

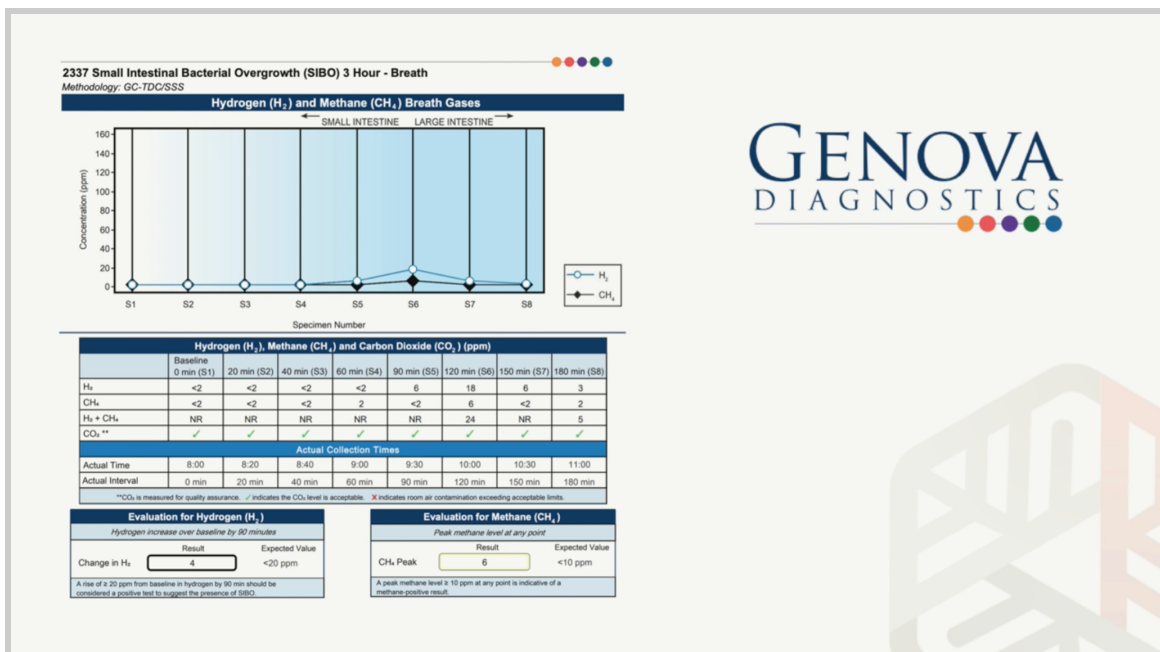
Identifying Gut Pathologies: Small Intestinal Bacterial Overgrowth Breath Test (Part 6)

What substrate and criteria you use for interpretation of a [small intestinal bacterial overgrowth] (SIBO) breath test will really depend on your practice and your preferences. Again, if you choose a more liberal approach in this case, with [erring] on the side of a false positive, that could lead to over-treatment. If you choose to be a little bit more conservative and err on the side of false negative, then maybe that could lead to under-treatment. This can be tricky, and the SIBO landscape is quickly evolving. I think there's a reason to be comprehensive in your approach and consider all of the above factors. I'd like to think that Chris and I are somewhere in the middle between conservative and liberal when it comes to labs and treatment, meaning we tend to choose the lactulose substrate with risk of false positives, but take into consideration what we listed in the previous slide when interpreting the results. We also follow the North American Consensus when it comes to interpreting those results. That being said, there's still a lot of questions about SIBO, some uncertainty about the validity of breath testing and how accurate it is, and, as one of Chris's mentors used to say, "If you look for something hard enough, you'll find it."

