S C Mitchell [3]

Affiliations + expand

PMID: 30049349 DOI: 10.1016/j.maturitas.2018.06.010

Review > Environ Health Prev Med. 2020 Jul 14;25(1):29. doi: 10.1186/s12199-020-00870-9.

Health impacts of environmental contamination of micro- and nanoplastics: a review

Baorong Jiang [1 2 3], Alexandra E Kauffman [1], Lei Li [3], Wayne McFee [4], Bo Cai [2 5], John Weinstein [6], Jamie R Lead [1 2 7], Saurabh Chatterjee [1 2], Geoffrey I Scott [1 2], Shuo Xiao [8 9 10]

Affiliations + expand

PMID: 32664857 PMCID: PMC7362455 DOI: 10.1186/s12199-020-00870-9

Free PMC article

Mikroplastik Partikel – ein Gesundheitsthema ?

University of Arizona, presented at American Chemical Society (ACS) meeting 17.Aug.2020

- "We never want to be alarmist, but it is concerning that these non-biodegradable materials that are present everywhere can enter and accumulate in human tissues, and we don't know the possible health effects."
- "Once we get a better idea of what's in the tissues, […] we can start to understand the potential health risks, if any."

Mikroplastik Partikel – ein Gesundheitsthema ?

Microplastics and human health

Knowledge gaps should be addressed to ascertain the health risks of microplastics

By **A. Dick Vethaak**[1,2] *and* **Juliette Legler**[3]

Science

Science **371** (6530), 672-674.
DOI: 10.1126/science.abe5041

Recent evidence indicates that humans constantly inhale and ingest microplastics; however, whether these contaminants pose a substantial risk to human health is far from understood. The lack of crucial data on exposure and hazard represents key knowledge gaps that need to be addressed to move forward.

To date, pressing microplastic-related health issues such as internal exposure; ADME processes, [...] interaction with the immune system; [...] and how environmental microplastics differ from other ambient natural and engineered nanoparticles are largely unexplored.

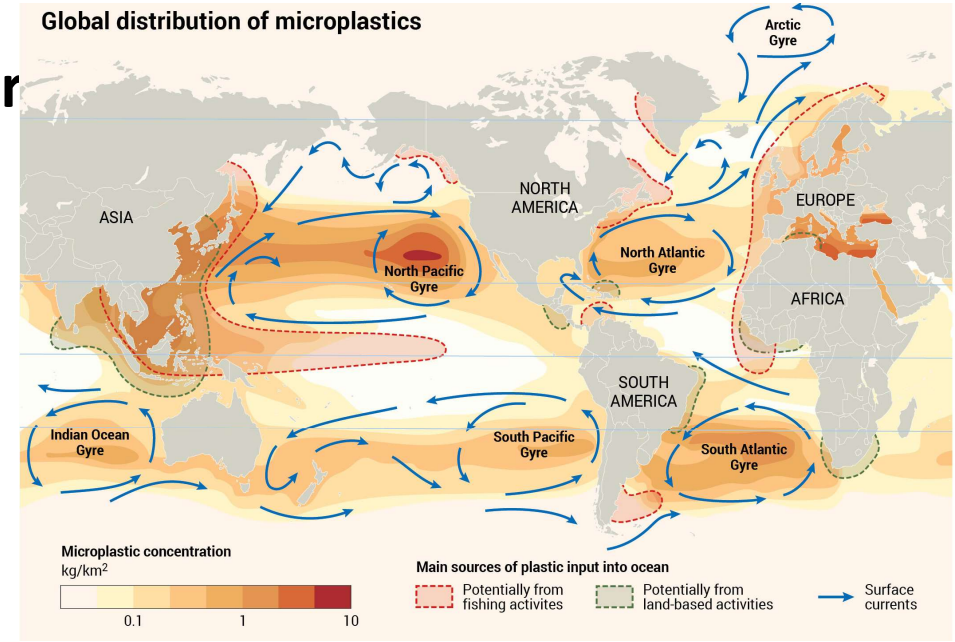
Multidisciplinary research efforts, involving scientists from environmental and medical sectors as well as polymer scientists, are needed to tackle this potential health hazard.

