Susan Allen Hosts: Bradley Bush, ND

SIBO: The Brain Gut Hormone Connection

IFMNT Webinar Series Oct 25th 2017
About the Speaker

Dr. Bradley Bush is a registered Minnesota state licensed N.D. with a degree from National College of Naturopathic Medicine in Portland, OR. He is an owner and Clinical Director at Natural Medicine of Stillwater, owner/operator of Neurovanna laboratory and frequently lectures on topics of neuro-endo-immunology, brain-gut connection, diagnostic testing, mood disorders, insomnia and Lyme disease. He is a consultant to the natural products & laboratory industry. Dr. Bush sits on advisory boards to multiple companies and non-profits. Dr. Bush lives in Stillwater with his naturopathic wife and four daughters.

Bradley Bush, ND
Who are we talking about?

Better with restrictive diets, but can’t expand diet menu.

Success on Paleo, Whole30, Atkins, GAPS, Low FODMAP

“Always bloated, too gassy!”

“It all started after a round of antibiotics.”

“My illness created food allergies.”

“My joints, muscles, head aches after eating certain foods.”
Small Intestinal Bacterial Overgrowth (SIBO)

SIBO is defined as an excessive amount of bacteria in the small intestines.

SIBO is a condition where colonic (anaerobic) bacteria (those normally found in the large intestines) are found in significant populations in the small intestines; where they ferment disaccharides.

SIBO bacteria produce gasses (H₂ and CH₄) as by-product of complex sugar (disaccharide) metabolism.

Most common SIBO bacteria:
Aerophilic strains = Streptococcus, Escherichia coli, Staphylococcus, Klebsiella.
Anaerobes = Bacteroides, Lactobacillus, Clostridium.
Colonic Bacteria

- Most bacteria are limited to the colon.
- Most bacteria contained in food are killed by the acidity of the stomach.
- Fiber, not consumed in the small intestines, is fermented in the colon producing short-chain fatty acids (SCFAs).
- Colonic bacteria contribute to stool bulk.
- SCFAs reduce colonic pH.
SIBO Symptoms

Classic Symptoms
Nausea, flatulence, bloating, diarrhea, halitosis, constipation, malnutrition

Other Symptoms
Muscle weakness, joint pain(s), brain fog, anxiety, insomnia, headaches, GERD, neuropathy and skin rashes
4 Sources for Intestinal Gasses:

1. swallowed air and air mixed with food
2. chemical reactions in the gut
3. diffusion of gases from the blood stream
4. microbial metabolism


Bloating, Gas, Diarrhea

- Healthy humans when fasting and at rest do not exhale hydrogen. As hydrogen is only generated during anaerobic metabolism and the human organism at rest does not have anaerobic metabolism, the hydrogen excreted with the exhaled air must originate from anaerobic bacteria.

- Anaerobic bacteria prefer to metabolize sugar molecules, which, as part of a fermentation reaction, are initially broken down into short-chain fatty acids (SCFA), carbon dioxide (CO₂) and hydrogen (H₂).

- A large part of the CO₂ remains in the intestines and leads to the symptom of bloating.

- SCFA generate an osmotic gradient and, by doing so, absorb water into the intestinal lumen, which leads to the symptom of diarrhea.

- The hydrogen generated in the intestines passes the intestinal wall, ends up in the bloodstream, is transported to the lungs and excreted as part of the exhaled breath.
### Reported Prevalence of Small Intestinal Bacterial Overgrowth

<table>
<thead>
<tr>
<th>Condition</th>
<th>SIBO Prevalence Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Study Controls</td>
<td>0-20%</td>
</tr>
<tr>
<td>Celiac disease</td>
<td>up to 67%</td>
</tr>
<tr>
<td>Crohn’s disease</td>
<td>up to 88%</td>
</tr>
<tr>
<td>Ulcerative Colitis</td>
<td>81%</td>
</tr>
<tr>
<td>Chronic Fatigue Syndrome</td>
<td>81%</td>
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<tr>
<td>Fibromyalgia</td>
<td>93%</td>
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<tr>
<td>Irritable Bowel Syndrome</td>
<td>up to 78%</td>
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<tr>
<td>Gastrectomy</td>
<td>63-78%</td>
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<tr>
<td>Connect Tissue Disease (e.g. Scleroderma)</td>
<td>43-55%</td>
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<tr>
<td>Diabetes Type II</td>
<td>up to 44%</td>
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<tr>
<td>Hypothyroidism</td>
<td>54%</td>
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<tr>
<td>Obesity</td>
<td>up to 41%</td>
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<tr>
<td>Rosacea</td>
<td>46%</td>
</tr>
<tr>
<td>Hypochlorhydria (drug-induced)</td>
<td>up to 78%</td>
</tr>
</tbody>
</table>

