Diet in Irritable Bowel Syndrome

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Disclosure

- I have the following financial relationships to disclose:
  - Gerson-Lehrman (consultant)
  - Mead-Johnson (consultant)
- No products or services produced by these companies are relevant to my presentation

Objectives

- Describe how specific dietary components can exacerbate symptoms in IBS
- Apply different dietary management strategies to children with IBS

FGIDs and Dietary Complaints

- Focus groups in children (n=25)
- Median number of foods identified = 11
  - Spicy
  - Cow’s milk
  - Pizza
- Parental assessment of quality of life inversely correlated with number of foods

(Carlson MJ. J Acad Nutr Diet 2014;114:403)

Diet in IBS

Pathogenesis of Symptoms

Malabsorbed dietary carbohydrate

Physiologic effects

- Osmotic load
- Fermentable substrate

Luminal fluid

Gut distention

Other effects?

Symptoms

- Diarrhea
- Bloating
- Pain
- Gas

(Barratt JS. Pract Gastroenterol 2007;31:51)
Dietary Carbohydrates

**Sugars** (1-2)
- Monosaccharides
  - Glucose
  - Galactose
  - Fructose
- Disaccharides
  - Lactose
  - Sucrose
  - Maltose
  - Trehalose

**Oligosaccharides** (3-9)
- Malto-oligosaccharides
- Maltodextrin
- Non-α-glucan oligosaccharides
- Raffinose
- Stachyose
- Fructooligosaccharides

**Polysaccharides** (≥10)
- Starch
  - Amylose
  - Amylopectin
- Non-starch polysaccharides
  - Pectin (100%)
  - Gums (100%)
  - Hemicellulose (65-90%)
  - Cellulose (20-40%)
  - Psyllium (55%)
  - Wheat bran (55%)

**Polys**
- Sorbitol
- Mannitol
- Xylitol

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Glucose vs Fructose Absorption

**Fructose versus Fructans**

Is Carbohydrate Malabsorption More Common in IBS?

**Lactase Genotype – IBS vs Control**
- Similar frequency of lactase non-persistence between patients with IBS (n=75) and healthy controls (n=75) in Brazil
- Similar findings in India (IBS, n=150; healthy controls, n=252)

**Sorbitol and Mannitol Absorption**

Healthy Controls
- Sorbitol
- Mannitol
- Glucose

IBS

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(Cummings JH. Eur J Clin Nutr 2007;61:S5)
(http://www.fao.org/docrep/w8079e/w8079e01.htm)

(Murray K et al. Am J Gastroenterol 2014;109:110-9)

(Bernardes-Silva CFR. Clin Chim Acta 2007;386:7)
(Kumar S. J Gastroenterol Hepatol 2012;27:1825)

(Yao CK. J Hum Nutr Diet 2014;27:263)
**Pathogenesis of Symptoms**

- **Lactose Malabsorption**
  - D-IBS
  - Controls

<table>
<thead>
<tr>
<th>Percentage of positive HBT (%)</th>
<th>10g</th>
<th>20g</th>
<th>30g</th>
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<tbody>
<tr>
<td>D-IBS</td>
<td>47.8</td>
<td>58.7</td>
<td>53.3</td>
</tr>
<tr>
<td>Controls</td>
<td>18.2</td>
<td>21.7</td>
<td>17.3</td>
</tr>
</tbody>
</table>

(Yang J. Clin Gastroenterol Hepatol 2013;11:262)

**Visceral Hypersensitivity and Symptoms**

- **Change in rectal sensation threshold volume**

(Yang Y. Aliment Pharmacol Ther 2014;39:302)

**Effect of Duodenal Lipid Infusion**

- Perception of distension

(Yaldarelli MP. Am J Gastroenterol 2005;100:383)

**What Else Might GI Symptoms be Related To?**

- **Diet and Psychosocial Distress**
  - IBS-D (n=55) and healthy controls (n=18) with lactase deficiency
  - Greater anxiety in IBS-D patients with lactose intolerance vs those with just malabsorption

(Yang Y. Aliment Pharmacol Ther 2014;39:302)

- **Diet and Psychosocial Distress**

(Yedochowski M. Dig Dis Sci 2000;45:1255)
Diet and Psychosocial Distress
- Randomized, double blind crossover (n=22)
- 3-day trials with 3-d washout
  - Gluten (16 g/d)
  - Whey (16 g/d)
  - Placebo (no protein)
- State Trait Personality Inventory
  - Baseline
  - Day 3 of each challenge

(Peters SL. Aliment Pharmacol Ther 2014;39:1104)

Gut – Brain Axis
- 4-wk RCT healthy women
  - No product
  - Non-fermented dairy product
  - Probiotic dairy product
- fMRI scans – Less activity in areas responsible for processing afferent signals from the gut and emotional arousal

(Tillisch K. Gastroenterology 2013;144:1394)