Hintergrund - Zusammenfassung

Grafik adaptiert nach: G. Rothert. plastic-food-chain. (https://georgerothert.com/plastic-food-chain/); © CBmed

Hintergrund - Zusammenfassung

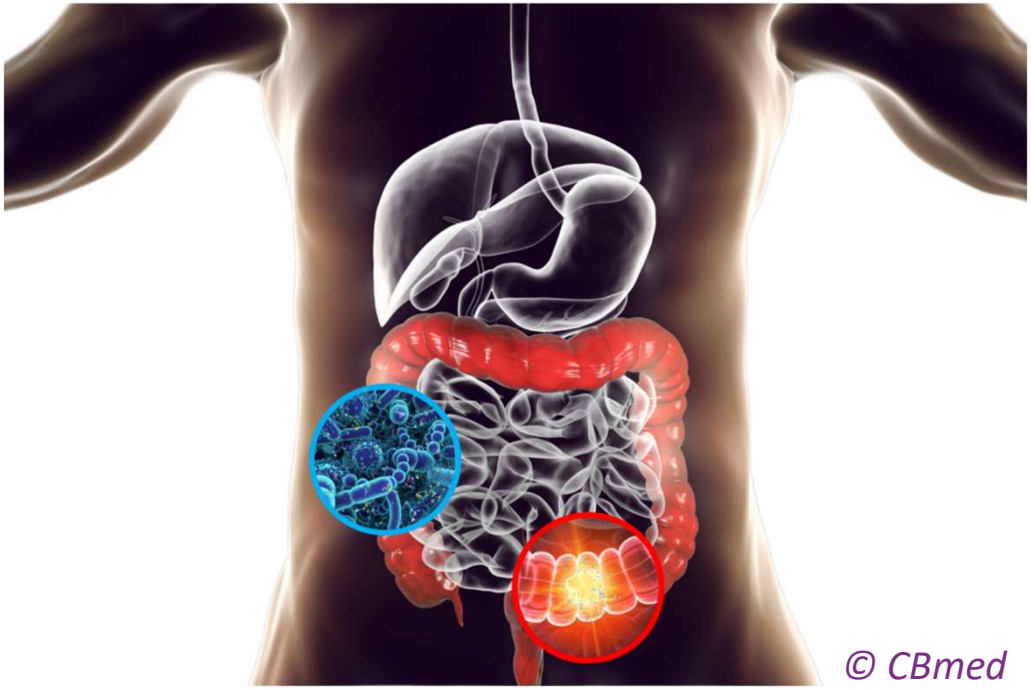
- **Mikro- und Nanoplastik überall in Natur und Organismen zu finden**
- **Unterschiedliche Größe, Form, Zusammensetzung**
- **Vor allem aus Abbau von Verpackungs-material (zB PET-Flaschen, PE-Folien)**
- **Durchschnittliche, wöchentliche Aufnahme von ca. 5g Mikroplastik durch jeden Menschen in Österreich**



Riccardo Pravettoni and Philippe Rekacewicz; 2019. from: Global linkages – a graphic look at the changing Arctic (rev.1) – www.grida.no

Hintergrund - Zusammenfassung

- **Kaum Forschungsergebnisse über Wirkung innerhalb von Organismen**
- **Keine wissenschaftlichen Resultate über naheliegende Effekte in Bezug auf Tumor-entstehung, -progression und -verbreitung**
- **Keine wissenschaftlichen Untersuchungen über Darm-Mikrobiom-Modulation**



