use metronidazole (250 mg t.i.d. × 14 days) as an alternative to neomycin (unpublished). Since different antibiotic regimens are recommended based on the gas type, breath testing is necessitated when considering this treatment.

Herbal Antibiotics

While there has only been one published report of herbal antibiotics in the treatment of SIBO, our experience is that they have similar effectiveness to antibiotics.[56] We have used the following botanicals: *Allium sativum, Hydrastis canadensis*, and other berberine-containing herbs, *Origanum vulgare*, cinnamon, and *Azadirachta indica*. We have used these as both single agents and in various combinations at dosages that are at the upper end of label suggestions × 30 days. Specific single dosages we have used include allicin extract of garlic: 450 mg b.i.d.–t.i.d., goldenseal/berberine: 5g q.d. in split dosage, emulsified oregano: 100 mg b.i.d., and neem: 300 mg t.i.d. Our breath testing has validated the need for the longer treatment period of 30 days for herbal antibiotics compared with 14 days for antibiotics. We have also observed with this method prolonged die-off reactions, which can last for the duration of treatment course. Studies on herbal antibiotics for SIBO are needed, particularly to identify botanicals effective in reducing methane.

Table 2: SIBO Fruit & Vegetable Guide

LESS FERMENTABLE[12]

Vegetables
Bok choy[4] 1 cup/85 g
Broccoli[1,2,4] ½ cup
Butternut squash[2,4] ¼ cup/30g
Cabbage[4] 1 cup/98g
Cabbage: savoy[1] ½ cup
Carrot
Celery root/celeriac
Chives
Collard greens
Cucumber
Eggplant
Endive/witlof
Fennel bulb[1,4] ½ cup
Ginger
Green beans
Kale
Kabocha squash/Jap pumpkin
Lettuce
Olives
Peppers: bell/sweet
Radicchio[2] 12 leaves
Radish
Rutabaga
Scallion: green part
Spinach[1] 15 leaves/150g
Swiss chard
Tomato
Yellow & sunburst squash
Zucchini/courgette[1] ¾ cup/100g

Fruit
Banana: fresh, dried
Berries: blueberry[1] <80 ea, boysenberry, strawberry, raspberry[1] 10ea/19g
Citrus: clementine, lemon, lime, mandarin, orange, tangelo, tangerine
Grapes
Kiwifruit
Melon: cantaloupe/rock, honeydew[1] ½ cup/100g
Papaya
Pineapple
Pomegranate[1] ½ ea/38g, ¼ cup seeds
Rhubarb

Sweetener
Honey: clover[5] 2 Tb/meal*

MODERATELY FERMENTABLE[12]
Limit to 1/ meal.*

Vegetables
Asparagus[3] 1 spear
Artichoke Hearts[3]: canned[6] ¼ cup
Brussels Sprouts[1,2,4] 4 ea/76g
Butternut Squash[2,4] ½ cup/60g
Cabbage[4] >1 cup/98g
Cabbage: Savoy[1] 3/4 cup
Leek[1] ½ ea/42g
Parsnip[10]
Peas: green[2] 1/3 cup/54g, snow peas[1,2,4] 7 pods
Pepper: chili[1,2] 40g
Spinach[1] >15 leaves/150g
Tomato: soup/juice[3]
Tomato: sun-dried[3] 2Tb/15g

Fruit
Berries: cranberry[1] 1Tb
Cherries[3,4] 3 ea
Citrus: grapefruit[1] ½ ea/104g
Melon: honeydew[1] >½ cup/100g
Pineapple: dried[1] 1 slice
*Meal = eating that is separated by 3–4 hours

Notes
1. fructans – FOS (oligosaccharide), inulin (prebiotic polysaccharide)
2. galactans – GOS: raffinose, stachyose (oligosaccharide)
3. fructose in excess of glucose (monosaccharide): only an issue for fructose malabsorbers
4. polyol/sugar alcohol – mannitol, sorbitol
5. our limited testing indicates that fructose malabsorbers can handle this amount of honey, particularly clover variety
6. water soluble fructose & fructans leach out (Gibson)
7. starch (polysaccharide)
8. soluble fiber – pectin, carrageenan, gums (prebiotic polysaccharide)
9. sugar/sucrose (disaccharide)
10. low FODMAP, low carb but SCD illegal – yet noted to do well for some by Gottschall
11. SCD Illegal
12. Adult quantities listed: reduce for children

MORE FERMENTABLE[12]

Vegetables
Asparagus[1,2,3] 4 spears
Artichoke[1]
Bean sprouts[11]
Beet[1] 4 slices
Bok choy[4] 1½ cup/127 g
Broccoli[1,2,4] 1 cup
Brussels sprouts[1,2,4] 6 ea/114g
Cabbage: savoy[1] 1 cup
Cauliflower[4]
Celery[4]
Corn[11]
Fennel bulb[1,4] >1 cup
Garlic[1]
Jerusalem artichoke[1,3]
Leek[1] 1 ea/84g
Mushrooms[1,4]
Onions[1]
Peas: green[2] ½ cup, sugar snap[3], snow peas[1,2,4] 10 pods,
Potato: white[7,11], sweet[4,7,13]
Starch powder[7,11]:arrowroot, corn, potato, rice, tapioca …
Seaweeds[8,11]
Scallions: white part[1]
Shallot[1]
Turnip[11,4]
Taro[11]
Water chestnuts[11]
Yam[11]
Yucca[11]
Zucchini/courgette[1] >¾ cup/100g

Fruit
Apple[3,4]
Apricot[1,4]
Avocado[1]
Berries: cranberry[1] 2 Tb, blackberry[4], raspberry[1] >50ea
Canned fruit in fruit juice[3]
Cherries[3,4] 6 ea
Citrus: grapefruit[1] 1 ea/207g
Dried[1]: current, date, fig, raison, prunes[1,4]
Jam/jelly[3,8,9]
Mango[3]
Nectarine[1,4]
Peach[1,4]
Pear[1,4]
Plantain[7,11]
Plum[4]
Pomegranate[1] 1 ea/76g, ½ cup seeds
Watermelon[1,3,4]

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Prevention of SIBO

SIBO is a disease that relapses because eradication itself does not always correct the underlying cause.[57,58] Pimentel's 2006 treatment algorithm includes 2 essential preventions: diet and a prokinetic (motility agent). Our approach offers 3 optional additions: hydrochloric acid, probiotics, and brush border healing supplements (Figure 3).

Prokinetic

A key underlying cause of SIBO is thought to be deficiency of the migrating motor complex (MMC), which moves bacteria down into the large intestine during fasting at night and between meals.[59] Prokinetics stimulate the MMC, symptomatically correcting this underlying cause. Prokinetics studied for SIBO include low-dose naltrexone 2.5 mg q.d., h.s., or b.i.d., low-dose erythromycin 50 mg h.s., and tegaserod 2–6 mg h.s.[59,60] Tegaserod has a higher success rate for SIBO prevention versus erythromycin, but has been withdrawn from the US for safety reasons.[59] Prucalopride 1–4 mg h.s. is not yet available in the US but is a safer alternative to tegaserod.[61] A trial removal of the prokinetic at ≥ 3 months is suggested but continued long-term use may be needed.[28]

Diet

A lower-carbohydrate diet is used in combination with a prokinetic to discourage a return of overgrowth of bacteria by limiting the food that they thrive on. Once the overgrowth is gone and small intestine damage has healed, the diet can be expanded beyond the strictness of the SCD and GAPS diets. The time frame for this is uncertain. To our knowledge, only one study has examined