Prevalence of SIBO and/or Small Intestinal Overgrowth (SIFO) in Study Population

Jacobs et al., Aliment Pharmacy The 2013; 37: 1103-1111
### Underlying Issues of SIBO

| Anatomic Abnormalities                  | Gastric atrophy  
|                                        | Duodenal or jejunal diverticula  
|                                        | Stenosis & obstructions  
|                                        | Post-surgical alterations  
|                                        | (blind loops, resections, jejunoileal by-pass)  
| Motility Dysfunction                   | Systemic sclerosis  
|                                        | Parkinson disease  
|                                        | Diabetic neuropathy  
|                                        | Ileocecal valve incontinence  
| Other conditions                       | Aging  
|                                        | Malnutrition  
|                                        | Acid blocking meds (e.g. PPIs)  

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# Nutrient Deficiencies and Symptoms

<table>
<thead>
<tr>
<th>Nutrient Deficiency</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A deficiency</td>
<td>Night blindness, Xeropthalmia, Leaky gut, increase LPS</td>
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<tr>
<td>Vitamin D deficiency</td>
<td>Osteomalacia, hypocalcemia tetany</td>
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<tr>
<td>Vitamin E deficiency</td>
<td>Neuropathy, hemolysis</td>
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<tr>
<td>Vitamin K deficiency</td>
<td>Coagulopathy</td>
</tr>
<tr>
<td>Vitamin B12 deficiency</td>
<td>Peripheral neuropathy, mesoblastic anemia</td>
</tr>
<tr>
<td>Hypoalbuminemia</td>
<td>Edema</td>
</tr>
<tr>
<td>Fat malabsorption</td>
<td>Weight loss, steatorrhea diarrhea</td>
</tr>
<tr>
<td>Carbohydrate malabsorption</td>
<td>Weight loss, diarrhea</td>
</tr>
<tr>
<td>Iron deficiency</td>
<td>Microcystic anemia, fatigue</td>
</tr>
</tbody>
</table>
Nutritional Deficiencies in SIBO

• Deficiencies in fat-soluble vitamins (A, D, E, and K); due to bacterial deconjugation of bile salts.

• Cobalamin (vitamin B12) deficiency. Folate levels can be normal but frequently are elevated due to increased synthesis of folate by small bowel bacteria.

• Magnesium deficiencies commonly seen in clinic; muscle twitching.

Multifactorial Diet Treatments

- Sugar malabsorption issues
  - lactulose
  - fructose
- Dietary fat changes
  - MCFA substitute
  - Digestive support: pancreatic enzymes, ox bile.
- Low FODMAP foods
- Episodic diet restrictions, fasts
- Fad diet leverage: Whole30, Paleo, Atkins, etc.
Address Nutrient Deficiencies

• B12 (oral, sublingual and/or IM)
• Fat soluble vitamins
• Calcium, magnesium and iron
• Consider HCL supplementation
GI Prokinetics

Drugs/supplements that promote or restore coordinated gastrointestinal motor function leading to enhancement of propulsive activity.
GI Prokinetics Options

- Erythromycin 50mg hs. Compounding necessary for this low dose, or quarter a 250mg pill to get 62.5 mg.
- Low-dose Naltrexone (LDN)- 2.5 mg for diarrhea types or 5 mg for constipation types, at bedtime (Ploesser et al. 2010)
- Iberogast: 20 drops after meals.

Reduce bacterial loads and improve digestion
- Betaine HCL: Reduces bacterial levels in food and support proper digestion, often reducing transit time. Low stomach acids can also lead to increase incidence of food allergies and H. pylori infection (stomach ulcers).
- Pancreatic digestive enzymes with meals: these can reduce the amount of fermentation of undigested foods.
- Ox Bile before meals.