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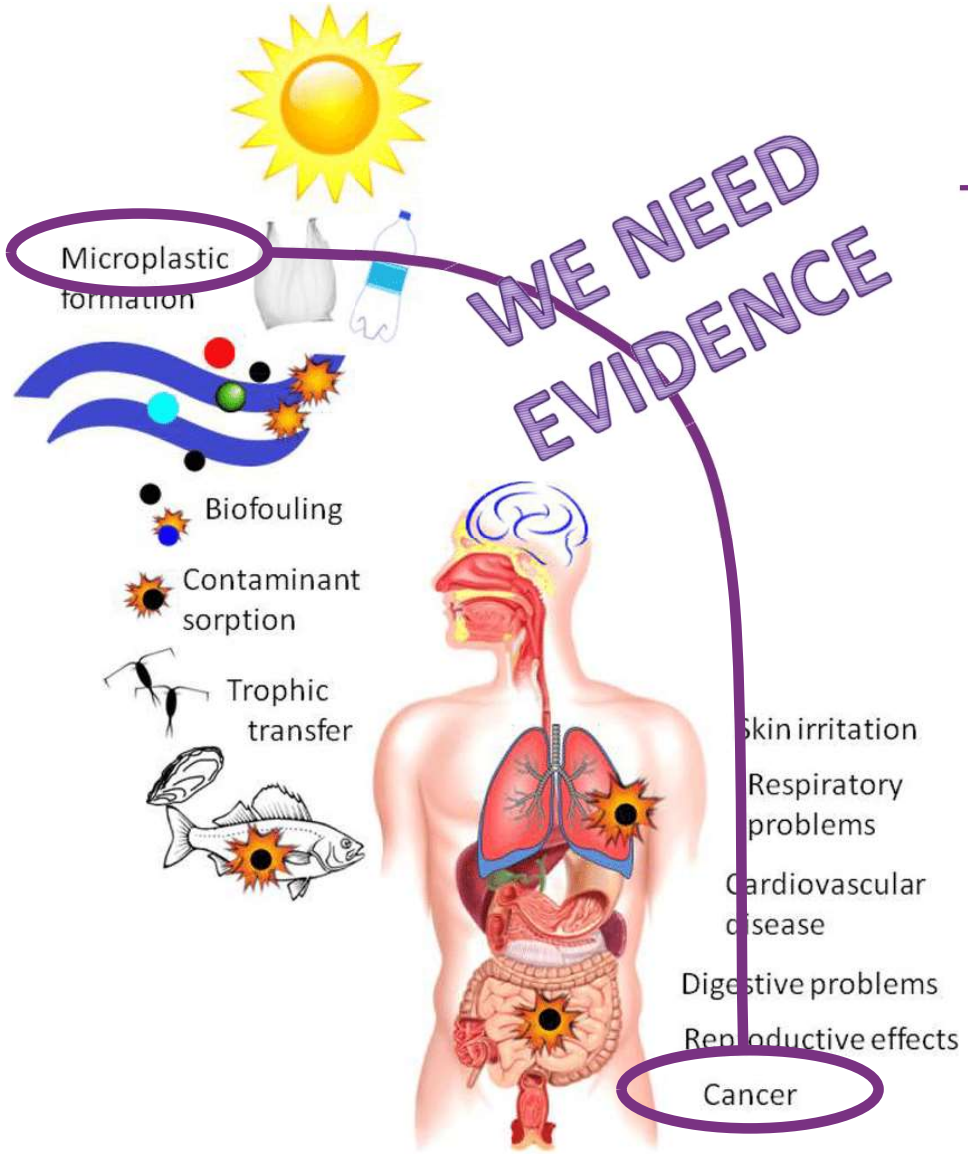
