Unraveling the Alphabet in Your Gut

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Outline

How does the gastrointestinal tract work?
What is the microbiome?
How does the microbiome affect our gut?
  - How do we manage this?
How do we manage heartburn?
Questions?
Basic Anatomy

**Foregut**
- Thymus
- Bronchus
- Esophagus
- Lung
- Stomach
- Proximal duodenum
- Pancreas*
- Hepatobiliary (liver, gallbladder, bile ducts)*

**Midgut**
- Jejunum (middle section of the small intestine)
- Ileum (third section of the small intestine)
- Appendix
- Ascending colon

**Hindgut**
- Transverse colon
- Descending colon
- Rectum
The Gut Microbiome

- 40 trillion microorganisms
- 1000 different bacterial species
- Complex equilibrium between the microbiome and host
- Alterations in the gut microbiome can lead to different GI conditions
What Alters our Microbiome?

Maternal Factors
- Gut microbiota
- Vaginal infection

Postnatal Factors
- Mode of delivery (C-section, vaginal)
- Breast-feeding/Formula feeding
- Introduction of solid food
- Early life (adversity, antibiotic exposure)

Environmental Factors
- Diet (Western, Mediterranean, protein, fat, fiber)
- Exposure to animals

Perturbations to Microbiome
- Maladaptive diet (↑fat, ↑fiber, ↑sugar)
- Medications [Antibiotics, Proton pump inhibitor, Metformin]
- Smoking (↑ inflammatory signaling, △ colonic mucin production)
- Stress (↑intestinal permeability, ▼SCFA production)

Disease e.g.
- Obesity
- IBS
What are some GI conditions associated with an altered Microbiome?

- Irritable Bowel Syndrome
- Inflammatory Bowel Disease
- Colorectal Cancer
- Obesity
What is Irritable Bowel Syndrome or IBS?

- Abdominal discomfort associated with a change in stool form and/or frequency
- Very common. 20% of the US population!
- “Brain-gut” disorder with an altered GI microbiome
Common Bowel Symptoms

- Cramping
- Gassy
- Burning
- Stabbing
- Bloating
- Achy
Psyllium is Effective for IBS

• Poorly fermentable, soluble fiber is effective for treating IBS.
• Data comes from 15 randomized controlled trials.
• Different from the insoluble fiber found in fruits and vegetables!
• Can promote a more beneficial microbiome.
Soluble Fiber

Psyllium powder is the best studied fiber.
- Found in clinical trials to provide overall relief of IBS symptoms in both adults and children
- Comes in powders or capsules
- 10-20 grams per day (divided doses)
What are Probiotics?

- Live microorganisms taken to restore the gut microbiome.
Our View on Probiotics

• Taken as a group, probiotics improve global IBS symptoms like bloating and gas.

• However, because of study limitations, a recommendation for a particular probiotic cannot be made.

• Not unreasonable to take them for a month to decide whether or not you get any benefit from it.

• Insufficient data on prebiotics.
Antibiotics for IBS

Rifaximin

- Non-absorbable antibiotic that works in the intestine to modify the microbiome.
- Improves overall IBS symptoms.
- 2 week course.
Low FODMAP Diet and the Microbiome

“Let food be thy medicine and medicine be thy food”
– Hippocrates
The Low FODMAP Diet

- FODMAPs (fermentable oligosaccharides, monosaccharides, disaccharides and polyols) are specific types of sugars in our diet that are poorly digested by the human intestine and as a consequence, reach the colon where the sugars are fermented.

- The Low FODMAP Diet is a diet where foods that are high in these sugars are avoided/minimized.
# Foods suitable on a low-fodmap diet

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Vegetables</th>
<th>Grain Foods</th>
<th>Milk Products</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bananas, blueberries, boysenberries, cantaloupe, cranberry, durian, grapefruit, honeydew melon, kiwi fruit, lemon, lime, mandarin, orange, passionfruit, pawpaw, raspberry, rhubarb, rockmelon, star anise, strawberry, tangelo</td>
<td>Ailocks, bamboo shoots, bean shoots, bok choy, carrots, celery, choka, choy sum, endive, ginger, green beans, lettuce, olives, parsnips, potato, pumpkins, red capsicum (bell pepper), silver beet, spinach, squash, zucchini, sweet potato, turnip, yam, zucchini</td>
<td>Cereals, gluten-free bread or cereal products</td>
<td>Milk lactose-free milk*, oat milk*, rice milk*, soy milk*, *check for additives</td>
<td>Tofu, sweeteners, sugar* (brown sugar), glucose, artificial sweeteners not ending in “-of”</td>
</tr>
<tr>
<td><strong>Herbs</strong> basil, chil, coriander, ginger, lemon grass, marjoram, mint, oregano, parsley, rosemary, thyme</td>
<td><strong>Other</strong> arrowroot, millet, pyjyllium, quinoa, sorghum, tapioca</td>
<td><strong>Ice cream substitutes</strong> gelato, sorbet</td>
<td><strong>Butter substitutes</strong> olive oil</td>
<td></td>
</tr>
</tbody>
</table>

# Eliminate foods containing fodmaps

<table>
<thead>
<tr>
<th>Excess Fructose</th>
<th>Lactose</th>
<th>Fructans</th>
<th>Galactans</th>
<th>Polyols</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit apple, mango, nashi, pear, tinned fruit in natural juice, watermelon</td>
<td><strong>Sweeteners</strong> fructose, high fructose corn syrup</td>
<td><strong>Large total fructose dose</strong> sources, large serves of fruit, dairy products, fruit juice</td>
<td><strong>Legumes</strong> baked beans, chickpeas, kidney beans, lentils, soy beans</td>
<td><strong>Vegetables</strong> cauliflower, green capsicum (bell pepper), mushroom, sweet corn</td>
</tr>
<tr>
<td><strong>Sweeteners</strong> sugar* (brown sugar), glucose, artificial sweeteners not ending in “-of”</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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*small quantities
What’s the Evidence?

• 7 Studies show that around 50-60% of IBS patients can get symptom relief with a low FODMAP diet.
• Low FODMAP diet changes the gut microbiome.
• A 2-4 week trial is usually sufficient to gauge response.
• This is NOT a long term diet. Foods should be reintroduced.
Colon Cancer and the Microbiome

- Colon cancer is the third most common cancer in the US.
- Microbiome may play a large role in the development of cancer.
Microbiota-based Strategies for Prevention

- Obesity
- Dietary fiber
- Less Fat
- Less Red Meat
- More marine omega 3 fatty acids
- >2 yogurt servings/week lowers risk of colon polyps
Acid Reflux and Heartburn
Treatment of Heartburn

• H2 Blockers
  o Pepcid, Zantac, Tagamet

• Proton Pump Inhibitors (PPI)
  o Prilosec, Protonix, Prevacid, Nexium

• These medications remove the acid from the fluid in the stomach, so that the fluid does not cause inflammation of the esophagus.
A Word about PPIs…

• Long Term use of PPI medications is safe. This was demonstrated in a recently published prospective trial of 17,600 patients.

• Bottom line: Safe to use if needed.
Questions?

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