Hypothyroid is major cause of motility disorders.

Need to expand test screening: fT3, fT4, TSH, TPO antibodies, anti-thyroglobulin antibodies. rT3 can also be done.

Hypothyroidism can cause: constipation (decreased gut motility), decreased taste sensation, gastric atrophy, edema (non-pitting).

Pernicious anemia occurs in 10% of autoimmune thyroiditis.
SIBO’s Link to Estrogen Metabolism

- Small intestinal blood flows directly into liver.
- SIBO is a cause of non-alcoholic fatty liver disease.
2-Hydroxyestrone
16-alpha-Hydroxyestrone
DIM 100-200 mg daily

Research shows that Diindolylmethane (DIM) can support healthy estrogen metabolism.
COMT Met/Met mutations:
- Estrogen metabolism
- Catecholamine catabolism

SAMe 200mg: 1-2 caps qam

Lower doses needed if also address other methylation issues: MTHFR, B12 issues, etc.

Synergistic: Calcium d-Glucarate 200mg daily.
20 yo female
PMS, acne, anxiety, brain fog, bloating, gas, constipation

Family Hx: Elevated serotonin, MAO A mutations
20 yo female
PMS, acne, anxiety, brain fog, bloating, gas, constipation
Case Study

20 yo female
PMS, acne, anxiety, brain fog, bloating, gas, constipation

90% better after Rifaximin treatment. Acne, PMS and Sleep better.

SIBO Treatments
- Herbal antibiotics x 2 weeks
- Rifaximin 550mg TID + Neomycin 500mg BID x 2 weeks
- Rifaximin 550mg TID + Metronidizole 500mg BID 2 weeks

Hormonal treatments
- DIM 75 mg and Calcium D-Glucurate 200mg daily.
- Castor Oil Packs
- SIBO treatment
- Paleo diet

Anxiety/ Sleep/Cognitive Treatments
- 4-amino-3-phenylbutyric acid 220mg hs
- DL-phenylalanine 500mg qam for 2 months
- Licorice root 200mg qam for 2 months
Breath Testing

- Originally was used mostly to detect lactose intolerance (milk intolerance).
- Expanded to other complex sugars including: fructose (from fruits), maltose (from starches), and sucrose (common table sugar).
Methane Production

• About 30% of adult population (the so-called ‘CH4 producers’) harbour high concentrations of methanogenic flora, normally present in the left colon, able to consume large quantities of hydrogen to produce methane.

• Methanogenesis consumes 4 moles of H2 to reduce 1 mole of CO2 to CH4.

• Methane-producing bacteria outcompete other H2-consuming bacteria for common H2 substrate.


fasting level of ≥5 and ≥10 ppm can respectively predict excessive methane production with specificity of 99.7 and 100% while sensitivity was of 96.1% and 86.4%


Hydrogen Sulphide Bacteria

CH4 producers sulphate-reducing bacteria, normally present throughout the colon, seem to be limited to the right colon.

HS-producing bacteria may be responsible for unexplained elevated H2 at baseline in breath testing.


SIBO Testing before Carbohydrate Malabsorption Testing

SIBO should be excluded prior to BT for carbohydrate malabsorption to avoid false positives. In the presence of SIBO, fructose and lactose are prematurely exposed to excessive small intestinal bacterial composition that will lead to early fermentation and elevation of exhaled gases.

Patient Screening

• ** Confirm classic SIBO symptoms:** gas, bloating, diarrhea and constipation.

• **Factor in any dietary restrictions:** e.g. avoids all dairy and gluten with dietary challenges resulting in classic SIBO symptoms. Better on FODMAP, Paleo, or Whole30 diets.

• **Onset of symptoms:** after antibiotics or abdominal surgery.