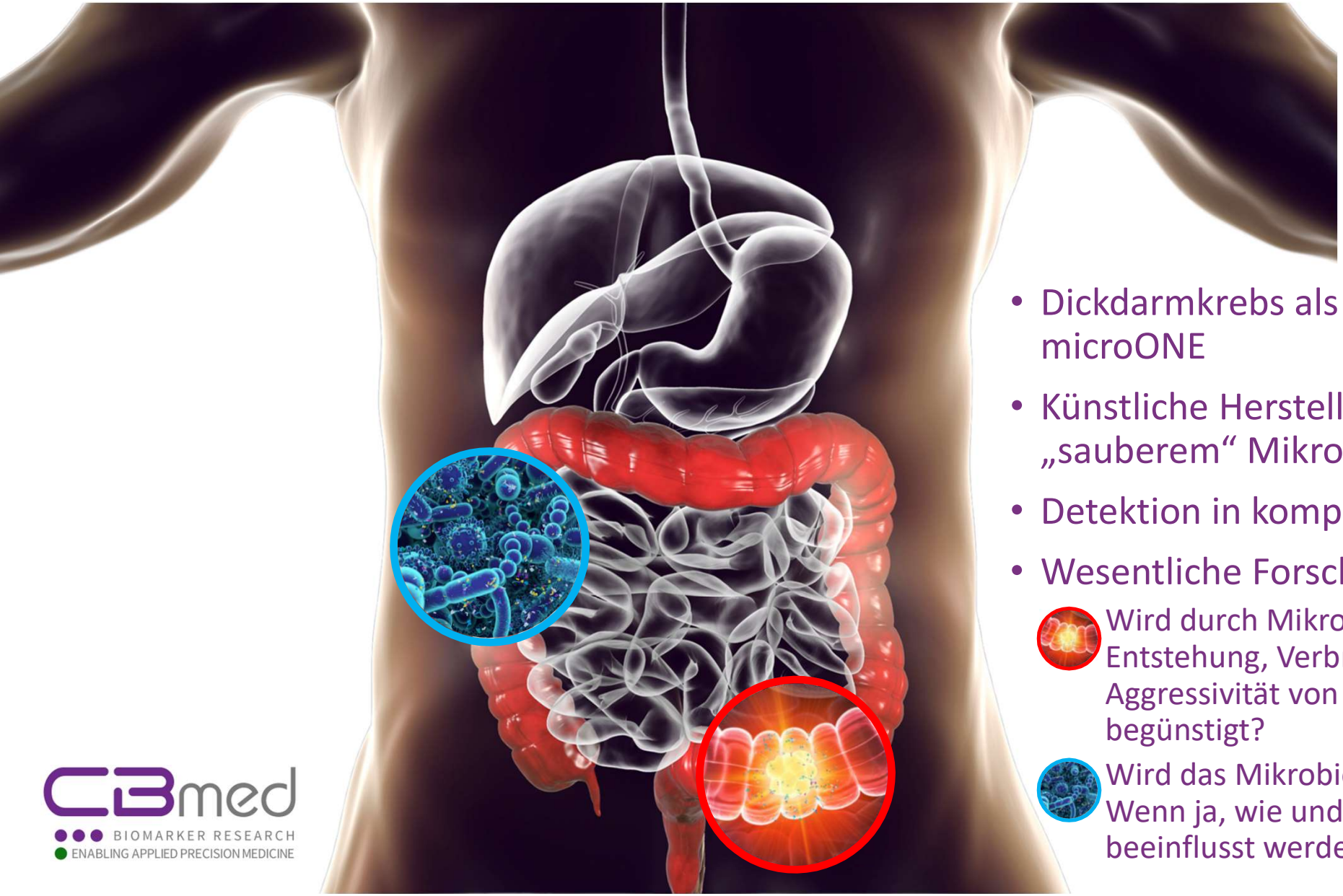
microONE – Ziele



