We have found that an absolute level of gases at or above the positive ppm levels provided by Quin Tron, without a rise over baseline, correlates well with clinical SIBO. This is especially true for methane gas, which can have a pattern of elevated baseline (over 12 ppm) which remains elevated for the duration of the test. In cases such as these, methane may only *rise* 5 ppm over baseline, but the ppm level is consistently above positive. Interpretation of elevated hydrogen or methane on the baseline specimen (pre-lactulose ingestion) is controversial, but we prefer to consider a high baseline to be a positive test.[31,40]

The classic positive for SIBO has been considered to be a double peak, with the first peak representing the SIBO and the second peak representing the normal large intestine bacteria. This is an infrequent presentation in our experience. More frequently we see one peak that rises highest in the third hour, representing distal SIBO and then the normal LI bacteria.

If the measured gases do not rise until after 120 minutes, it is possible that this is due to a prolonged transit time, which we have seen in patients with severe constipation. In such a patient with the expected symptom picture for constipation type SIBO, a significant rise at 140 minutes may be interpreted as a positive test.

Breath testing may be used in pediatric cases, so long as the child can follow instructions to blow. For those under 3 years old, testing is best done on site at a lab due to differences in collection methods versus at-home kits. Pediatric lactulose dosing is 1g/kg body weight with a maximum of 10 g (22 pounds and above receive the max/adult dose of 10 g).[41] Lactulose requires a prescription.

Treatment of SIBO

In 2006, Pimentel shared his treatment algorithm for IBS with SIBO which included the use of either antibiotics, elemental diet or both.[28] Our approach offers two additional options: diet and herbal antibiotics (Figure 3, p. 89).

Diet

We advise diet (Specific Carbohydrate Diet or Gut and Psychology Syndrome Diet) for all SIBO patients.[42,43] Since bacteria use carbohydrates as their energy source and ferment them to gas, a low-carbohydrate diet can directly reduce symptoms by decreasing the amount of gas produced.[44] Reducing carbohydrates may also reduce the overall bacterial load as the food supply shrinks, though formal studies to validate this are lacking. These diets decrease polysaccharides, oligosaccharides, and disaccharides by eliminating all grains, starchy vegetables, lactose, sweeteners other than honey, and in the beginning, beans. Many patients experience a rapid and significant decrease in symptoms after starting a SIBO diet. The Specific Carbohydrate Diet (SCD) has been reported to have an 84% success rate for inflammatory bowel disease, a condition commonly associated with SIBO.[45,46]

Diet alone has proven successful for infants and children, but for adults one or more of the other three treatment options are often needed to reduce bacteria quickly, particularly in cases in which diet needs to be very restricted to obtain symptomatic relief. Additionally, any diet will always need to be customized to the individual by trial and error over time. That being said, following a diet prescription offers a place to start. We have found that using the SCD or Gut and Psychology Syndrome Diet (GAPS) as the core diet (Table 1), with the incorporation of the fruit and vegetable recommendations from the Low FODMAP Diet (Table 2 p. 88), is an effective approach. The Low FODMAP Diet is an IBS treatment diet that has investigated the fermentable levels of carbohydrate foods (fruits, vegetables, and grains) and has a success rate of 76%.[47] The FODMAP Diet is not specifically designed for SIBO and therefore does not eliminate polysaccharide and disaccharide sources such as grains, starch, starchy vegetables, and sucrose. Eliminating these poly- and disaccharides is essential in SIBO because SIBO creates a situation in which these normally well-absorbed carbohydrates, foods that usually go to feed the host, can now feed bacteria inappropriately located in the small intestine, creating symptoms and worsening the problem (Figure 1).

Low-carbohydrate diets are weight-loss diets. Particular attention must be paid to those who are low weight or underweight. If a low-carb SIBO diet is causing too much weight loss, this dietary strategy will need to be altered to allow for more carbohydrates. In these circumstances, one or more of the other three treatment options should be considered along with white rice, glucose, and other carbohydrate sources.

Diet is also essential for prevention, post SIBO treatment.

Elemental Diet

An elemental diet can be used in place of antibiotics or herbal antibiotics to rapidly decrease bacteria. Elemental diets are powdered predigested nutrients that are mixed with water and used in hospitals for various gastrointestinal disorders to give digestion a rest. The concept behind this treatment for SIBO is that the nutrients will be absorbed before having a chance to feed the bacteria, thus feeding the person but starving the bacteria. It is used in place of all meals, for 2 to 3 weeks, and has a success rate of 80% to 85%.[48] Elemental diets are not protein powders or cleansing/detox formulas. They are available over the counter and are not covered by insurance, which can make this treatment course costly.

Antibiotics

The most studied and successful antibiotic for SIBO is rifaximin. It has a broad spectrum of activity and is nonabsorbable. Its nonabsorbability allows it to stay in the intestine, acting locally and it is therefore less likely to cause systemic side effects common to standard absorbable antibiotics.[49] Rifaximin has up to a 91% success rate and is given at 550 mg t.i.d × 14 days.[50,51] Additionally, rifaximin has several unique benefits: it does not cause yeast overgrowth, it decreases antibiotic resistance in bacteria by reducing plasmids, antibiotic resistance does not develop to it, making it effective for retreatments, and it is anti-inflammatory, decreasing intestinal inflammatory cytokines and inhibiting NF-κβ via the PXR gene.[52–54] Rifaximin is best used for SIBO when hydrogen is present, but when methane gas is present, double therapy of rifaximin plus neomycin (500 mg b.i.d. × 14 days) is more effective.[55] Many gastroenterologists

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Table 1: SCD/GAPS Resources

SCD	GAPS
Breaking the Vicious Cycle by Elaine Gottschall	*Gut and Psychology Syndrome* by Dr. Natasha Campbell-McBride
www.breakingthevisciouscycle.info	*Gaps Guide* by Baden Lashkov
www.scdlifestyle.com	gutandpsychologysyndrome.com