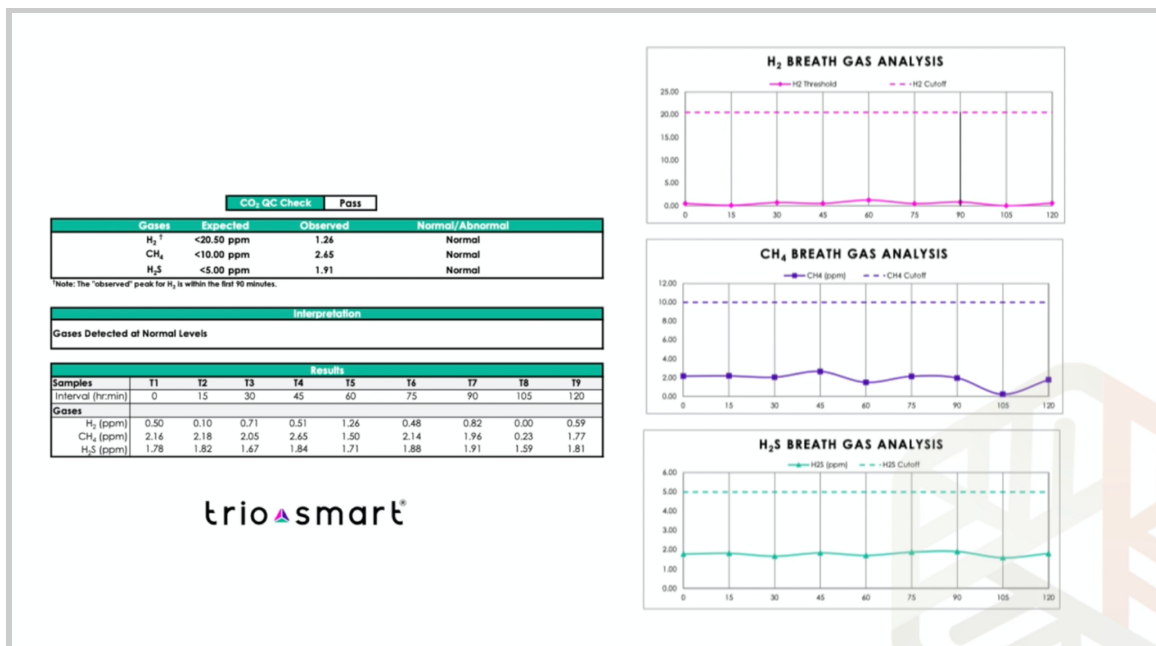
Some may say that the risk in false positive[s] for SIBO is that you may miss other underlying issues. However, SIBO can be a symptom of a deeper problem. For example, dysbiosis, imbalance of the large intestinal microbiome, or perhaps heavy metal toxicity, mold toxicity, or some other more fundamental issues, such as the gut-brain axis issue that is creating an environment in the small intestine that's hospitable to bacterial overgrowth. If you just keep treating the overgrowth itself without addressing the underlying cause that's leading to overgrowth, then that's really not Functional Medicine, for one. And number two, it's not going to be effective, and it could even cause harm because you're treating patients multiple times with antimicrobials or antibiotics. Even if you're using botanicals that are typically safer, they can't have adverse effects on people as well as if they're overused. This is where experience and critical thinking come into play. Knowing when to take a step back, reevaluate the patient's symptoms and treatment timeline, etc.

If you're using rifaximin and using that over and over again, there are some issues there, as well. One is that it's pretty expensive and it's not approved in the United States for treating SIBO, even though that's how it's mostly used in a Functional Medicine context. It's really only approved by the [U.S. Food and Drug Administration] for certain types of liver disease and for [irritable bowel syndrome] (IBS) [with] diarrhea. The other issue with rifaximin that I have seen is that even though it's generally safe and well tolerated, it's not absorbed systemically into the circulation. And I've seen a subset of patients who do get worse after repeated SIBO treatment with rifaximin and not better, so they actually end up having worse symptoms than before they started the rifaximin treatment. It's just something to keep in mind. It's fairly rare, but it is another reason to consider what other underlying causes might be present before treating SIBO over and over and over again with antimicrobials or antibiotics. With all that being said, we do test for SIBO regularly and often as a starting place. We are suggesting and using trio-smart or the Genova SIBO breath test and using the North American Consensus criteria for interpreting the results. But if the patient is treated and does not improve, especially with both botanicals and drugs, you really should consider whether [there] might be something else going on that's driving the bacterial overgrowth and decide to look deeper.