- TO DETERMINE THE POSSIBLE EFFECTS OF MNP ON THE DEVELOPMENT/SEVERITY OF CRC AND THE SURROUNDING ENVIRONMENT (MICROBIOME);
- TO INVESTIGATE THE INTERACTION OF MNP WITH DRUG TARGETS AND TARGETED DRUGS;
- TO ESTABLISH PREDICTIVE BIOMARKERS THAT ALLOW A DIRECT RISK ASSESSMENT; AND
- TO DEVELOP RECOMMENDATIONS FOR A SAFE USE OF PLASTICS IN THE FUTURE;

Carbery M et al. Environment International, 2018.



- Dickdarmkrebs als Modell in microONE
- Künstliche Herstellung von „sauberem“ Mikroplastik
- Detektion in komplexen Systemen
- Wesentliche Forschungsfragen:
  - Wird durch Mikroplastik die Entstehung, Verbreitung oder Aggressivität von Dickdarmkrebs begünstigt?
  - Wird das Mikrobiom verändert? Wenn ja, wie und kann dies beeinflusst werden?

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microONE – Setup

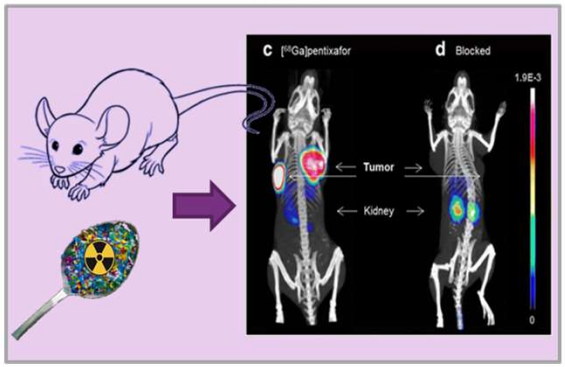
Preparation
Detection
Analysis

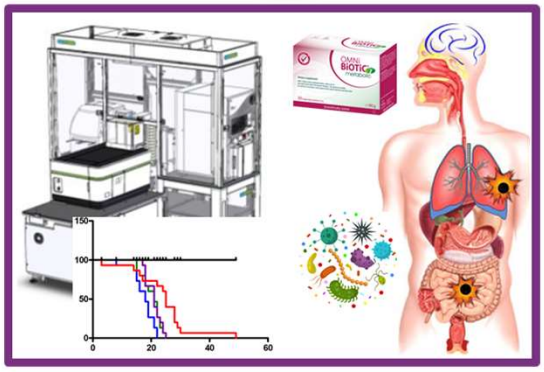
Labeling
Evaluation
Model Systems

Interaction
Human Health Effects
Treatment

Cancer

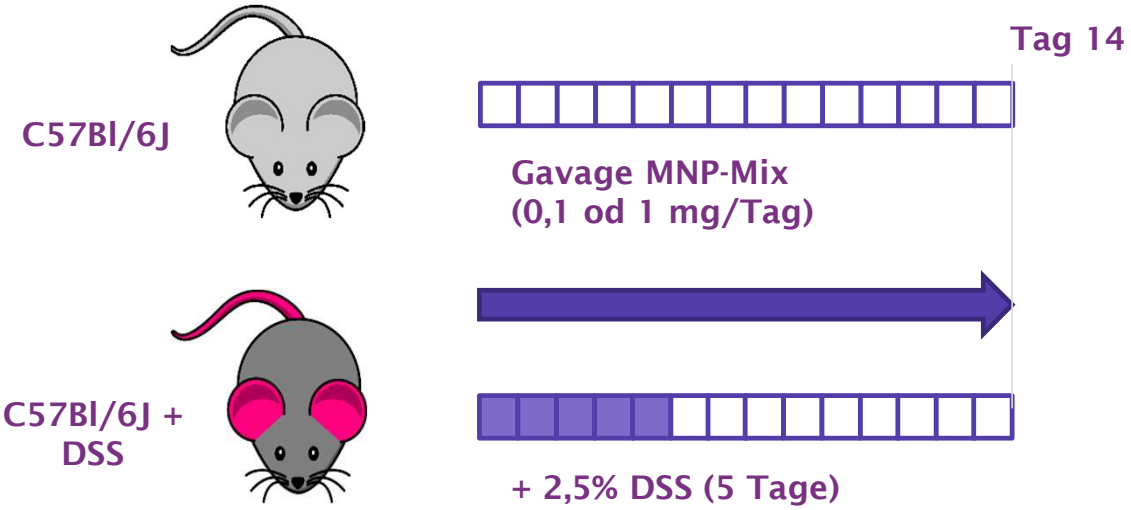
Micro-
biome





microONE – erste Erkenntnisse

MNP in chronischer Darmentzündung: DSS induzierte Colitis



Täglich:
- Orale Gavage MNP-Mix (0,1 od 1 mg/Tag)
