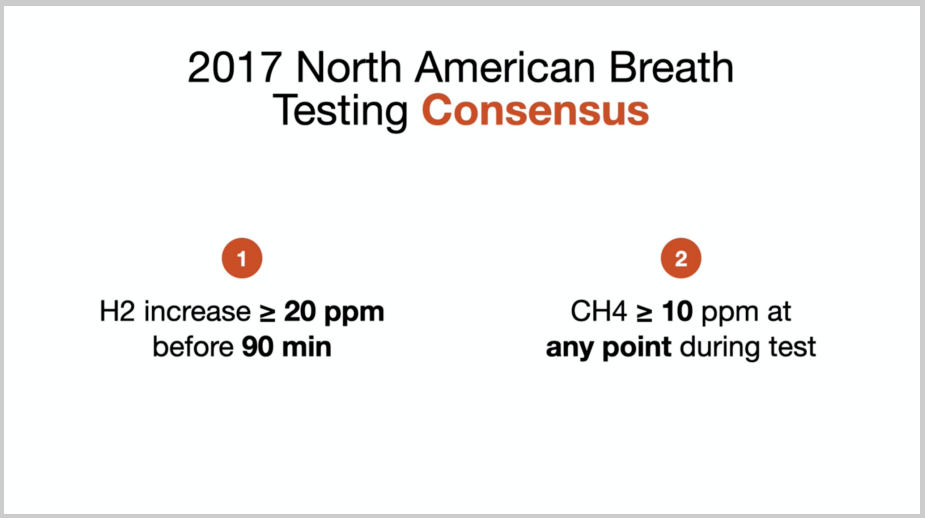
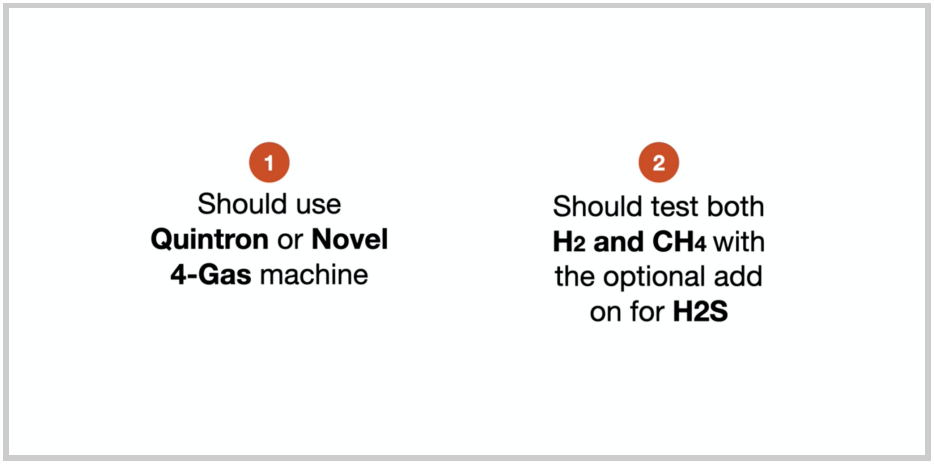
Identifying Gut Pathologies: Small Intestinal Bacterial Overgrowth Breath Test (Part 5)

Let's talk about interpreting the results. There have been a number of proposed criteria for [small intestinal bacterial overgrowth] (SIBO) breath test result interpretation over the last decade. The landscape is constantly evolving, so I'm going to do my best to keep you updated as those changes occur. The most recent was in 2017 with the North American Consensus. You've heard me mention this a number of times throughout the program and this lesson, where they asked 17 clinicians and scientists to answer these pre-meeting survey questions encompassing five different domains: indications, preparation, performance, interpretation of results, and knowledge gaps.



A few key points that came out of this consensus were dosing recommendations for the lactulose of 10 grams, glucose of 75 grams, fructose of 25 grams, and lactose of 25 grams. I'm not going to speak much about fructose and lactose in this lesson because they are used more for assessing fructose and lactose malabsorption issues, which we aren't going to cover here. The Consensus also agrees that breath test[s] [are] useful in the diagnosis of carbohydrate mal digestion. This is where the fructose and lactulose solutions come in. Methane-associated constipation and

evaluation of bloating or gas, but not in the assessment of oral-cecal transit time. They agreed that a concentration of greater than or equal to 10 to the third [power] CFUs per milliliter is now generally considered a diagnosis of SIBO for small bowel aspirate. The interpretation criteria for breath testing [were] updated to say a rise in hydrogen of greater than or equal to 20 parts per million by 90 minutes during [the] glucose or lactulose breath test for SIBO was considered positive. So the first peak must be within 90 minutes of substrate administration, but a second peak is not required. Methane levels greater than or equal to 10 parts per million [were] considered positive for methane or intestinal methanogen overgrowth (IMO). Other considerations included SIBO being excluded prior to doing a lactose or fructose breath test when using the test to assess for carbohydrate malabsorption syndrome in order to avoid false positives. A rise in hydrogen of greater than or equal to 20 parts per million at any time on the lactose or fructose breath test from baseline was considered positive for carbohydrate maldigestion syndrome. The North American Consensus, as I've mentioned, did not address hydrogen sulfide excess because the testing was not available at the time of that meeting.



