Stool Bile Acid Profiles in Pediatric Patients who Received FMT for *C. difficile* Infection

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Disclosures

• Nothing to disclose

*Clostridium difficile* Infection (CDI)

• CDI is linked to over 30,000 deaths per year in the U.S.
• An economic cost of >$3 billion.
• Disease recurrence rates can be as high as 35%
Recurrent *Clostridium difficile* Infection (CDI)

- Fecal microbiota transplant (FMT) is highly effective for the treatment of recurrent *C. difficile* infection (CDI)
- Adult studies suggest that stool bile acid restoration occurs with FMT
- Pediatric CDI is a different disease
  - Incidence is lower in pediatric patients
  - More difficult to diagnose
  - However, recurrent CDI does occur

**Stool Bile Acid Differences in Pediatric and Adult Patients**

- **Primary bile acids**
  - Cholates are germinants of *C. difficile* spores via interaction with spore germinant receptor CspC
  - Chenodeoxycholic acid (CDCA) is a known competitive inhibitor at the CspC site as well as being toxic to vegetative cells
- **Secondary bile acids**
  - Lithocholate and deoxycholate are toxic to *C. difficile* vegetative cells.
Study design

- Stool collected from healthy pediatric patients and patients with primary and recurrent CDI
  - Healthy patients from pediatric human microbiome project
- Stool samples from pediatric patients who received FMT for recurrent CDI
  - Stool taken prior to and 8 weeks after FMT
  - Stool from the universal donor was also collected
- Stool sent for 16s sequencing and global metabolomics

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Average Age (range)</th>
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</thead>
<tbody>
<tr>
<td>Healthy Control</td>
<td>38</td>
<td>9.5 (7-12)</td>
</tr>
<tr>
<td>Primary CDI</td>
<td>21</td>
<td>11.2 (9-16)</td>
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<tr>
<td>Recurrent CDI</td>
<td>13</td>
<td>7.7 (2-16)</td>
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<td>FMT</td>
<td>5</td>
<td>12.5 (9-16)</td>
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</tbody>
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Preliminary Network Analysis

Microbe-patient network

Metabotile-Patient Network

Pediatric Bile Acid Analysis

Pediatric Stool Bile Acids

- Primary Bile Acids
- Secondary Bile Acids

Relative Abundance
Pediatric Bile Acid Analysis

**Pediatric Stool Bile Acids**

Relative Abundance

- Healthy Control: n=38
- Primary CDI: n=21
- Recurrent CDI: n=13

Cholate
CDCA
Deoxycholate
Lithocholate

Microbe-metabolite Network in FMT

Pre-FMT
Post-FMT

FMT patient stool bile acids

**Stool Bile Acid Profiles**

- Primary Bile Acids
- Secondary Bile Acids

p<0.01
Conclusions

• Stool bile acids profiles in pediatric recurrent CDI patients show similar characteristics to adult patients with CDI: their profiles are ones that are favorable for C. difficile germination.

• FMT in these pediatric patients results in restoration of bile acid profiles to those of healthy children

• This suggests FMT functionally restores the microbiome, at least in respect to fecal bile acids.

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