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# Assessment of microplastic concentrations in human stool


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# Disclosure of Conflicts of Interest

I herewith declare the following paid or unpaid consultancies, business interests or sources of honoraria payments since October 1, 2016, and anything else which could potentially be viewed as a conflict of interest:

→ **I have no conflicts of interest.**

# Methods – A world-wide prospective pilot study

Recruitment of 8 healthy test persons around the globe via personal contacts

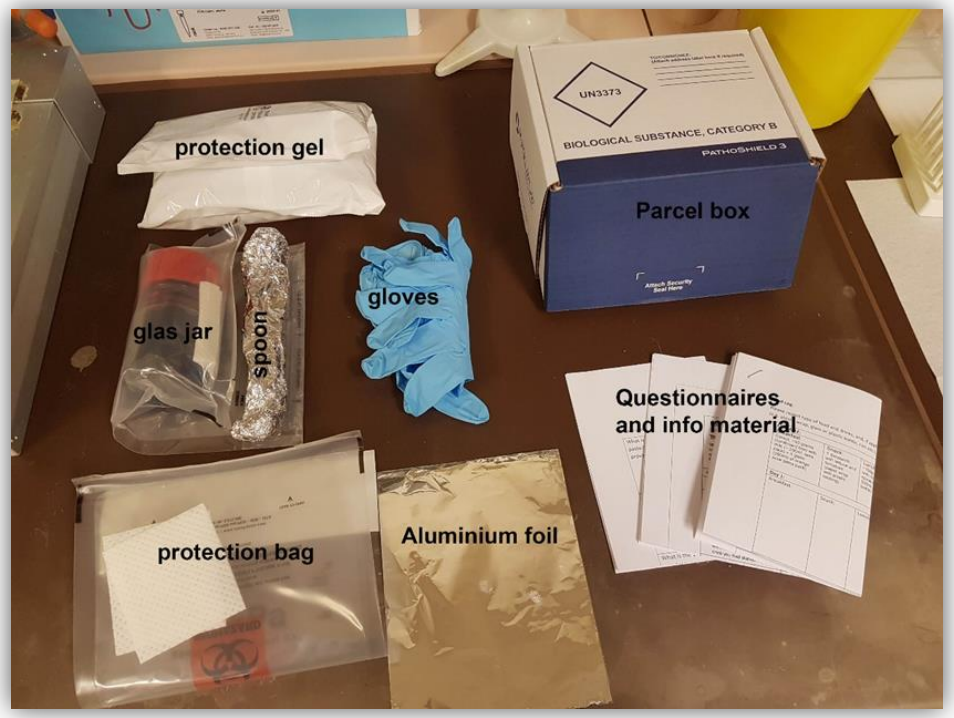
- Enontekiö, Finland
- Groningen, Netherlands
- Torun, Poland
- Vienna, Austria
- Birmingham, United Kingdom
- Sassari, Italy
- Krasnoyarsk, Russia
- Tokyo, Japan

# Methods – exclusion criteria

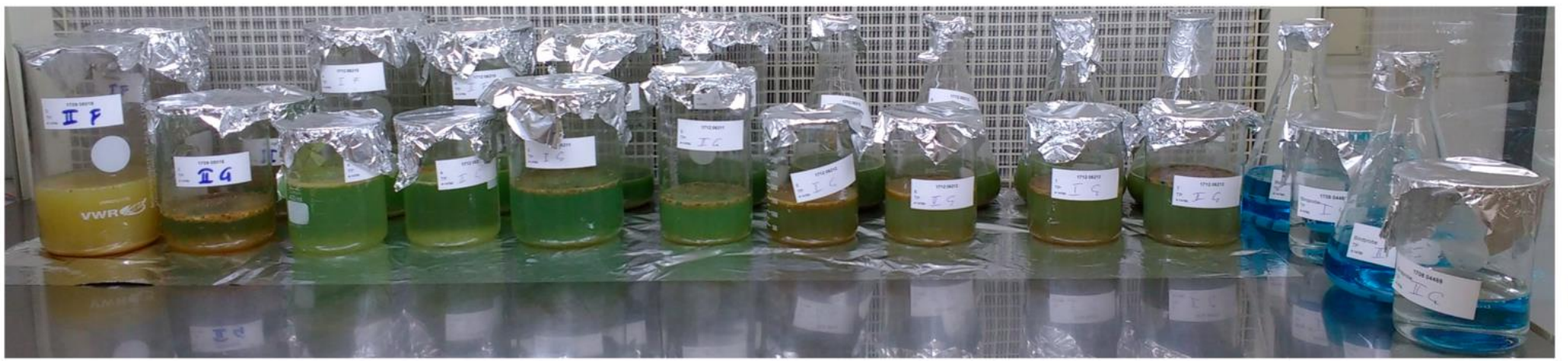
- Medical diet
- Diarrhoea or obstipation
- Antibiotics taken within the last 2 weeks
- Drugs affecting stool frequency and consistency (e.g. loperamide)
- Drugs affecting resorption (e.g. activated charcoal, cholestyramine)
- Diagnosed gastrointestinal disease (e.g. Ulcerative colitis, Crohn's disease)
- Invasive or abrasive dental treatment within the last 2 weeks

