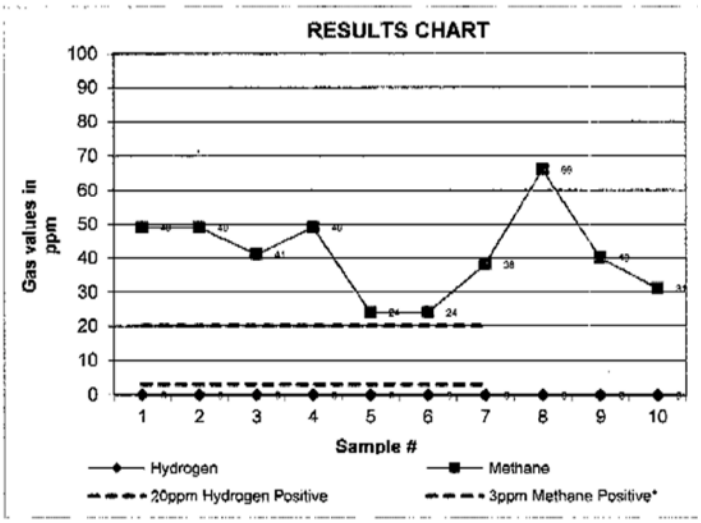
Gut: SIBO – Part 9

Here's another high methane result at baseline.

SMALL INTESTINAL BACTERIAL OVERGROWTH REPORT SHEET - 10 SPECIMEN TEST

Patient Name.....
Patient Number.....
Date of Birth.....
Date Specimen Collected.....
Date Received .....
Physician.....
Physician ID#.....
Address.....
Date Reported.....

	Sample Time	Sample #	ppm H_2	ppm CH_4	(f) CO_2
Fasting	Control	1	0	49	0.97
	20 min.	2	0	49	1.05
	40 min.	3	0	41	0.95
	60 min.	4	0	49	0.91
	80 min.	5	0	24	1.05
	100 min.	6	0	24	1.09
	120 min.	7	0	38	0.91
Colon	140 min.	8	0	66	0.94
	160 min.	9	0	40	0.85
	180 min.	10	0	31	1.11



The 120 minute mark corresponds to the time the biomarker should transition from the small intestine and enter the colon.

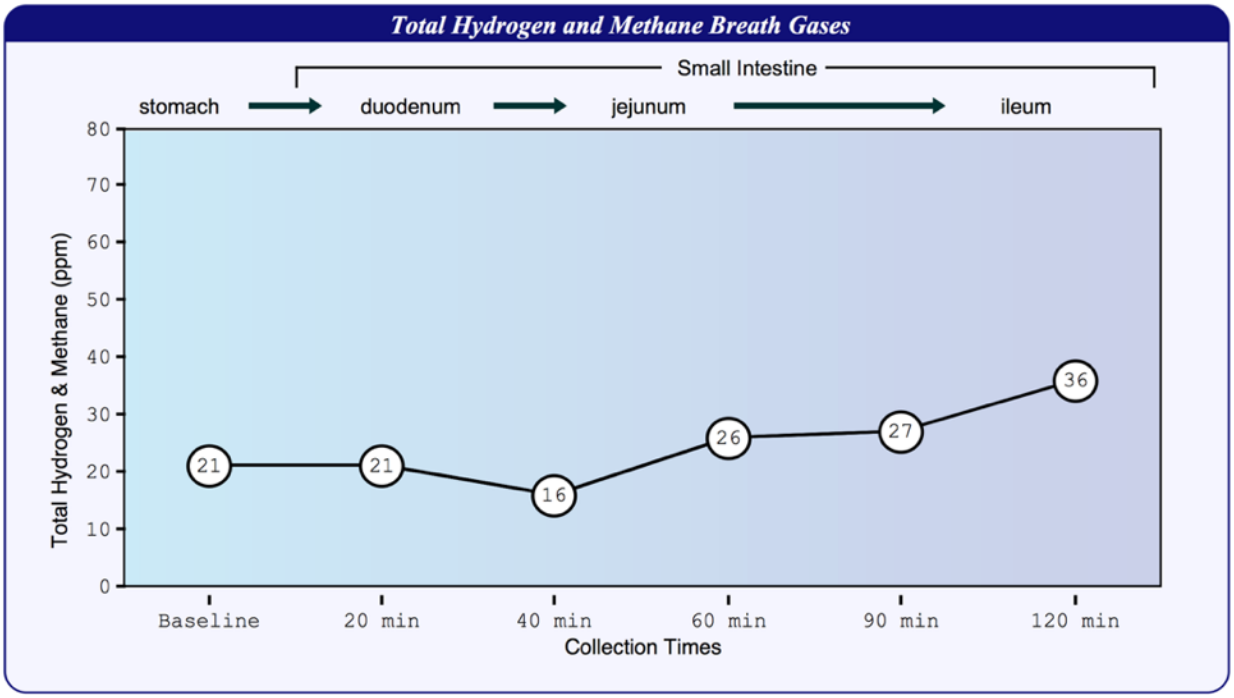
Summary of 2 Hour Results

Peak increase values for each trace gas are presented below:

