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How SIBO Causes the Symptoms Of IBS

There are two main pathophysiological issues involved in SIBO. First, bacteria can ferment food meant for the host simply by their inappropriate location in the small intestine, which allows them premature exposure to host nutrition. Bacterial fermentation produces hydrogen and/or methane gas. Bacterial gas leads to the IBS symptoms of bloating, pain, altered bowel movements, eructation and flatulence (Figure 1). The quantity of gas may be extensive, causing bloating/distention.[26] Excess gas can then exit the body as flatulence or eructation. The intestines are sensitive to pressure and therefore the pressure of distention can lead to abdominal pain. In addition, visceral hypersensitivity, a feature of IBS, may create a lower threshold for pain/discomfort and a hyperresponsiveness of muscular contraction in response to the gas, leading to cramps in some.[27,28] The gases also affect bowel motility with hydrogen having a greater association with diarrhea and methane having an almost exclusive association with constipation.[29,30] Methane has been shown to slow gastrointestinal motility by 59% in animal studies, and the volume of methane overproduction correlates with the severity of constipation.[31,32] Therefore when both hydrogen and methane are present, diarrhea, constipation, or a mixture of both can be present based on the relative amounts of gases.[29] The bacterial consumption and uptake of host nutrients, such as B12 and iron, can lead to macrocytic and/or microcytic anemia or chronic low ferritin, in addition to general malabsorption and malnutrition in more severe cases.[8,33] The increased motility of diarrhea may also induce malabsorption. Finally, continuous fermentation of host nutrition by repeated exposure to daily meals, perpetuates bacterial overgrowth and its symptoms, creating a vicious cycle (Figure 1).

Second, bacteria damage the digestive and absorptive structure and function of the small intestine. This occurs because, unlike the large intestine, the small intestine is not designed for large colonization. The damage leads to both gastrointestinal and systemic symptoms (Figure 2). Key damaging factors are: bacterial deconjugation of bile, which creates fat malabsorption (steatorrhea, fat-soluble vitamin deficiency); bacterial digestion of disaccharide enzymes, which furthers carbohydrate malabsorption, fermentation, and gas; and increased intestinal permeability (leaky gut), which leads to systemic symptoms.[34–38]

Diagnosis of SIBO

As mentioned above, hydrogen/methane breath testing is the most common method of assessing SIBO. Instrumentation is available from Quintron Instrument Company in Milwaukee, Wisconsin. It provides a device called the Breathtracker, which is used to measure these gases following a 24-hour prep diet and an overnight fast. After collection of a fasting baseline specimen, a solution of lactulose – an unabsorbable synthetic sugar – is ingested as the substrate for bacterial fermentation. Lactulose is nonabsorbable because only bacteria, not humans, produce the enzymes to digest it. It takes the lactulose approximately 2 hours to traverse the small bowel. Glucose may also be used as a test substance, but because of its rapid absorption in the proximal small intestine, it may fail to identify more distal SIBO.[24] Serial breath specimens are taken every 20 minutes during this time and for a third hour as well. Tests may be done at a facility with a Breathtracker or at home with a kit. Kit breath samples are exhaled into special vials similar to a vacutainer tube which stores the labeled sample until it can be delivered to the lab for analysis. In the Portland, Oregon, area, SIBO breath testing is available at our lab (NCNM Clinic Laboratory) as well as at the Oregon Health and Science University and Emanuel Hospital endoscopy centers. Out-of-town samples can be mailed, and other testing sites are available around the country. Not all labs have the equipment to test for methane. Methane testing is important because treatment is different for methane versus hydrogen.

Preparation for the test varies from lab to lab, but a typical prep diet is limited to white rice, fish/poultry/meat, eggs, clear beef or chicken broth (not bone broth or bouillon), oil, salt, and pepper. The purpose of the prep diet is to get a clear reaction to the test solution by reducing fermentable foods the day before. In some cases, two days of prep diet may be needed to reduce baseline gases to negative. Antibiotics should not be used for at least 2 weeks prior to an initial test; some sources recommend 4 weeks.[39]

Interpretation of the test varies among practitioners. The criteria provided by Quin Tron for a positive test are as follows:

- a rise over baseline in hydrogen production of 20 parts per million (ppm) or greater within 120 minutes after ingesting the test substrate
- a rise over baseline in methane production of 12 ppm or greater within 120 minutes after ingesting the test substrate
- a rise over baseline in the sum of hydrogen and methane production of 15 ppm or greater within 120 minutes after ingesting the test substrate

Figure 1

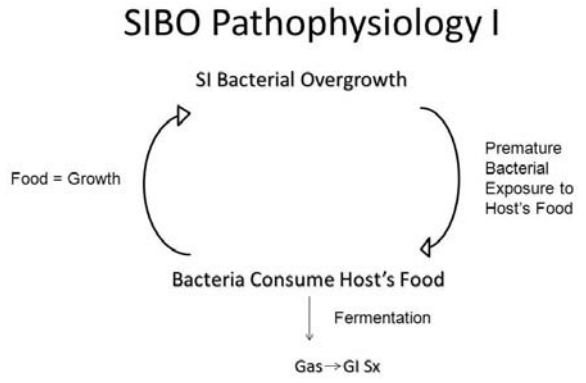

Figure 2