With all that said, let's look at some lab results. These are going to be some lactulose breath tests from the three labs that I've been talking about so far. As I mentioned, we don't use glucose tests in our clinic regularly, so I don't really have a whole lot of examples to share with you.

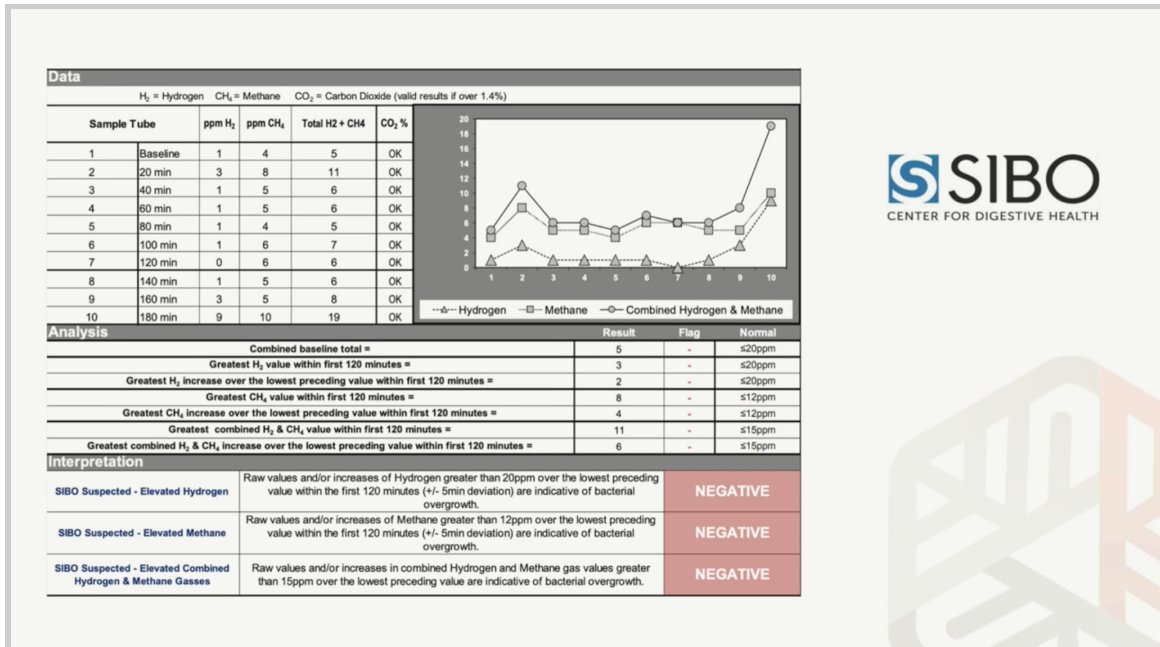


So this is a completely normal result by all criteria from Genova Diagnostics. As you can see, there's not an increase of 20 parts per million or more at any time in this test, but especially not before 90 minutes. We have a value of 6 at 90 [minutes] and a value of 18 at 120 [minutes], compared to a baseline value of less than 2. So at 90 minutes, per the North American Consensus, that's an increase of 4, which is a negative result. And even if you're using the 120-minute mark, then that would still be a negative result, with the value of 16. For methane, we're seeing values in negative 2 all the way through the test until the 120-minute mark, when it goes up to 6 and then a negative result. Remember, for methane, we're looking at the [maximum] value reported at any time on the test, so this is an example of a totally normal SIBO breath test.