• **Commonly falsely diagnosed as:** IBS, estrogen dominance, Lyme disease, food sensitivities, MS, fibromyalgia and chronic fatigue.
**Table 1. Contraindications for hydrogen breath tests.**

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**Absolute contraindications**
- Known or suspected hereditary fructose intolerance (CI for fructose load test, sorbitol load test)
- Known or suspected (postprandial) hypoglycaemia

**Relative contraindications**
- Administration of antibiotics (in the last four weeks)
- Colonoscopy (in the last four weeks)
- Irrigoscopy (in the last four weeks)
- Fluoroscopy of the small bowel according to Sellink (in the last four weeks)
- Ileostomy (except for the diagnosis of SIBOS)
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Glucose vs. Lactulose

Glucose

- Sensitivity 93%
- Specificity 86%
- Absorbed exclusively in small intestines
- Glucose is absorbed completely in the upper small intestine and may not be able to diagnose SIBO of the distal small intestine (ileum)

Lactulose

- Sensitivity 68%
- Specificity 100%
- Absorbed in both the small and large intestines
- Commonly increases transit time
- Does not raise blood sugar levels
- Allows for double-peak observations


Glucose Challenge

Advantage

• LBT is inappropriate for SIBO diagnosis in patients with rapid bowel transit (Walters 2005, Riordan 1996)

• Lactulose itself induces rapid small intestinal transit. (Bond et al. 1975)

Criteria for Positive

**Glucose**

- A rise over lowest preceding value in hydrogen production of 12 parts per million (ppm) or greater within 120 minutes PSC*.
- A rise over lowest preceding value in methane production of 12 ppm or greater within 120 minutes PSC.
- A rise over lowest preceding value in the combined sum of hydrogen and methane production of 12 ppm or greater within 120 minutes PSC.

**Lactulose**

- A rise over lowest preceding value in hydrogen production of 20 parts per million (ppm) or greater within 120 minutes PSC.
- A rise over lowest preceding value in methane production of 12 ppm or greater within 120 minutes PSC.
- A rise over lowest preceding value in the combined sum of hydrogen and methane production of 15 ppm or greater within 120 minutes PSC.

*PSC = Post substrate challenge*
What is Lactulose?

• Produced by isomerization of lactose.
• A disaccharide sugar formed from one molecule each of fructose & galactose (monosaccharides).
• Not absorbed in the small intestine nor broken down by human enzymes.
• Prescription required in USA.
Prescription Required for Lactulose

• Lactulose is a prescriptive drug and therefore regulated by the FDA.

• The CLIA Program regulates laboratory devices and systems.

• QuinTron Breath Analyzers (lab equipment) have CLIA certificate of waiver; test collection materials and lactulose does not.

• WARNING: Practitioners are ultimately held responsible for prescribing without a license.
Quality Control

Exceeding the lab equipment manufacture’s suggested quality control recommendations for usage, maintenance and storage.

**Frequent Calibrations**: Lab equipment is calibrated before each test run and after every 5th test to ensure the most precise measurements for each of your patient’s samples.

**CO2 Correction Factor**: All samples are processed using carbon dioxide (CO2) correction factor technique that improves sample standardization and interpretation.

**Stability**: Ambient room temperature and humidity monitored and tightly controlled to reduce environmental impacts.

**Reducing inferring factors**: Sample processing and testing is conducted in a windowless room free of sun exposure to sample tubes or laboratory machinery.

**Partnering with Industry Leaders**: uses QuinTron's patented EasySampler™ Test Kits. Trusted by hospitals, gastroenterologist and other great institutions world-wide. Consistent with materials used in most published SIBO research.
Indications for Breath Testing

• For diagnosis of SIBO

• Assess presence of antibiotic-responsive microbial colonization of the GI tract

• Evaluate for excessive methane excretion with clinical constipation and slowing of GI transit.

• Diagnosis of carbohydrate maldigestion syndromes

• With presence of bloating
100% agree that SIBO is ruled out before performing a lactulose of fructose breath test.

Positive findings:

- Hydrogen $\geq 20$ ppm
- Methane $\geq 10$ ppm
Case Study – Hydrogen Pos.

Notes:

Pre-test notes:

In-test notes:
Diagnostic criteria met: A rise over lowest preceding value in hydrogen production of 37 ppm and rise in total gases (hydrogen + methane) of 42 ppm within 120 minutes after ingesting lactulose.