- Abwiegen

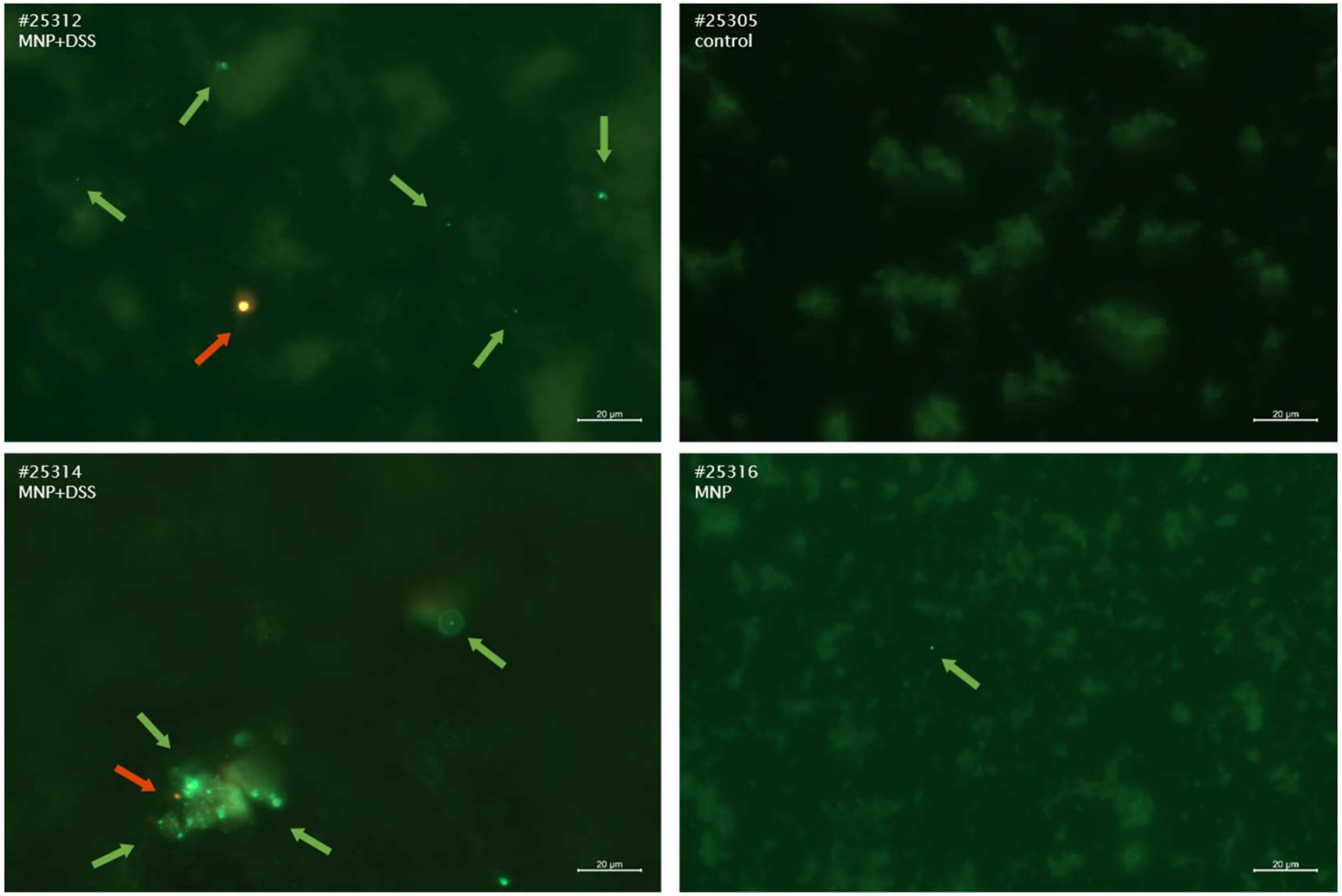
Alternierend:
- 24h metabolischer Käfig

terminal:
- Blutprobe
- Organentnahme

> relevante und detektierbare Dosis für Hauptexperimente

microONE – erste Erkenntnisse

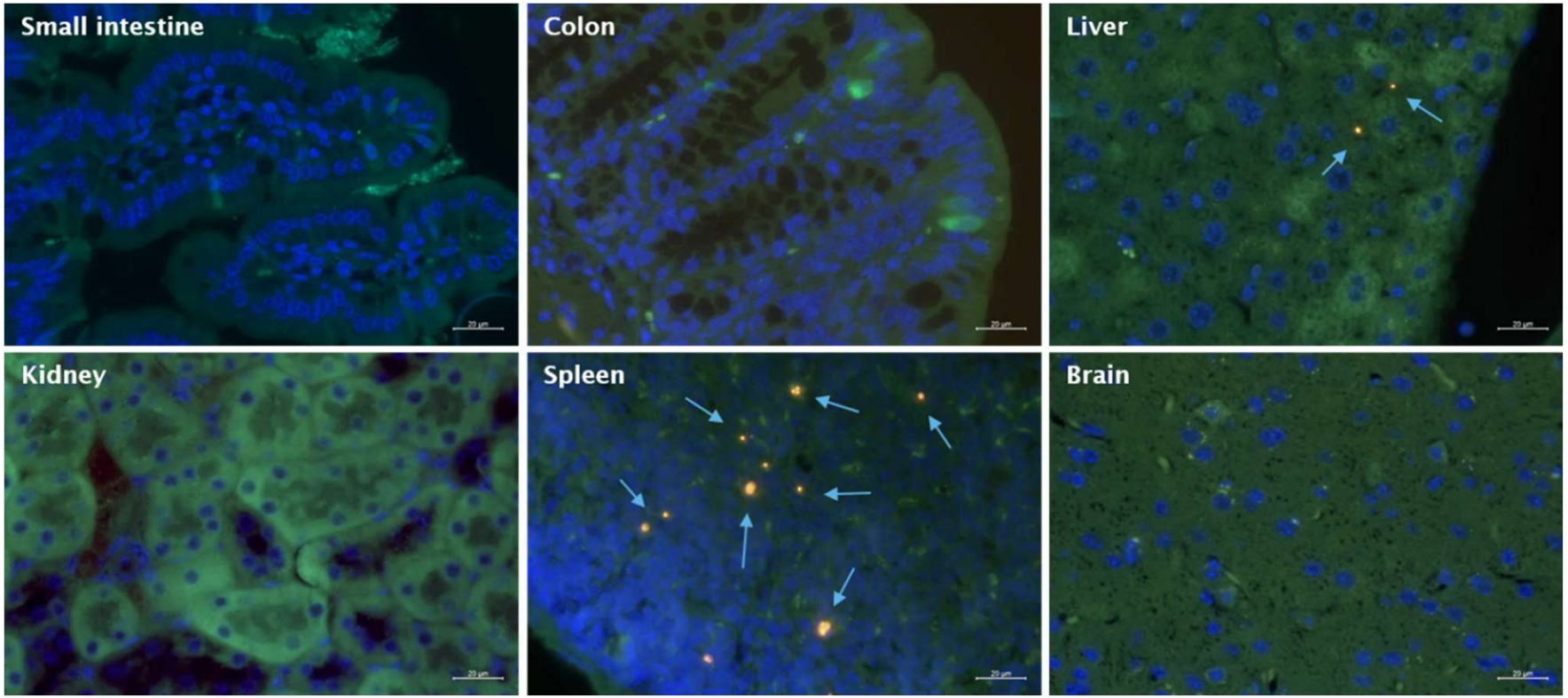
Vermehrt MNP im Blut bei Colitis



© MedUni Wien & Cbmed; unpublished data.

microONE – erste Erkenntnisse

Nachweis von MNP in den meisten Organen



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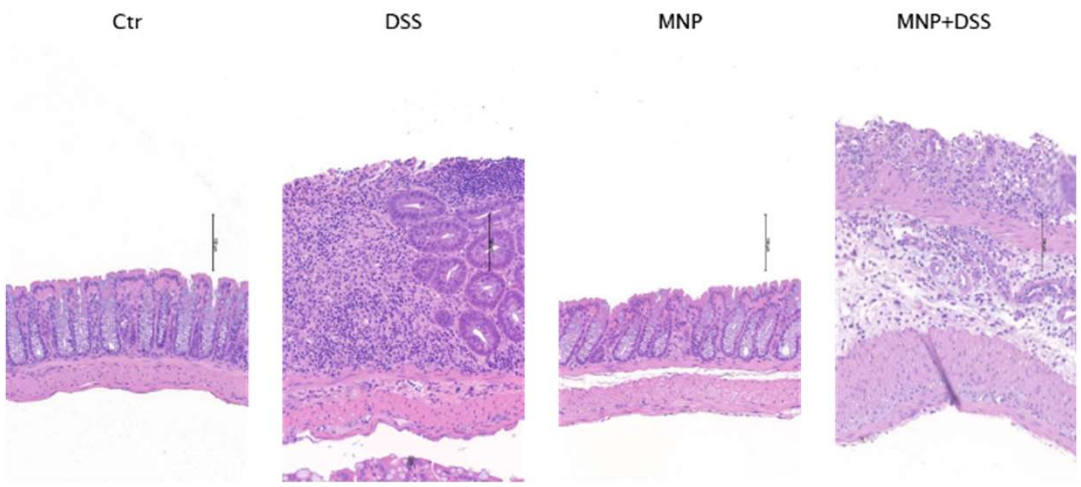
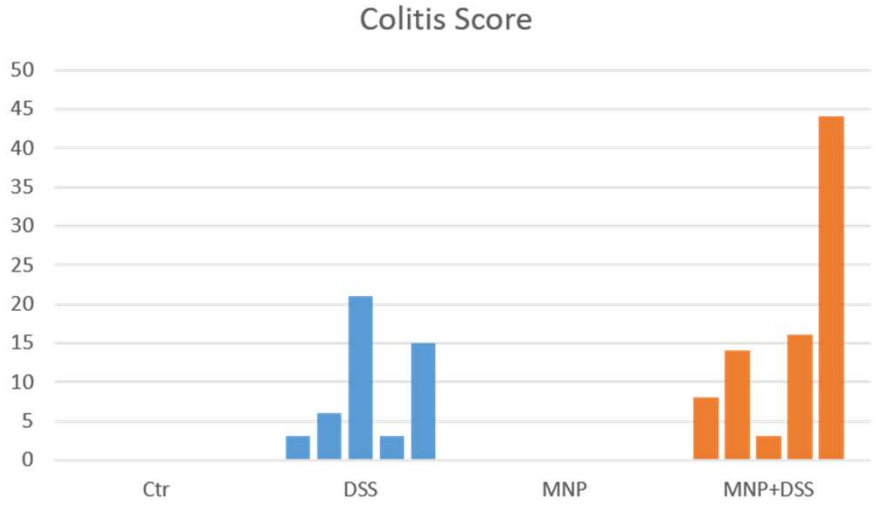
microONE – erste Erkenntnisse