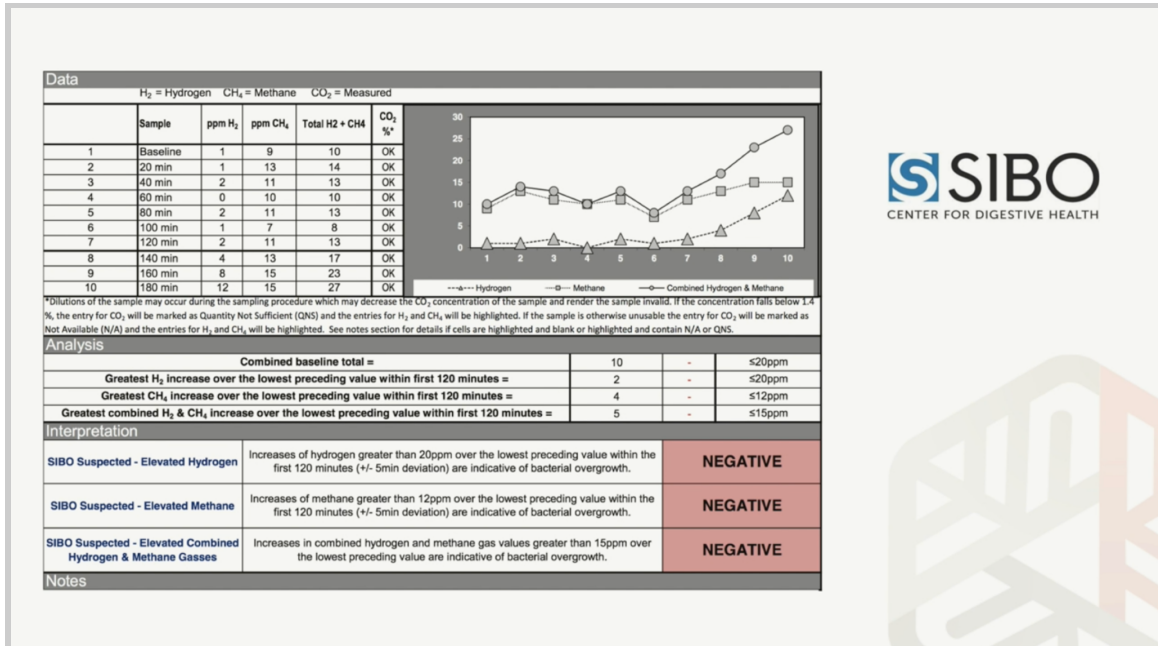
Here's another example of a normal breath test. This is from trio-smart breath testing. You can see the hydrogen levels stay low and never go above the 20 parts per million over baseline before 90 minutes. Methane here stays well below 10 across the collection times, as well, also a negative result. We then have hydrogen sulfide as the third gas tested on trio-smart. A reminder that at the time of this recording, trio-smart is the only commercially available breath test that is testing for hydrogen sulfide excess. For hydrogen sulfide, the parameters are anything below 5 parts per million at any time on the test is considered negative, and if it goes above 5 at any time, then that's a positive result. So this is a range set by Gemelli Biotech, based on a 2018 study showing the mean and maximum hydrogen sulfide level was significantly higher in [patients with] diarrhea when compared to patients [with constipation] and healthy subjects. At the time of this recording, there hasn't been any update to the North American Consensus on hydrogen sulfide.

And you can see that this test for hydrogen sulfide is negative, with never having gone over 1.91 at any time on the test.