Many labs offer both lactulose and glucose breath testing, so there are several considerations in terms of what you should use. The first is you should always choose a lab that uses the QuinTron machine or the Novel 4-Gas machine. QuinTron is used in most studies and has been around a little bit longer. And the Novel 4-Gas breath test has been rigorously studied, as well. Second, the lab should test for at least hydrogen and methane. In the past, some labs would only test for hydrogen. But now, I think most labs are including both hydrogen and methane, at the very least, with a third option of choosing a test that includes hydrogen sulfide testing.

Keeping all this in mind, there are three labs that we tend to use for SIBO breath testing. First is the trio-smart breath test from Gemelli Biotech. This measures hydrogen, methane, and hydrogen sulfide levels using the Novel 4-Gas device over 135 minutes. They use the North American

Consensus guidelines for interpretation. The glucose substrate is provided in the kit. However, the lactulose substrate will need a prescription by a practitioner at 10 grams for 15 milliliter solution to be picked up by the patient at their preferred pharmacy. So that is something to consider if you don't have prescribing rights.

The second is the Genova Diagnostics SIBO Breath Test. They offer a two- or three-hour breath test option via QuinTron. We often recommend the three-hour breath test for those with slower gastrointestinal transit or constipation. They only measure hydrogen and methane gases at this time, but they do use the North American Consensus guidelines for interpretation. Both lactulose and glucose are included in the kits.

And third is NUNM. They offer a three-hour breath test via QuinTron. At this time, they're not using the North American Consensus, and they report that they're using the QuinTron guidelines and research-based evidence in the literature to guide their interpretation recommendations. They measure only hydrogen and methane gases, and the lactulose in glucose is included in the kits. Note that you may see some Commonwealth Lab results floating around in the older versions of the knowledge base or the programs, and we used to use them. But they did go out of business in 2017, so we're not going to talk about them here in this material.

SIBO breath test interpretation criteria comparison

Criteria	H_2	CH_4 (IMO)	$H_2 + CH_4$	H_2S excess
Quintron/ NUNM	↑ ≥20 ppm **over lowest preceding value** within 120 min of lactulose	↑ ≥12 ppm **over lowest preceding value** within 120 min of lactulose	↑ ≥15 ppm **over lowest preceding value** within 120 min of lactulose	N/A
2017 Consensus	↑ ≥20 ppm **at any point during test** within 90 min of lactulose	Methane levels ≥10 ppm **at any point during test**	N/A	N/A
Novel 4-Gas (Gemelli Labs)	Uses **North American Consensus** (see above)	Uses **North American Consensus** (see above)	N/A	H_2S ≥ 5 ppm **at any point during test**

As I mentioned so far, interpretation of SIBO breath testing results can vary quite a bit, and there has only recently been this consensus issued. So, for many years, there wasn't a consensus, and people were just doing it differently according to their understanding or reading of the literature or whoever they trained with. So we're going to look at some different criteria here. At the time of

this recording, I think most labs have adopted the North American Consensus guidelines. But there are some, like NUNM, that still use the QuinTron manufacturer recommendations.

The QuinTron, and by default, NUNM, criteria [are] an increase of greater than or equal to 20 parts per million over the lowest preceding value within the 120 minutes of lactulose or an increase in greater than or equal to 12 parts per million of methane over the lowest preceding value within 120 minutes, or an increase of combined methane and hydrogen of greater than or equal to 15 parts per million over the lowest preceding value within 120 minutes of lactulose. I know that's a lot, but you can see it on this slide here how that's divided up. If you're using a lab and they are just spitting out machine-generated test interpretation, [these are] usually the criteria that will be used or used to be, for that matter. So now, with the new consensus, I think most labs are using [the] North American Consensus, and you can always check the results of any lab that you get. It should say where they're getting their criteria from.

As we've discussed, we now have [those] 2017 Consensus criteria that you can see here. I think it's being used by most clinicians at this point. For hydrogen, again, it's an increase of greater than or equal to 20 parts per million at any point during the test within 90 minutes of lactulose. So you're looking for a value that is 20 parts per million above the baseline value any time before 90 minutes. That increase could happen at 30 minutes, it could happen at 60 minutes, or it could happen at 90 minutes. For methane, we're looking for a level greater than or equal to 10 parts per million at any point during the test. Once again, that could even be in the colon or at 160 minutes. It could also be right at baseline, which is actually somewhat common with methane. It's much more common to see higher levels at baseline for methane, as you'll see later on in the presentation.