Diet and Inflammation

Healthy Controls

IBS-D Lactose malabsorption

IBS-D Lactose Intolerance

(Yang Y. Aliment Pharmacol Ther 2014;39:302)

Food Induced Mucosal Damage
- Confocal endomicroscopy in adults with IBS (n=36) and Barrett’s (n=10)
- Applied to mucosa randomly dilute
  - Cow milk
  - Wheat
  - Soy
  - Yeast

(Fritscher-Ravens A. Gastroenterology 2014;epub)
Dietary Therapy

Low FODMAPs Diet
- Fermentable
- Oligosaccharides
- Fructans/Galactans
- Disaccharides
- Monosaccharides
- And
- Polyols

(Dietary Therapy)

Dietary Carbohydrates

Sugars
- Monosaccharides
  - Glucose
  - Galactose
  - Fructose

Disaccharides
- Lactose
- Sucrose
- Maltose
- Trehalose

Polyols
- Sorbitol
- Mannitol
- Xyitol

Oligosaccharides
- Malto-oligosaccharides
- Maltodextrin
- Non-d-glucan
- Oligosaccharides
  - Raffinose
  - Stachyose
  - Fructooligosaccharides
  - Inulin

Polysaccharides
- Starch
- Amylose
- Amylopectin

Non-starch polysaccharides
- Pectin (100%)
- Guar (100%)
- Hemicellulose (65-90%)
- Cellulose (20-80%)
- Psyllium (55%)
- Wheat bran (55%)

(Dietary Carbohydrates)

Low FODMAPs Diet in Adults
- Double blind, crossover
  - IBS (n=30)
  - Healthy controls (n=8)
- 21 d treatment and washout periods
- All food provided

(Halmos EP. Gastroenterology 2014;146:67)

Low FODMAPs Trial in Adult IBS

IBS
- Baseline
- Typical Aut.
- Low FODMAP

Healthy Controls

(Halmos EP. Gastroenterology 2014;146:67)

Low FODMAPs in Childhood IBS
- Randomized, crossover, double blind
- Children with IBS (n=33)
- Two day treatment with one week washout
- All food provided

Chumpitazi BP et al. NASPGHAN 2014 abstract

(Sugars)

(http://www.fao.org/docrep/w8079e/w8079e0l.htm)
Low FODMAP Diet in Childhood IBS

Chumpitazi BP et al. NASPGHAN 2014 abstract

Pathogenesis of Symptoms

Physiologic effects
- Malabsorbed dietary carbohydrate
- Osmotic load
- Luminal fluid production
- Inflammation
- Other effects?
- Luminal distention

Symptoms
- Diarrhea
- Bloating
- Pain
- Gas

(Barratt JS. Prac Gastroenterol 2007;31:51)

Low FODMAP – Gastric Endocrine Cells

Healthy Controls

IBS Pre-diet

IBS Post-diet

(Mazzawi T. Mol Med Rep 2014;109:1)

Fiber Treatment in IBS

- Pediatric studies of poor quality
- Guar gum/juice vs juice (n=60) for 4 wk
  - Improvement in abdominal pain
  - Trend toward improvement in bowel habit (both IBS-D and IBS-C)
- Unsettled in adult literature
- Some evidence of benefit from psyllium

(Romano C. World J Gastroenterol 2013;19:235)
(Huertas-Ceballos AA. Cochrane 2009)
(Bijkerk CJ. Aliment Pharmacol Ther 2004;19:245)

Probiotics for Childhood IBS

- Lactobacillus rhamnosus GG
  - 3 RCT (n=133)
  - 1x10^9 - 6x10^9 CFU/d
  - Effective
- VSL#3
  - Multicenter, crossover trial (n=133)
  - Appeared effective

(Horvath A. Aliment Pharmacol Ther 2011;33:1302)

Dietary Management of IBS

Medical Investigation
- Diagnosis

Assessment of Usual Diet and Symptoms
- Low FODMAP Diet
  - 10-14 day Trial
  - Adherence

Symptoms Improved
- Poor Response
  - Consider Other Triggers/Therapy
  - + Psychological

Return to Usual Diet

(Tuck C.J. Exp Rev Gastroenterol Hepatol 2014;8:810)
Summary

- IBS patients are more sensitive to the effects of diet than healthy controls
- Symptom generation appears related to Gut-Brain axis
  - Psychosocial distress
  - Gut inflammatory status
  - Microbiome composition
- Low FODMAP diet effective
- Probiotics possibly effective
- Role of fiber unclear

Acknowledgements

- Collaborators
  - Bruno Chumpitazi, MD
  - Danita Czyzewski, PhD
  - Mariella Self, PhD
  - Jim Versalovic, MD, PhD
  - Tor Savidge, PhD
  - Margaret Heitkemper, PhD – University of Washington

- Funding
  - R01 NR013497
  - R21 DK099643