Small Intestinal Bacterial Overgrowth (SIBO)

Breath Test Interpretation Guidelines

Normally, most bacteria in the digestive tract is found in the large intestines. In fact, the large intestines can contain up to 17 times more bacteria than the small intestines.

When too much bacteria or too much of the wrong kind of bacteria is present in the small intestines, an individual is said to have small intestinal bacterial overgrowth (SIBO). This increased bacterial load results in excessive amounts of fermentation and inflammation. This leads to classic symptoms of SIBO including gas, bloating, and abdominal pain.

Hydrogen and methane breath testing assist in the diagnosis of SIBO. Glucose/Lactulose are commonly used as challenge substrates for breath tests identifying SIBO.

Common Symptoms and Reasons to Test for SIBO

- Nausea
- Flatulence
- Bloating
- Diarrhea
- Constipation
- Malnutrition
- Irritable Bowel Syndrome (IBS)
- Irritable Bowel Disease (IBD)
- Leaky Gut Syndrome
- Chronic Fatigue Syndrome
- Acid Reflux
- Rosacea
- Restless Leg Syndrome (RLS)
- Fibromyalgia
- Gastroeseophageal Reflux Disease (GERD)
- Celiac Disease
- Diverticulitis

50-80% of individuals with IBS have SIBO.

Neurovanna Simplifies SIBO Diagnosis and Treatment

Results

Lab report show measured gas levels in both table and line-graph formats. The report indicates if results meet the generally recognized SIBO guidelines.

Interpretations

Doctors who are experts in diagnosing and treating SIBO generate test interpretations.

The report includes doctor-generated interpretations based on gas measurements, submitted patient information, and patient's reaction to consumed substrate during their 3-hour breath collection test.

Observational feedback on potential collection issues and dietary impact on data along with any unique data feedback is also included.

Recommendations

Actively-practicing SIBO experts provide treatment recommendations.

Consults with SIBO specialist doctors are available for active Neurovanna clients.

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Neurovanna SIBO Diagnostic Criteria

Although no universal diagnostic criteria for non-invasive diagnosis of SIBO exists, generally accepted conservative guidelines for breath test diagnosis of SIBO have been established in the medical literature.

	Glucose (Parts per million)	Lactulose (Parts per million)
Rise in hydrogen production within 120 minutes of post substrate consumption (PSC)	≥12	≥20
Rise in methane production within 120 minutes of PSC	≥10	≥10
A rise in the sum of hydrogen and methane production within 120 minutes of PSC	≥12	≥15

Clinical Considerations

Glucose Challenge This test requires drinking glucose. Consider the SIBO Lactulose Breath Test for patients with blood sugar control issues.

Lactulose Challenge Lactulose may contain trace amounts of lactose (up to 3% of volume). Lactulose should be avoided if severe allergy to lactose is present. <link> The glucose breath test may be used as an alternative.

Interfering Factors

- Inappropriate choice or incomplete avoidance of food the night before the test will provide a high, but gradually falling, level of hydrogen or methane.
- Rapid transit time can give a false-positive result.
- Delayed gastric emptying/slow transit can give a false-negative result.
- Smoking or sleep during collection can result in a false hydrogen positive.

Quality Control

Neurovanna's quality control exceeds laboratory equipment manufacturer's recommendations with machinery calibrated after every 2 hours or 5th test run. Testing performed on a CLIA waived, QuinTron BreathTracker™ Digital MicroLyzer H+. A parallel measurement of carbon dioxide (CO_2) is obtained with each sample to allow for greater testing precision. All samples are processed using CO_2 correction factor technique that reduces errors and improves interpretation.

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Fructose Malabsorption

Breath Test Interpretation Guidelines

There are two common causes of fructose malabsorption. First is a genetic error of hepatic enzyme aldolase B synthesis. Second is incomplete fructose absorption. In this case, the capacity of the gut to transport fructose across the intestinal epithelium is exceeded. The inability to keep up with fructose transport may be caused by disease/disorders, such as Celiac disease, that damage the intestines.[1, 2]

Fructose absorption capacity varies widely within the population. Up to 50% of the U.S. population is unable to absorb 25 g of pure fructose. In clinical trials, researchers found that up to 80% of healthy controls were unable to absorb a 50 g fructose load.[1, 2]

Symptoms of Fructose Malabsorption

- Abdominal pain
- Bloating
- Flatulence
- Diarrhea (commonly mistaken for irritable bowel syndrome)
- Small intestinal bacterial overgrowth (SIBO)
- Fungal overgrowth

Many people with fructose malabsorption can only tolerate up to 25 g of fructose and may need to improve health with additional nutritional counseling and/or digestive support.[1, 2]

Neurovanna Fructose Diagnostic Criteria

Numerous published studies, consensus papers and laboratory validations are used by clinicians to interpret breath test results. Laboratory diagnosis and commentary are provided to the practitioner for educational purposes and should not be considered as diagnostic.