You may have also noticed that QuinTron, NUNM, [and] North American Consensus do not have guidelines for hydrogen sulfide interpretation, and this is because QuinTron does not test for hydrogen sulfide levels, and testing hydrogen sulfide levels was not possible at the time the North American Consensus was developed. So we use the work of Dr. Pimentel in his lab findings for guidance on those interpretation criteria.

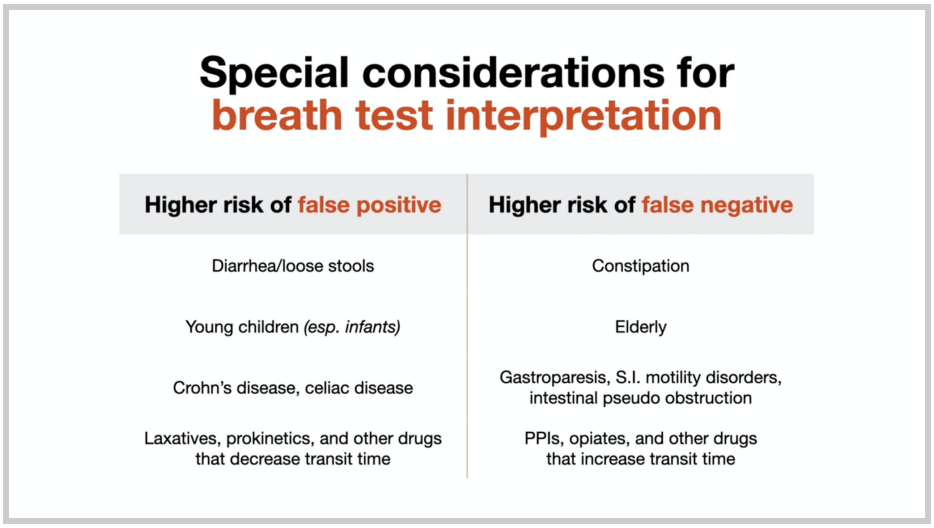
Here's the Novel 4-Gas or trio-smart breath test from Gemelli Labs and their interpretive guidelines. They use the North American Consensus for hydrogen and methane levels. Also, just a quick note that the trio-smart [breath test] reports the observed peak within 100 minutes instead of the 90-minute mark to account for variability in the sample collection process. So it's important to keep in mind that they allow for some flexibility with the timing on their report to take example of the sample collection process. So [that's] just something to keep an eye on when you're

reading your results. Then for hydrogen sulfide, a value of greater than or equal to five parts per million at any point during the test is considered positive for hydrogen sulfide excess.

It's really important to consider transit time in breath test interpretation. It's being done somewhat, but I don't think it's being done at the full level that it should be, both in Functional Medicine and especially in the conventional medicine world. That's really unfortunate, given what we've already talked about in terms of research on transit time in healthy volunteers being less than 90 minutes, in many cases, and lactulose being primarily an indicator of transit time more than anything else. So if a patient has frequent or loose stools, if they have an early rise in hydrogen, even at 60 to 70 minutes, it could be normal because they have a fast transit time, and lactulose could be reaching the colon at that point. On the other hand, if the patient is significantly constipated and you see a rise in hydrogen at 140 minutes, that would typically be interpreted by the various labs as being negative for SIBO. But in this case, it might still be in the small intestine for them because they have slow transit time.

It's further complicated by the fact that orocecal transit time, which is the amount of time it takes for the lactulose to get from the mouth to the colon, does not always mirror total transit time. For example, it's theoretically possible for someone to have a somewhat faster orocecal transit time, but normal transit time overall. Maybe their colon transit time is a little bit slower than average, so the time it takes for something to get from the mouth to defecation is normal, but their orocecal transit time is fast. Or it could be the other way around. Fortunately, at least as far as I can tell from reading the research, it doesn't seem to happen very often, and usually total transit time is a good representation of orocecal transit time. So if you have someone who's having frequent stools throughout the day, undigested foods in the stool, [and] all those kinds of things that would make you expect fast transit time, then it's likely that their orocecal transit time is fast and vice versa.

Another factor to consider is the age of the patient. In elderly patients, transit time tends to be increased, and constipation is common, whereas in young children, especially infants, transit time tends to be decreased. Finally, you'd really want to consider the effect of motility disorders such as gastroparesis, small intestine inflammation, celiac disease, and pseudo-obstruction.



The chart here on the slide summarizes all of what we've talked about, and patients who [we] would really consider a high risk [of] false positive would be patients with diarrhea or loose stool, young children, patients with Crohn's or celiac disease or other issues in the small intestine, and certainly patients taking laxatives, prokinetics, or other drugs that decrease transit time. Of course, they shouldn't [take] these drugs during SIBO tests, but something to keep in mind [is that] patients who are at a higher risk of a false negative would be those with constipation, elderly people with gastroparesis or other motility issues, or patients taking PPIs, opiates, and other drugs that decrease transit time.