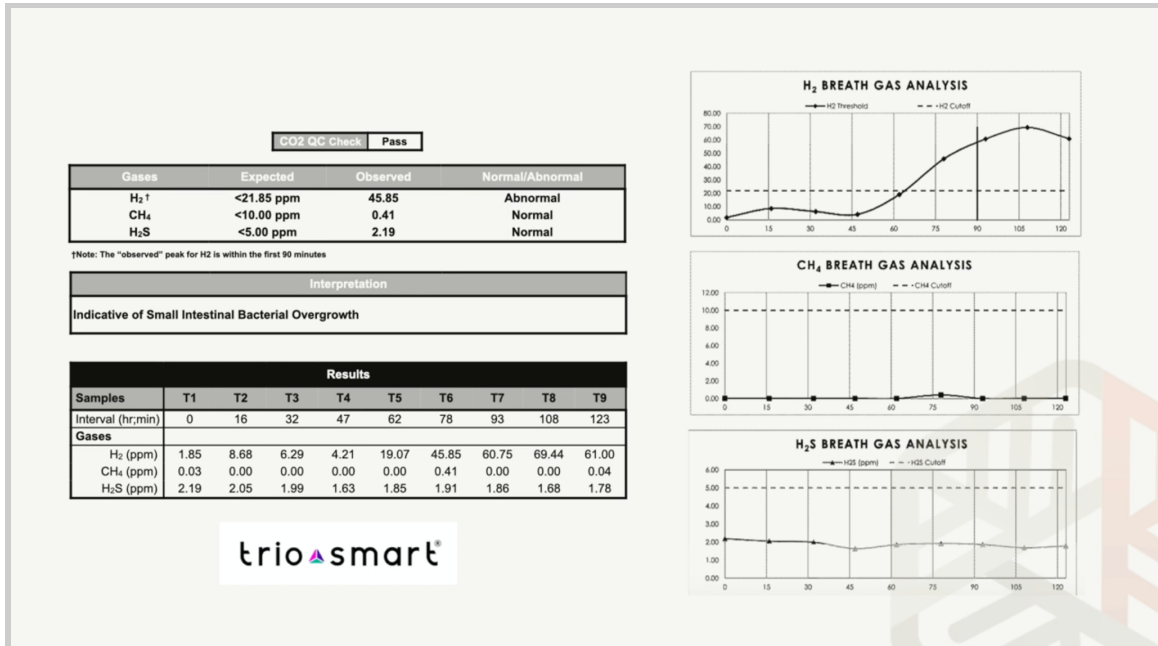


Here's a negative NUNM SIBO breath test. You'll notice that the hydrogen is negative and would be regardless of what criteria you use to interpret. But with the methane, technically, this would be a positive result based [on] the North American Consensus but is negative based [on] the QuinTron or NUNM criteria, which, as you remember, say anything above 12 parts per million within the first 120 minutes is considered a positive test. Now, in all fairness, I would also probably take time to consider this positive result of 10. It's just barely positive by the North American Consensus. So, in this case, I'd really take a long look at the patient's presentations, symptoms, and more to evaluate how to manage this result.

This patient had no [gastrointestinal] complaints but was experiencing significant fatigue and came to us mostly for cardiovascular disease risk prevention. Her stool sample was also very normal. So, in this case, we decided not to treat and continue moving forward with additional lab testing and resolving other imbalances first and agreed to circle back to SIBO if we felt the need.