- Methane production ≥12 parts per million (ppm) above baseline during the test[3]
- A rise in hydrogen production ≥20 ppm over baseline during the test[3,4]
- A rise in the sum of hydrogen and methane production of ≥15 ppm during the first 120 minutes of the test[4]

Clinical Considerations

Falsely elevated findings may result from:

- Improper test preparation
- Residual fiber in the intestine due to delayed transit time
- Residual oropharyngeal (mouth and throat) bacteria
- Exposure to tobacco smoke during collection
- Chewing gum during collection
- Sleeping during collection

Elevated baseline hydrogen levels after strictly following preparation guidelines can occur and may interfere with test interpretations. Based on a complete clinical picture, some healthcare practitioners may consider an elevated hydrogen baseline a positive test.

Quality Control

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1. Latulippe ME and Skoog SM. *Crit Rev Food Sci Nutr*. 2011;51(7):583–592.
2. Berni Canani R, et al. *Nutrients*. 2016;8(3):157. Published 2016 Mar 10.
3. Rezaie A, et al. The American journal of gastroenterology. May 2017;112(5):775-784.
4. QuinTron validated criteria.

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Lactose Malabsorption

Breath Test Interpretation Guidelines

About 70% of the adult world population is lactose-intolerant due to low levels of intestinal lactase (hypolactasia).[1] Hypolactasia often remains undiagnosed and has the potential to cause some morbidity. Lactose-intolerance/ hypolactasia is most commonly diagnosed by the lactose hydrogen breath test.

Lactose is found only in mammalian milk and is hydrolysed by lactase in the small intestine. It has been discovered that the "wild-type" gene status for the lactase gene is characterized by lactase non-persistence, often leading to lactose intolerance. Two genetic polymorphisms responsible for persistence (i.e. lactose tolerant) have been identified, with their distribution concentrated in northern Europeans.[1]

Symptoms of Lactose Malabsorption

- Abdominal pain
- Bloating
- Flatulence
- Diarrhea (commonly mistaken for irritable bowel syndrome)
- Small intestinal bacterial overgrowth (SIBO)
- Fungal overgrowth

Many people with hypolactasia can tolerate some lactose-containing foods with nutritional counseling and/or digestive support.[1]

Neurovanna Lactose Diagnostic Criteria

Numerous published studies, consensus papers and laboratory validations are used by clinicians to interpret breath test results. Laboratory diagnosis and commentary are provided to the practitioner for educational purposes and should not be considered as diagnostic.

- Methane production ≥12 parts per million (ppm) during the test[2]
- A rise in hydrogen production of ≥20 ppm above baseline during the test[2,3]
- A rise in the sum of hydrogen and methane production of ≥15 ppm during the first 120 minutes of the test[3]

Clinical Considerations

Falsely elevated findings may result from:

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- Residual fiber in the intestine due to delayed transit time
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1. Lomer MC, et al.. Aliment Pharmacol Ther. 2008 Jan 15;27(2):93-103. Epub 2007 Oct 23.
2. Rezaie A, et al. The American journal of gastroenterology. May 2017;112(5):775-784.
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Sucrose Malabsorption

Breath Test Interpretation Guidelines

Sucrose, a sugar found in fruits and also known as table sugar, is broken down by the enzyme sucrase into glucose and fructose. Sucrase (also called sucrase-isomaltase, saccharase or invertase) is located in the brush border of the small intestinal mucosa. A deficiency in sucrase leads to sucrose malabsorp-tion and can be genetic or acquired.

People with congenital sucrase-isomaltase deficiency cannot break down the sugars sucrose and malt-ose or other compounds made from these sugar molecules (carbohydrates). More than 25 mutations within the human sucrase gene are responsible for sucrose malabsorption.

Reduced enzymatic activity and villous atrophy in the small intestine are associated with maldigestive and malabsorptive diarrhea, which can also lead to sucrose malabsorption. The level of sucrase activity in the brush border can be used as a measure of small intestine mucosal health.

Sucrose Malabsorption Leads to:[1,2]

- Dehydration
- Metabolic acidosis
- Hypercalcemia
- Failure to thrive
- Developmental delay

Regardless of the cause, absent or diminished sucrase activity allows undigested sugars to accumulate in the lumen of the small intestine, resulting in the clinical effects of sucrase-isomaltase deficiency.

Neurovanna Sucrose Diagnostic Criteria

- Methane production ≥12 parts per million (ppm) during the test[3]
- A rise in hydrogen production of ≥20 ppm above baseline during the test[3,4]
- A rise in the sum of hydrogen and methane production of ≥15 within the first 120 minutes[4]

Clinical Considerations

- Falsely elevated findings may result from:
- Improper test preparation
- Residual fiber in the intestine due to delayed transit time
- Residual oropharyngeal (mouth and throat) bacteria
- Exposure to tobacco smoke during collection
- Chewing gum during collection
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Elevated baseline hydrogen levels after strictly following preparation guidelines can occur and may interfere with test interpretations. Based on a complete clinical picture, some healthcare practitioners may consider an elevated hydrogen baseline a positive test.

Quality Control

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1. Sander P, et al. Hum Mutat. 2006 Jan;27(1):119.
2. Cohen SA. Mol Cell Pediatr. 2016;3(1):5. doi:10.1186/s40348-015-0028-0
3. Rezaie A, et al. The American journal of gastroenterology. May 2017;112(5):775-784.
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