Diagnosis/Recommendation:

Diagnosis = POSITIVE for Small Intestinal Bacterial Overgrowth (SIBO), ICD-10 A04.9

<table>
<thead>
<tr>
<th>Sample</th>
<th>Time</th>
<th>ppm H2</th>
<th>ppm CH4</th>
<th>ppm H2 + CH4</th>
<th>% CO2</th>
<th>Correction</th>
<th>Symptoms</th>
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<td>3</td>
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<td>1</td>
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<td>3.7</td>
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<td>3</td>
<td>11</td>
<td>4</td>
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<td>13</td>
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<td>7</td>
<td>47</td>
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<td>1.37</td>
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<td>4</td>
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<td>5</td>
<td>21</td>
<td>4</td>
<td>1.37</td>
<td></td>
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</table>
Case Study – Methane Pos.

Notes:

Pre-test notes:
Pre-test symptoms:
In-test notes:
A rise over lowest preceding value in methane production of 80 ppm or greater within 120 minutes and rise in total gases (hydrogen + methane) of 109 ppm within 120 minutes after ingesting lactulose.

Diagnosis/Recommendation:

Diagnosis = POSITIVE for Small Intestinal Bacterial Overgrowth (SIBO), ICD-10 A04.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Time</th>
<th>ppm H2</th>
<th>ppm CH4</th>
<th>ppm H2 + CH4</th>
<th>% CO2</th>
<th>Correction</th>
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<td>125</td>
<td>129</td>
<td>4.1</td>
<td>1.34</td>
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</table>
Recognized diagnostic criteria for SIBO provided by laboratory machine manufacturer:

- A rise over lowest preceding value in hydrogen production of 20 parts per million (ppm) or greater within 120 minutes after ingesting lactulose

- A rise over lowest preceding value in methane production of 12 ppm or greater within 120 minutes after ingesting lactulose

- A rise over lowest preceding value in the combined sum of hydrogen and methane production of 15 ppm or greater within 120 minutes after ingesting lactulose.
Pre-Test Prep - Avoid

No antibiotics or antifungals 4 WEEKS (28 days) BEFORE TESTING.

WAIT TWO WEEKS (14 days) after surgery, colonoscopy, enemas, or colonics.

4 DAYS BEFORE YOUR TEST avoid all laxatives. This includes (high dose) vitamin C and magnesium that is being taken specifically to induce a laxative effect.

Avoid fermented foods 1 day before testing.

No smoking, including second-hand smoke, for at least 1 hour before or at any time during the breath test.

No sleeping or vigorous exercise for at least 1 hour before or at any time during the breath test.
Prep Diet

• Constipation = 2 Days; Diarrhea = 1 Day

• Fasting overnight 12-hours before testing

• Prep Diet:
  • You may drink plain water, coffee, tea (no sugar/artificial sweeteners or cream added)
  • Baked or broiled chicken, fish or turkey. (Salt and pepper only)
  • Plain steamed white rice
  • Eggs
  • Clear chicken or beef broth (meat broth not bones with cartilage)
Additional Prep Diet Suggestions

• The last meal on the day preceding the test should not be too ample and should ideally not consist of any fiber. On the day prior to the test, products such as onions, leeks, garlic, cabbage, pickled cabbage or beans should be avoided.

• Twelve hours prior to the test, the patient should stop smoking and chewing gum

• Bacteriacidic mouthwash can be used prior to testing.

• Hyperventilation was seen to reduce hydrogen breath levels. Normal breathing was shown to contain higher hydrogen levels.

• The colon is not the only region of the in normal human gastrointestinal tract which harbors anaerobic bacteria. The mouth and pharynx are also colonized by anaerobes capable of carbohydrate fermentation.

Additional Prep Diet Suggestions

Not necessary to stop proton pump inhibitors prior to breath testing.

How to Collect

Some labs may have a collection instructions video posted online.

• Gentle exhale.

• Breath-Count 1, 2 - Connect tube - Count 1, 2 - Disconnect tube - Then stop exhaling breath.
Treatment Options

• Diet: FODMAP/ Specific Carbohydrate Diet
• Elemental Diet
• Herbal antibiotics
• Antibiotics
Herbal Antibiotics

Shown to be as effective as Rifaximin in SIBO treatment.