Peak Hydrogen (H2) Production:	**0**	**ppm**	Normal <20 ppm
Peak Methane (CH4) Production:	**25**	**ppm**	Normal <3 ppm*
Peak Combined Gas Production:	**25**	**ppm**	Normal <20 ppm

RESULT: BASED ON THE CRITERIA USED IN THIS STUDY, PRESENCE OF BACTERIAL OVERGROWTH IS SUPPORTED*

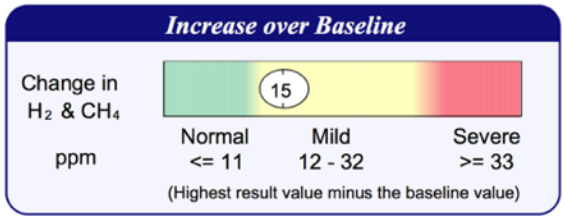
This patient was 49 parts per million at baseline, as you can see it stayed pretty high, and dips down at 80 minutes and then goes back up at 120, 140 minutes. Again, with methane you can see it bounce around like this, it's unequivocally positive when you see high levels like this at baseline that remain high or bounce around a bit. Well, this patient was a 45-year-old female, again you'd expect constipation given these results, in this case she didn't have—it was a little bit surprising—she had a tendency toward constipation, but it wasn't really common or really significant. She did take some magnesium on a daily basis, so it's possible that that was ameliorating that tendency. But her complaints were low energy, dark circles under her eyes, and abdominal weight gain.

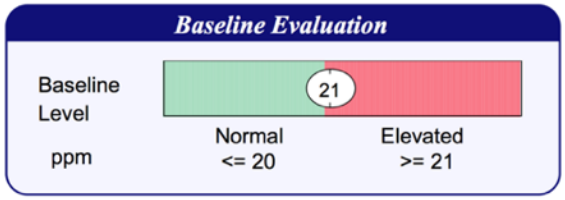


Hydrogen & Methane (ppm)

Minutes	Base-line	20	40	60	90	120
Hydrogen (H_2)	18	16	12	21	22	31
Methane (CH_4)	3	5	4	5	5	5
Total	21	21	16	26	27	36

This test was developed and its performance characteristics determined by Genova Diagnostics, Inc. It has not been cleared or approved by the U.S. Food and Drug Administration.





Okay, so what about this one? It's an interesting result, you see high baseline hydrogen, 18 parts per million at baseline, but it stays more or less at that level throughout the test. It dips down a little bit at 40 minutes and increases a little bit at 120 minutes, but it's more or less a similar level throughout. And this can be improper test preparation, residual fiber in the intestine causing elevated hydrogen. But this pattern can also be indicative of SIBO, can be a positive result. More typically, when you see improper test prep, you'll see a high baseline level of hydrogen and maybe high at 20 minutes and then it drops down into the normal range, but in some cases, you can see it high throughout the test, and in this case actually, we did find out that the patient did not stay strictly to the test diet, which should only include meat and fish, jasmine rice, fat, salt, and pepper as we've discussed, and he for whatever reason just decided to ignore that and just kind of did his own thing, which included some blended smoothie with some fruits and vegetables, which could

have produced this result. So we had him redo the test and he was actually completely negative when he did follow the proper test prep.