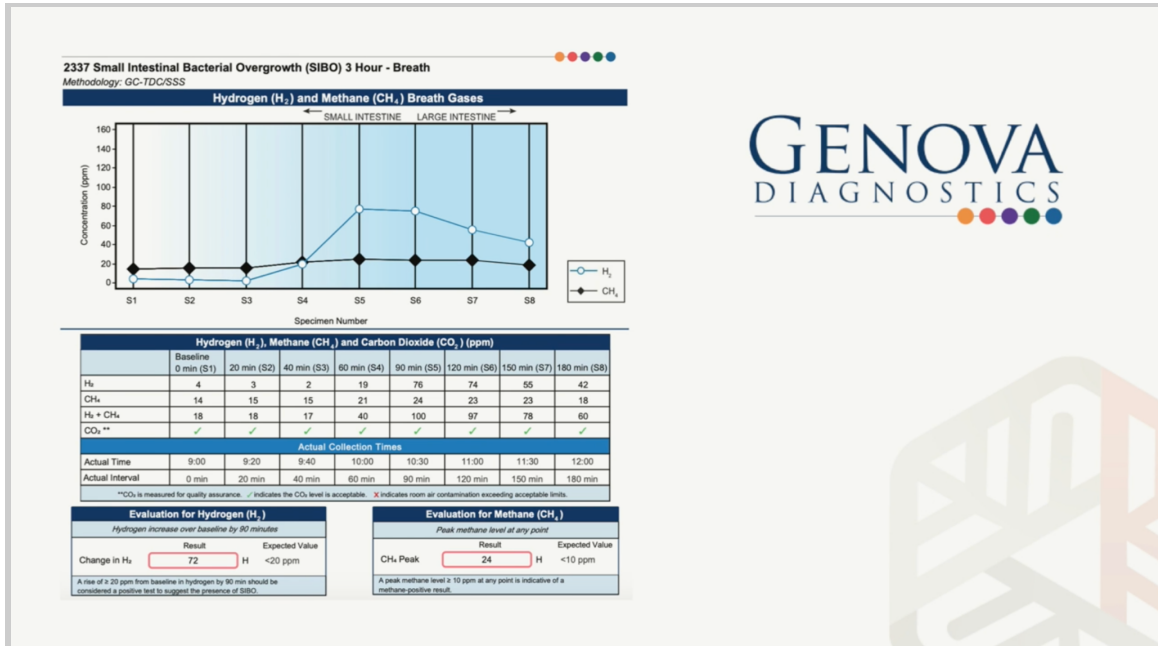


Now, this is a NUNM result that's normal, according to the QuinTron machine-generated criteria, as you can see. But you can also see there in the upper right that they used to be called NCNM, so you may see those names used interchangeably. I just wanted to point that out in case you saw that different names might be used interchangeably. You can also see that this is marked "negative," but if we use the new 2017 Consensus criteria, you can see that there is a methane value of 13 at 20 minutes. So that is above 10, and that would be a positive result for methane. And technically, the highest value on this test is 15, so that would be the positive result you would be reporting in your notes.