Recommend to be taken pre- & post- any antibiotic regimen.

Many traditional herbs are effective.

Keys: dose appropriately, 1-3 months, rotate non-enteric and enteric varieties.

Herbal Antibiotics

Basic
• Oil of oregano 100mg BID
• Berberine 1,000mg BID
• Garlic (Allicin) BID

Additional Considerations

• NAC 1,000mg: BID-TID (biofilms, anti-inflammatory)

• Probiotics: regular and high dose
SIBO Antibiotic Treatments

• Rifaximin 550mg TID po x 14 days; traditional treatment.

• Rifaximin 550mg TID po + Neomycin 500mg BID x 10-14 days; methane + treatment.

• Repeat treatment: Rifaximin 550mg TID po + metronidazole 500mg BID x 14 days. 2nd round very commonly needed.


Rifaximin

- Rifaximin is a product of synthesis experiments designed to modify the parent compound, rifamycin, in order to achieve low gastrointestinal absorption while retaining good antibacterial activity.

- Meta-analysis of thirty-two studies involving 1331 patients showed 70.8% effective in eradicating SIBO with 4.6% overall rate of adverse events.

- Rifaximin SIBO eradication success varies widely due to study size and design.

Rifaximin +

- Hydrolyzed guar gum + Rifaximin = 87.1%
- Probiotics (Lactobacilli and Bifidobacteria) + Rifaximin = 82.6%

Rotating Antibiotic Treatment Options

Low Risk

- Gentamicin 5mg/kg/dose po BID x 7 days - Metronidazole 10mg/kg/dose po BID x 7 days - No antibiotics x 7 days.

Moderate Risk (no radiological or clinical evidence of dysmotility)

- Gentamicin 5mg/kg/dose po BID x 7 days - Metronidazole 10mg/kg/dose po BID x 7 days

High Risk (radiological or clinical evidence of dysmotility)

- Gentamicin 5mg/kg/dose po BID x 7 days - Metronidazole 10mg/kg/dose po BID x 7 days - Amoxicillin-clavulanic acid 15mg/kg/dose po BID x 7 days.

Anaerobic Specific

• Metronidazole
• Clindamycin

Not good mono-therapy options.
Caution with Antibiotic Usage

• *Clostridium difficile* infection (CDI) is also an important caveat of all antibiotic treatments. IBD patients are at an increased risk. (Nitzan et al. 2013)

• May result in a rebound effect on gut bacteria. Post antibiotic treatment resulted in a dramatic increase in concentrations of mucosal bacteria. (Swidsinski et al. 2008)

• IBD in children is associated with antibiotic usage. (Hviid et al. 2011)

• Antibiotic resistance


Elemental Diet formulas contain a balanced blend of macronutrients fortified with essential vitamins, minerals, and electrolytes to assure comprehensive support as a sole source of nutritional intake for limited periods.

Specifically formulated to contain free amino acids, partially hydrolyzed carbohydrate and medium chain triglycerides to aid in their absorption from the GI lumen. Designed to maintain nutritional sustenance as a sole source of nutrition for up to four weeks.

Not all are produced as a strictly hypoallergenic formula, free from intact protein, polypeptides, corn, gluten, wheat, soy, and dairy.

Brand #1 = 1 Scoop  36g  150 Calories

Recommended use: 2 scoops 3-5 times daily as a temporary replacement for food.

By Unit

Small bag (432g) = 12 Scoops 1800 Calories

Large bag (1296g) = 36 Scoops 5400 Calories
Ending Elemental Diet

Foods you had been eating before, could have been contributing to your SIBO. It is best not to immediately reintroduce these foods and slowly increase diversity and complexity of your diet.

Transition Diet

Day 1-2 No fiber (breath test prep diet): meats, eggs (yolks 1st), fats if tolerated: 1/4 - 1/2 cup white rice, dairy optional (lactose free dairy (aged cheese, 24 hr yogurt, commercial lactulose free dairy)

Day 2-3: Add cooked pureed low FODMAP/ vegetables.

Considerations

Beginning with broths and soups and slowly increase the volume to help stimulate peristalsis.