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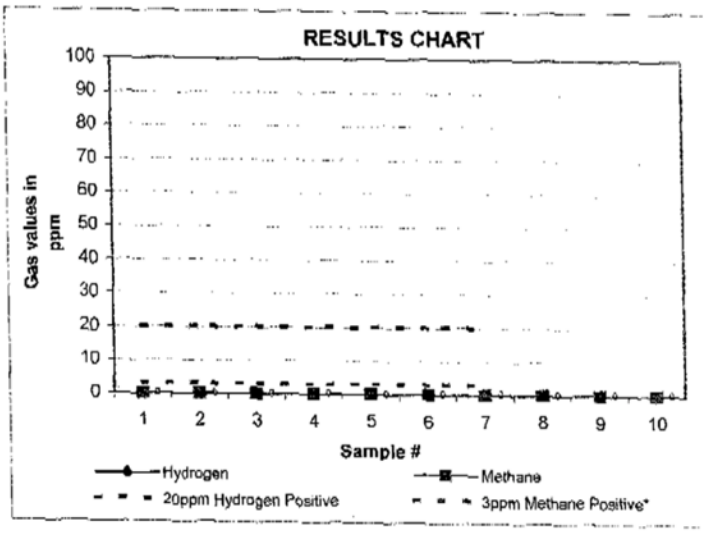
Date Reported.....

	Sample Time	Sample #	ppm H_2	ppm CH_4	(f) CO_2
Small Intestine	Control	1	0	0	1.17
	20 min.	2	0	0	1.13
	40 min.	3	0	0	0.98
	60 min.	4	0	0	1.00
	80 min.	5	0	0	1.15
	100 min.	6	0	0	1.16
	120 min.	7	0	0	0.98
Colon	140 min.	8	0	0	1.04
	160 min.	9	0	0	1.02
	180 min.	10	0	0	1.04



The 120 minute mark corresponds to the time the biomarker should transition from the small intestine and enter the colon.

Summary of 2 Hour Results

Peak increase values for each trace gas are presented below:

Peak Hydrogen (H2) Production:	0	ppm	Normal <20 ppm
Peak Methane (CH4) Production:	0	ppm	Normal <3 ppm*
Peak Combined Gas Production:	0	ppm	Normal <20 ppm

RESULT: BASED ON THE CRITERIA USED IN THIS STUDY, PRESENCE OF BACTERIAL OVERGROWTH IS NOT SUPPORTED*

All right, what about this result? This is also interesting. It's all zeros across the board, so hydrogen is zero from the first sample, control sample before the lactulose, all the way to 180 minutes, and then methane was zero all the way from control to 180 minutes. So you might think this person is fantastic, they have no bacterial overgrowth at all, really good negative result, and you'll see this is about 5 percent of cases of these breath test results. But there's a little bit more than meets the eye here, and if you understand the physiology behind the lactulose breath test as we've been discussing it, you might be questioning this already, because you should see a rise in hydrogen and methane when lactulose enters the colon; that would be normal bacterial fermentation of methane or lactulose when it enters the colon.

If you see zeros across the board like this, there are a couple different possibilities. One is the patient is severely, severely constipated and the lactulose has been in the small intestine this entire time, and they don't have small intestine bacterial overgrowth, which is pretty unlikely if they're that severely constipated. I mean, they can be constipated without having SIBO, of course, but this

wouldn't be my number one interpretation of this test result because usually you'd see some production of some gases along the way if the patient is that constipated.

The second interpretation here is that there is production of other types of gases that aren't measured by this test, or by a breath test that we know of right now. I talked about this earlier with hydrogen sulfide. So studies show that patients with lower methane production, like zeros here, can have higher concentrations of sulfate-reducing bacteria, and the product of sulfate reduction is hydrogen sulfide. Hydrogen sulfide should be removed by first-pass detoxification in the liver, but if detox mechanisms are impaired, the hydrogen sulfide can accumulate in the small intestine and the colon. And that gas has been shown to damage the colonic epithelium, it's associated with ulcerative colitis, it can also cause brain fog, post-exertional malaise and immune problems, it's been identified as a possible carcinogen, and you may know it as the gas that produces the characteristic smell of rotten eggs. So, if you go to a hot springs or have been around someone who has particularly foul-smelling gas, like parasite infection, sometimes it can be produced, that's hydrogen sulfide.

So, the interesting thing about this is that the sulfate-reducing bacteria and methanogens compete for hydrogen in mutually exclusive ways, so I mentioned before that methane-producing organisms consume hydrogen rather than carbohydrates themselves, which is what the hydrogen-producing bacteria do, so with hydrogen sulfide-producing organisms, they're the same as methanogens in that sense. They also use hydrogen as their substrate, but they compete with methanogens, so if you have a ton of sulfate-reducing bacteria in your gut, you could see methane levels of zero and hydrogen levels of zero, because those sulfate-reducing bacteria are basically consuming all of the hydrogen that would normally have been produced by bacteria, and there's nothing left for methanogens to consume, so the methanogens get starved out and aren't present, and then you see the zeros on the test. So the thing is, like I said, hydrogen sulfide is not measured on any lactulose breath test, so unfortunately we can't know for sure if seeing all zeros is indicative of hydrogen sulfide production, and there aren't really in my opinion at this point useful and reliable follow-up tests for determining the presence of hydrogen sulfide. I know that there a couple of tests out there, but I'm still trying to find evidence that I feel comfortable with in terms of using these tests.

