MUCUS

DETRIMENTAL MECHANISMS OF DIETARY EMULSIFIERS IN THE GUT

Lisa Miciotte
Lisa.miciotte@UGent.be

Promoters: Tom Van de Wiele, John Van Camp, Andreja Rajkovic

Context

- Food additives in processed foods are increasingly related to obesity and associated illnesses.
- Chassaing et al. have clearly demonstrated the harmful effects of 2 dietary emulsifiers in the gut system of mouse models.
- The mechanisms by which dietary emulsifiers (EM) cause damage in the gut are still very unclear.
- The experiments presented here were executed to test which effect dietary emulsifiers have on either the intestinal mucus layer or the gut microbiome.

Mucus diffusion assay

**Question:** Do emulsifiers affect nutrient diffusion through mucus layer?

**Findings:** No different diffusion pattern for different emulsifiers.

Viscosity Measurements

**Question:** Do emulsifiers dilute mucus?

**Findings:** Viscosity of mucus solution was not diminished by emulsifiers.

Batch experiments

**Interindividual variability?**

**Findings:** No indications for cell membrane damage.

Take home message: Microbial effects of dietary emulsifiers are more important than physicochemical effects on mucus layer in the gut.

Pure culture work

Do single strains of bacteria react differently to different EM?

**Findings:** Each strain responds to the emulsifiers in a species specific manner.

Growth curves

**Optical density-measurement**

**Comparison at 2%**

<table>
<thead>
<tr>
<th>Emulsifier</th>
<th>SCFA down</th>
<th>SCFA up</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMC 2%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Soy Lecithin 0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>2% CMC</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Soy Lecithin 1%</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Flow cytometry

Staining with CFDA & Dibac4(3), targeting cell membrane integrity

**Findings:** Inhibited SCFA-production observed for P80, RL and SL. Slightly different profile between donors.

CFDA-Emulsion

**SCFA**

**Acetate**

**Propionate**

**Butyrate**

**Viscosity**

**Flow**

**Cell count**

**Intact cells (1/µL)**

**Samples:** 0h, 24h, 48h

Short Chain Fatty Acid production (Acetate, Propionate, Butyrate)

Lipoided Cellicont

DGGE & Illumina sequencing

**Funded by BOF bef@ugent.be**

**Acknowledgements:**

Prof. Tom Van de Wiele
Prof. Inge Van Boeyen (Inbio)
Prof. Paul Van der Meeren (PaInT)
Silke Claus (Inbio)
Quenten Denon (PaInT)