SIBO Diet (short term, diet should be expanded)

LOW FODMAP Diet (short term, diet should be expanded)

Bi-Phasic Diet (Phase 2 Diet: homemade yogurt, butter, aged cheese, fruits (2 servings daily), veggies, limited grains (white rice, rice noodles, quinoa), legumes (lentil, lima), alcohol (clear spirits limited to 30ml every other day), sweeteners (raw cacao, honey, stevia).
32 yo female dx with Lyme disease and treated 9 months with antibiotics. SIBO dx and treated with herbal and prescriptive antibiotics. “Lyme disease” symptoms reduced by 90% after SIBO treatments.
42 yo female dx with eating disorder was positive for SIBO. Treatments resulted in significant reduction in food aversions and improved mood/energy. Treated with botanicals, antibiotics and elemental diet.
54 yo male with post-Lyme treatment syndrome. Burning mouth and esophagus syndrome. No diarrhea or constipation. Gas with most meals.

12 months antibiotics to address Lyme, Bartonella and Babesia.

Burning mouth syndrome and extreme fatigue continued.

First improvements occurred after SIBO herbal and antibiotic treatments.

After 2nd round of treatments symptoms suggested Babesiosis as main issue.
Case Study - Flat Line

Notes:

Pre-test notes:

In-test notes:
Diagnostic criteria was not met for Small Intestinal Bacterial Overgrowth (SIBO). Maximum methane elevation (<120 min) = 1 Maximum hydrogen elevation (<120 min) = 2 Late peak of hydrogen and methane was not observed following lactulose ingestion suggesting that there could be a reduction in the bacteria count in the entire intestinal tract.

Diagnosis/Recommendation:

Diagnosis = NEGATIVE for Small Intestinal Bacterial Overgrowth. If GI symptoms are observed additional testing may be recommended including: stool analysis, microflora stool analysis.

<table>
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<tr>
<th>Sample</th>
<th>Time</th>
<th>ppm H2</th>
<th>ppm CH4</th>
<th>ppm H2 + CH4</th>
<th>% CO2</th>
<th>Correction</th>
<th>Symptoms</th>
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<td>3.3</td>
<td>1.66</td>
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<td>3</td>
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<td>6</td>
<td>3</td>
<td>1.83</td>
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<tr>
<td>#9 - 180</td>
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<td>3</td>
<td>6</td>
<td>3.6</td>
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</tr>
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</table>
Case Study - Flat Line

Miscellaneous:
Late peak of hydrogen and methane was not observed following lactulose ingestion suggesting that there could be a reduction in the bacteria count in the entire intestinal tract.

Causes for Flat Line Results

• Testing too soon after antibiotics
• Lack of intestinal gut flora
• Presence of hydrogen-sulfide SIBO

The unique symptom of H2S production is "rotten egg" odor to the belching or flatus.
16 yo female
Chronic insomnia, anxiety, constipation and abdominal pains. Past Hx of bulimia and food aversions.

IgG food sensitivity test and elimination diet resulted in improved but persistent symptoms.
16 yo female
Chronic insomnia, anxiety, constipation and abdominal pains. Past Hx of bulimia.

Did not tolerate herbal treatments well. Gastroenterologist did not properly treat and symptoms disappeared for 2 weeks and returned.

Insomnia and anxiety stopped after 2nd round of antibiotics
Case Study

• 57 yr old female
• Persistent SIBO
• Main complaint chronic insomnia. Wake up at 3am feeling “overly caffeinated.”
• “Side effects” with most drugs/products. e.g. constipation with berberine, headache with digestive enzymes.
June 2015
Tx: herbal antibiotics (too few, too low of dosing)

May 2017
Tx: herbal and Rx antibiotics
Sleep better for 3 months and then worse.
September 2017
Treatment resistant SIBO
Tx: Elemental Diet

October 2017
Sleep better, no bloating
energy is good.
SIBO Conclusions

• SIBO is a challenging and complex clinical condition with etiology typically multifactorial and symptoms misdiagnosed.

• Diagnosis best determined by breath testing with a sugar challenge after a preparation diet. Most common labs do not detect SIBO.

• Treatments include antimicrobials, Elemental Diet, dietary restrictions, nutrient repletion, gut barrier support, root cause support including digestive aids.
Contact Dr. Bush...

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