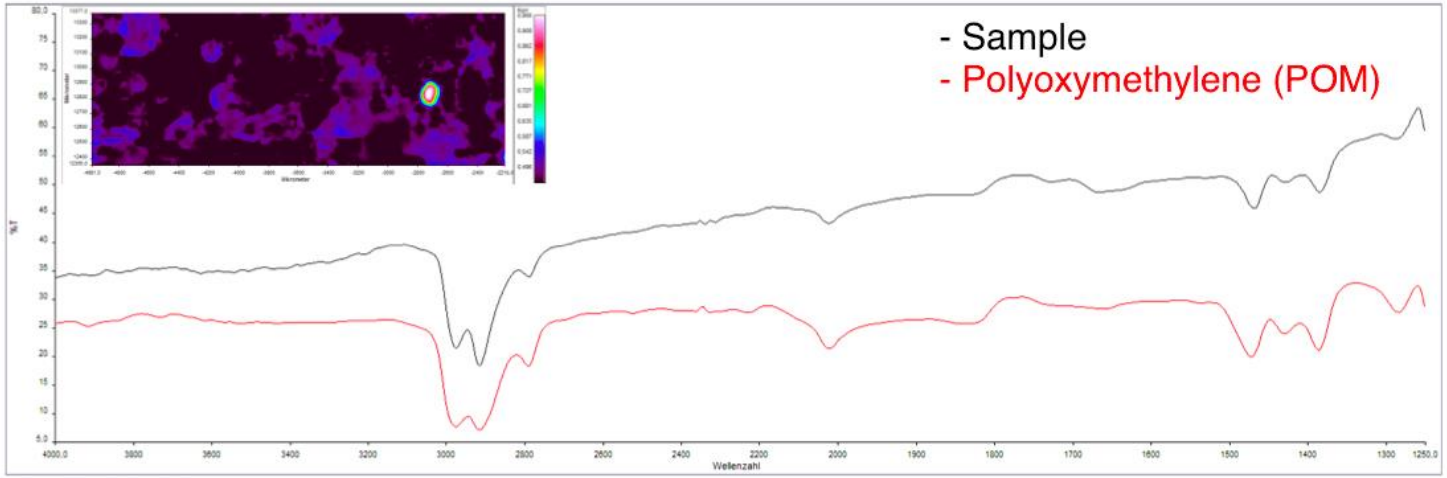
# Methods – data collection & sampling

- Food protocol 6-7 days prior to stool sampling
- Brand name of tooth paste and cosmetic products
- Information about chewing gum and alcohol intake
- Information about drinking habits from PET bottles
- Plastic-free stool sampling and shipping to Vienna