MNP verstärkt Ausmaß chronischer Colitis

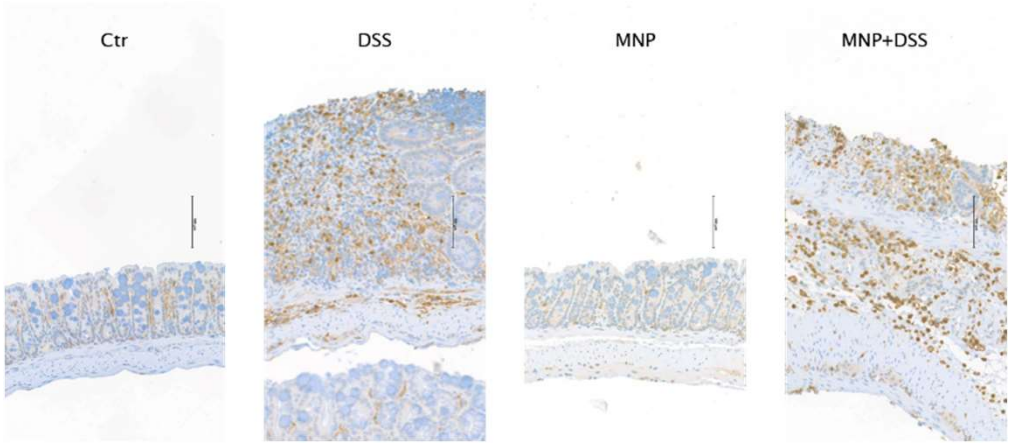


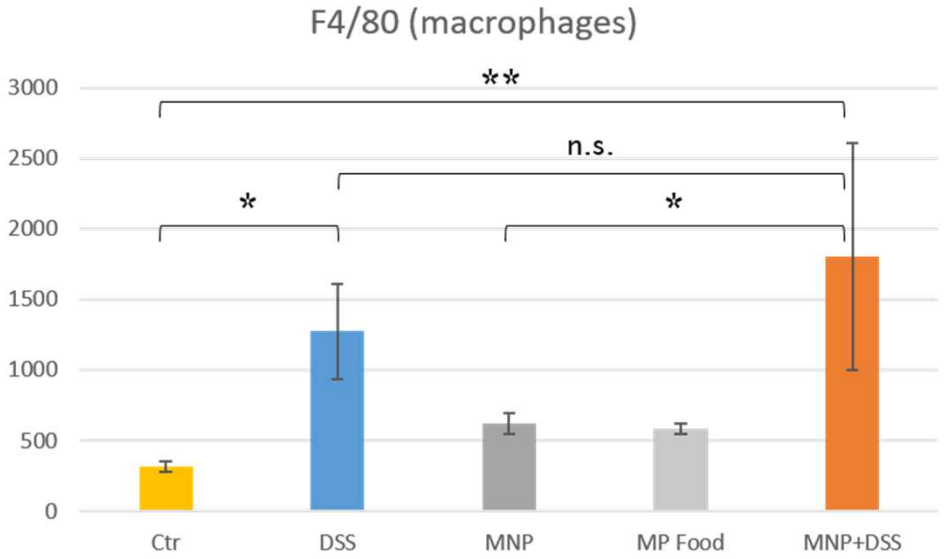


© MedUni Wien & Cbmed; unpublished data.

microONE – erste Erkenntnisse

MNP vermehrt Makrophagen in chronischer Colitis





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Zusammenfassung

- Wissenschaftliche Untersuchungen zum Zusammenhang zwischen MNP und Krebs noch am Anfang
- microONE Projekt mit großem internationalen Konsortium
  - Dickdarmkrebs als Modell
  - Beteiligung des Darm-Mikrobioms
  - Detektion von MNP in kompexen Systemen und in-vivo
- Erste Ergebnisse aus microONE – 10d MNP oral in Mäusen führt zu:
  - Aufnahme von MNP in Blut
  - MNP in den meisten Organen nachweisbar
  - Verstärkt chronische Darmentzündung
  - Vermehrt Makrophagen in Darmgewebe

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PRELIMINARY PROGRAMME

4 scientific sessions
10 expert keynote speakers

confirmed speakers

Silke Christiansen, Erlangen, Germany
Georg Gübitz, Vienna, Austria
Melissa Mather, Nottingham, UK
Christa Schleper, Vienna, Austria
Sibylle Trawöger, Würzburg, Germany
Suzanne Turner, Cambridge, UK
Dick Vethaak, Amsterdam/Delft, Netherlands

Organized by the microONE Team

Wed, 28th September 2022
9:00 am - 5:00 pm

Hotel Regina - Ferstelsaal
Vienna, Austria

www.microone.at
www.cbmed.at