So currently, if we see these zeros and if the patient has a lot of signs and symptoms of SIBO, then we will generally do a therapeutic trial and treat them and see how they respond. Unfortunately, we can't use the breath testing as follow-up to determine the success of the treatment because it doesn't detect hydrogen sulfide, so in that case we just have to treat empirically and base our treatment on the response of the patient.

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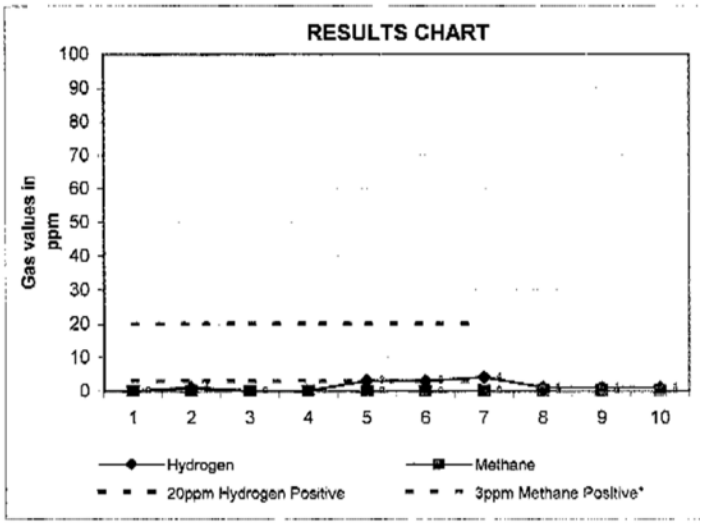
Address.....
Date Reported.....

Sample Time	Sample #	ppm H_2	ppm CH_4	(f) CO_2
Control	1	0	0	1.42
20 min.	2	1	0	1.46
40 min.	3	0	0	1.41
60 min.	4	0	0	1.35
80 min.	5	3	0	1.33
100 min.	6	3	0	1.42
120 min.	7	4	0	1.24
140 min.	8	1	0	1.19
160 min.	9	1	0	1.31
180 min.	10	1	0	1.47



The 120 minute mark corresponds to the time the biomarker should transition from the small intestine and enter the colon.

Summary of 2 Hour Results

Peak increase values for each trace gas are presented below:

Peak Hydrogen (H2) Production:	**4**	**ppm**	Normal <20 ppm
Peak Methane (CH4) Production:	**0**	**ppm**	Normal <3 ppm*
Peak Combined Gas Production:	**4**	**ppm**	Normal <20 ppm

RESULT: BASED ON THE CRITERIA USED IN THIS STUDY, PRESENCE OF BACTERIAL OVERGROWTH IS NOT SUPPORTED*

Here's another one, similar to the last one, it's not all zeros but it's pretty close. This could be a normal result but it could also be hydrogen sulfide production. This patient was a 50-year-old woman with constipation, gas, and other typical symptoms of SIBO, so we interpreted this as a positive result.

I mentioned on the last slide that there are a couple of labs that are doing hydrogen sulfide testing. There's a European lab called Protea Biopharma, it's marketed as a test for Th1/Th2 immune imbalance, but don't be thrown off by that. It does reveal hydrogen sulfide levels, because the way it works is when sulfides combine with iron compounds, they produce iron sulfide, which is a dark color in the urine. So if the patient does this urine test and the lab runs the test and the urine turns dark, then it suggests there are bacteria in the gut that are producing large amounts of hydrogen sulfide, so much that the normal sulfide oxidase enzyme in the wall of the gut's not able to oxidize all of it and convert it into thiosulfate, and then it passes into the blood and is filtered out by the kidneys and excreted in the urine. So the test makes sense to me from my understanding of the physiology, but it hasn't been validated and the methodology has not been peer-reviewed, so I don't know what to make of it. I know some clinicians are using it; so far we're not using it, we're just treating empirically based on these results.