# Microplastic analysis by Fourier-transform infrared (FT-IR) micro-spectroscopy



# Results – descriptive statistics

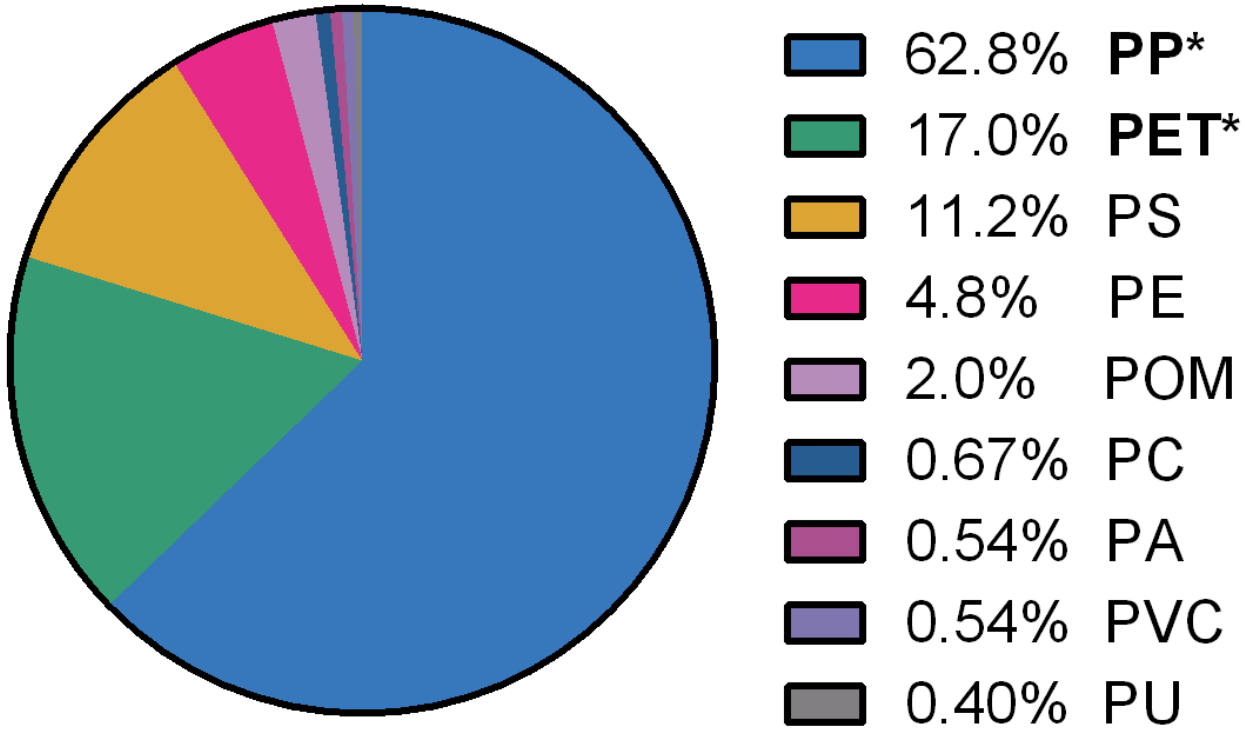
- 8 participants: 3 males, 5 females, aged 33-65 years
- 0/8 – vegetarian
- 2/8 – daily chewing-gum users
- 6/8 – ingested sea-food during the observation period
- 8/8 – had contact to plastic-wrapped food
- On average, 750 ml/day were drunk from PET bottles

# Results – stool analysis

| | |
|---|---|
| ❖ Stool weight: | 34 [8-39] g |
| ❖Positive samples: | 8/8 |
| ❖ Microplastic particles / 10g stool: | 20 [18-172] particles |
| ❖ Particle size: | 50-500 µm |
| ❖Plastic types detected: | 9/10 (3-7 types /sample) |

Values are displayed as median [Q1-Q3]

# Results – relative frequency of different microplastic types




PP, PET, PS and PE: > 95%

*PP and PET were found in all 8/8 samples

# Discussion

- How representative are these results?
- What are the sources of microplastics ingestion?
- What is the clinical impact of gastrointestinal microplastics?
- How can we reduce plastic pollution?

# Acknowledgements



Philipp Königshofer

Theresa Bucsics

Michael Trauner

Thomas Reiberger


Bettina Liebmann

Sebastian Köppel

# Supplementary Slides

# How representative are these results?

Consultation with our Department of Medical Statistics (Prof. Daniela Dunkler):

- In our study microplastics were present in 8/8 stool samples (100%).
- The confidence interval of this finding is 68-100%, when applying it to larger cohorts.
- Hence, more than 50% of the world population might have microplastics in their stool.
- However, only  larger studies will be able to confirm this assumption.

# What are the sources of microplastics ingestion?

- Food itself
  - ➔ Ingestion of sea-food correlated with microplastics content ($R=0.648$; $p=0.089$)

- Food contact materials
  - ➔ Packaging and processing

# What is the clinical impact of gastrointestinal microplastics?

- Microplastic translocates from the intestine and particles with sizes up to 130µm have been detected in the blood stream, lymphatic vessels and the liver of fish [1,2] and various mammals [3-7]
- Microplastics may harm via bioaccumulation (causing local immunoreactions) or can serve as a vector for other chemicals [7-10].
- In birds and fish oral plastic caused remodeling of the intestinal villi, distortion of iron absorption and hepatic stress [1,9-12]
- Especially patients with intestinal bowel diseases might be vulnerable to microparticles [13,14].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# How can we reduce plastic pollution?

- Increase awareness
- Reduce plastic usage where possible
- Increase plastics reuse & recycling
- Dispose plastic waste appropriately

*09/2018: The European Parliament voted in favor of a EU wide microplastics ban in cosmetics.*