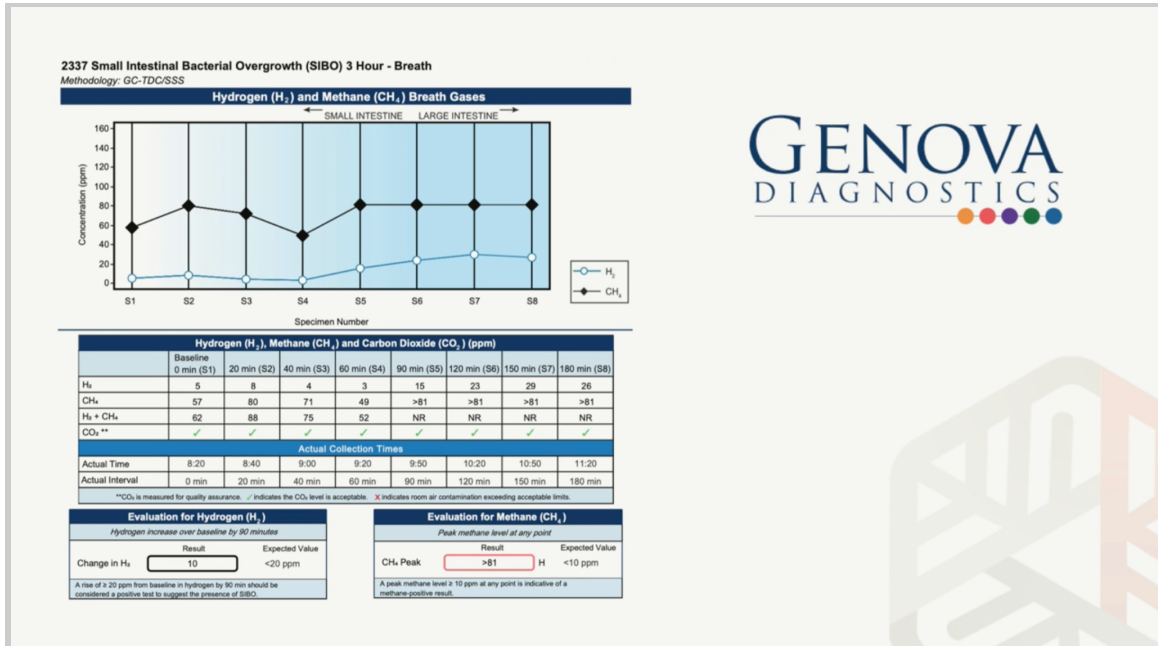


Here's a strong positive for hydrogen-dominant SIBO on the trio-smart test with a rise from 1.85 to about 58 at 90 minutes. Technically, though, this became a positive test any time the value went above 21.85 parts per million. This happened between the 62-minute sample and the 78-minute sample, so that's why you see the positive observed value of 45.85 being the abnormal result for hydrogen.

You can see here that the intervals reported on this test are not a perfect 15- or 20-minute interval. As you will often find, patients aren't always able to collect the timing perfectly, so the lab will report the sample times as they're indicated by the patient. That's why you may see some variability here in the reporting of the samples and also the reporting of the values. This is why I like the trio-smart test; it gives you graphs on the second page of the report. You can see that they bolded the 90-minute time variable in the graph, so you can easily estimate the 90-minute value if the collection samples are a little off. So there's nothing equivocal about this result. I'd consider this a strong positive SIBO result. This patient is a 40-year-old female with gastric reflux, insomnia, chronic sinusitis, and a history of antibiotic use. [She] also had moderate fungal overgrowth, low pancreatic elastase, high calprotectin, low secretory [immunoglobulin A] (IgA), and low butyrate on the stool test.



You can see here that this test is positive for both hydrogen-dominant SIBO and intestinal methanogen overgrowth. In this patient, what we see is a little bit more typical of methane. We see a high level of methane at baseline, of 14 parts per million, and then you see a mild increase throughout the test. That's usually more typical of what you see with methane, and it's definitely indicative of a positive result. This is a 24-year-old female who had lower abdominal pain, constipation that would sometimes alternate with diarrhea, that more classical IBS presentation. Also, [she had] fatigue, brain fog, and [a] rash on her arms. She also had fungal overgrowth, elevated lysozyme, and secretory IgA, and inflammatory gut markers on the stool test. She also had a history of mercury toxicity, iron overload, and impaired methylation, and [vitamin] B12 deficiency that was very likely secondary to SIBO, given what we've talked about.



Here's an example of a strong positive for intestinal methanogen overgrowth with methane that started high at 57 and increased slowly throughout the test, also something we've commonly seen with methane, as I've mentioned. This [Genova] test maxes out at 81, so you can see that this is why they have a greater than 81 indicated for every sample after the 90-minute mark. You can also see here that the hydrogen levels are low and negative on this test. Now, this could be representative of a couple of different things. One is that this person is truly only dealing with intestinal methanogen overgrowth, or that the methanogens are consuming all of the hydrogen gas and giving you a falsely low hydrogen level. We see this quite often, as we've mentioned before in the presentation. So we treat the patient for intestinal methanogen overgrowth and then retest, and the methane levels resolve, but the hydrogen levels jump way up, and people think that the treatment wasn't effective, when in reality in the situation, the rise of hydrogen is the consequence of getting rid of methanogens. So then, we have to pivot with treatment or keep the competitive hydrogen gas model in mind when treating intestinal with antigen overgrowth.

Now, I don't want to confuse you more about the nuances with interpretation, but I think it should be mentioned that Dr. Pimentel does still maintain that reducing methane levels to less than 3 is often needed in order to resolve constipation symptoms. So [that's] just something to think about as you move forward with SIBO testing and treatment.

This particular patient is a 57-year-old female with constipation, gas, abdominal pain, dark circles under [the] eyes, fatigue, muscle aches at night, and mood swings.