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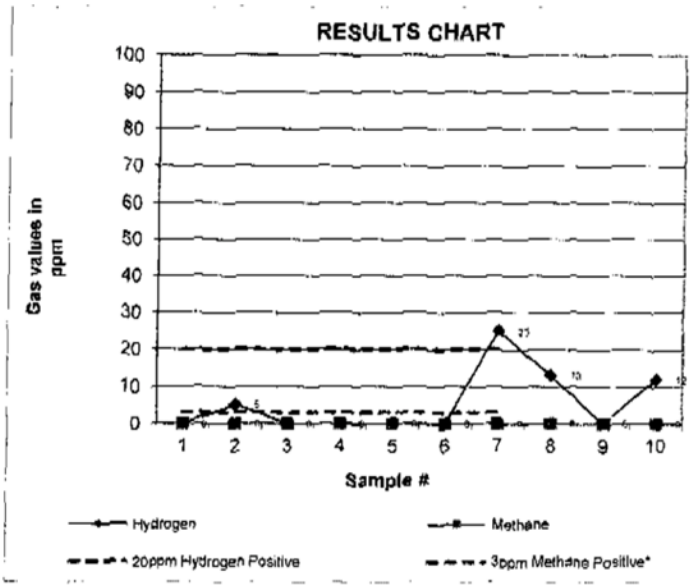
Sample Time	Sample #	ppm H_2	ppm CH_4	(f) CO_2
Control	1	0	0	1.34
20 min.	2	5	0	1.62
40 min.	3	0	0	1.79
60 min.	4	0	0	1.60
80 min.	5	0	0	1.66
100 min.	6	0	0	1.54
120 min.	7	25	0	1.83
140 min.	8	13	0	1.79
160 min.	9	0	0	1.76
180 min.	10	12	0	1.68



The 120 minute mark corresponds to the time the biomarker should transition from the small intestine and enter the colon.

Summary of 2 Hour Results

Peak increase values for each trace gas are presented below:

Peak Hydrogen (H2) Production:	**25**	**ppm**	Normal <20 ppm
Peak Methane (CH4) Production:	**0**	**ppm**	Normal <3 ppm*
Peak Combined Gas Production:	**25**	**ppm**	Normal <20 ppm

SULT: BASED ON THE CRITERIA USED IN THIS STUDY, PRESENCE OF BACTERIAL OVERGROWTH IS SUPPORTED

Okay, last test result to look at here, we see a late single hydrogen spike. If it's a single spike with nothing before or after, with hydrogen, the chances are they were breathing too deeply before they collected the sample and it's not a positive result. If you see a spike of methane, that's normal because methane diffuses quickly and it could indicate a positive result, like a patchy area of SIBO in one part of the intestine. With these more equivocal tests, if you're in doubt you can always retest, you can use a different lab, so if you used Commonwealth you can use NCMN, and vice versa. You can go ahead and treat the patient and then just retest after treatment to see what the results were, and that's valid given the safety of SIBO treatment, so even though these tests are sometimes equivocal and sometimes difficult to interpret, there are things you can do to make it easier to come to actionable clinical decisions.

So to summarize this presentation, as you can see there's a lot of gray area in SIBO testing, it's not black and white. There is tremendous uncertainty, more than is typically acknowledged in the discussions about SIBO testing from what I've seen. The interpretation of the results depends on

the lab you use, the substrate, whether glucose or lactulose, transit time, the patient, whether they follow the prep diet properly, and several other factors. At this point, I think it's difficult to get a result that we can be 100 percent confident in. I see it more as a spectrum; some of the earlier results that we looked at in this presentation were as close to unequivocally positive as you can get for a SIBO breath test, whereas some of the results that we looked at were a lot more questionable and could go either way depending on the patient's presentation and how you interpret that.

So, the decision on whether to treat really includes evaluation of the patient's signs and symptoms, clinical history, and other labs, but the good news as I've said a number of times now is that the treatment for SIBO is relatively safe, and that's true for both the botanical protocol I'm going to teach you and the pharmaceutical protocol. This is why many clinicians, myself included, consider a therapeutic trial if the breath results are equivocal, and that is another valid method of diagnosis in medicine, and it has its role. It's also true that, as you'll see when we start doing the full case studies, we're rarely treating SIBO alone, and we're often treating other gut conditions simultaneously, and you can choose a treatment that will be effective for all of the different conditions that you're treating, so any one of the conditions' presence or lack of presence becomes less significant from a practical perspective, because it's not really going to alter your treatment plan. So, we'll discuss that in more detail when we get to the section on treating gut conditions, all of these things that we're learning to diagnose. Okay, so that's it for now, next we're going to talk about microbial organic acid testing.