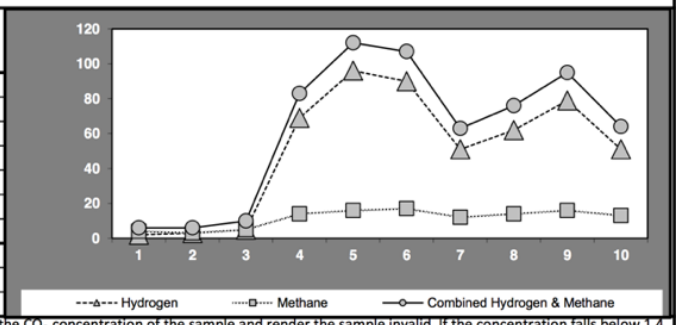
Gut: SIBO – Part 7

So here's our first kind of unequivocally positive result.

Data

H_2 = Hydrogen CH_4 = Methane CO_2 = Measured

	Sample	ppm H_2	ppm CH_4	Total H2 + CH4	CO_2 %*
1	Baseline	2	4	6	OK
2	20 min	3	3	6	OK
3	40 min	5	5	10	OK
4	60 min	69	14	83	OK
5	80 min	96	16	112	OK
6	100 min	90	17	107	OK
7	120 min	51	12	63	OK
8	140 min	62	14	76	OK
9	160 min	79	16	95	OK
10	180 min	51	13	64	OK



*Dilutions of the sample may occur during the sampling procedure which may decrease the CO_2 concentration of the sample and render the sample invalid. If the concentration falls below 1.4 %, the entry for CO_2 will be marked as Quantity Not Sufficient (QNS) and the entries for H_2 and CH_4 will be highlighted. If the sample is otherwise unusable the entry for CO_2 will be marked as Not Available (N/A) and the entries for H_2 and CH_4 will be highlighted. See notes section for details if cells are highlighted and blank or highlighted and contain N/A or QNS.

Analysis

Combined baseline total =	6	-	≤20ppm
Greatest H_2 increase over the lowest preceding value within first 120 minutes =	94	H	≤20ppm
Greatest CH_4 increase over the lowest preceding value within first 120 minutes =	14	H	≤12ppm
Greatest combined H_2 & CH_4 increase over the lowest preceding value within first 120 minutes =	106	H	≤15ppm

Interpretation

SIBO Suspected - Elevated Hydrogen	Increases of hydrogen greater than 20ppm over the lowest preceding value within the first 120 minutes (+/- 5min deviation) are indicative of bacterial overgrowth.	**POSITIVE**
SIBO Suspected - Elevated Methane	Increases of methane greater than 12ppm over the lowest preceding value within the first 120 minutes (+/- 5min deviation) are indicative of bacterial overgrowth.	**POSITIVE**
SIBO Suspected - Elevated Combined Hydrogen & Methane Gasses	Increases in combined hydrogen and methane gas values greater than 15ppm over the lowest preceding value are indicative of bacterial overgrowth.	**POSITIVE**

Notes

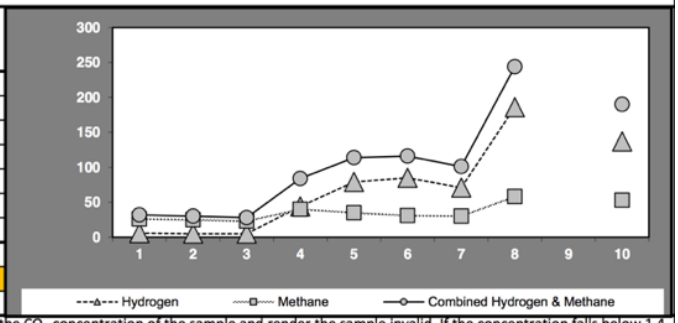
The following symptoms were reported during collection:
at 60 min: mild belching
at 120 min: headache

It's a very strong positive result for hydrogen increase and for combined hydrogen and methane, but that's entirely because of hydrogen here. You see that it increases from five parts per million, which is normal at 40 minutes, up to 69 parts per million at 60 minutes, and then a peak value of 96 parts per million at 80 minutes. Then it drops down again, and then it goes up again as the lactulose enters the colon. This is a classic double peak that we talked about before for hydrogen, and that is interpreted by basically everybody as a positive result. You can also see that there's an increase of four parts per million at baseline of methane to 14 parts per million at 60 minutes and then a peak value of 17 parts per million at 100 minutes, so that would be a positive for methane as well. Then, as I mentioned, you also have a positive for combined hydrogen and methane, which, of course, makes sense if both hydrogen and methane individually. There's really nothing equivocal about this result. It also completely made sense given the patient's presentation. The patient is a 55-year-old male with GERD, insomnia, chronic sinusitis, and a history of antibiotic use. He also had moderate fungal overgrowth, low pancreatic elastase, high calprotectin, low secretory IgA, and low butyrate on a stool test.

Data

H_2 = Hydrogen CH_4 = Methane CO_2 = Measured

	Sample	ppm H_2	ppm CH_4	Total H2 + CH4	CO_2 %*
1	Baseline	6	26	32	OK
2	20 min	5	25	30	OK
3	40 min	5	23	28	OK
4	60 min	44	40	84	OK
5	80 min	79	35	114	OK
6	100 min	85	31	116	OK
7	120 min	71	30	101	OK
8	140 min	186	58	244	OK
9	160 min				QNS
10	180 min	137	53	190	OK



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Analysis

Combined baseline total =	32	H	≤20ppm
Greatest H_2 increase over the lowest preceding value within first 120 minutes =	80	H	≤20ppm
Greatest CH_4 increase over the lowest preceding value within first 120 minutes =	17	H	≤12ppm
Greatest combined H_2 & CH_4 increase over the lowest preceding value within first 120 minutes =	88	H	≤15ppm

Interpretation

SIBO Suspected - Elevated Hydrogen	Increases of hydrogen greater than 20ppm over the lowest preceding value within the first 120 minutes (+/- 5min deviation) are indicative of bacterial overgrowth.	**POSITIVE**
SIBO Suspected - Elevated Methane	Increases of methane greater than 12ppm over the lowest preceding value within the first 120 minutes (+/- 5min deviation) are indicative of bacterial overgrowth.	**POSITIVE**
SIBO Suspected - Elevated Combined Hydrogen & Methane Gasses	Increases in combined hydrogen and methane gas values greater than 15ppm over the lowest preceding value are indicative of bacterial overgrowth.	**POSITIVE**

Notes

The following symptoms were reported during collection:
from 36 to 81 minutes - "some abdominal discomfort (mild)"

Sample #9 is invalid. The CO_2 content of this sample was inadequate for analysis. This is usually due to improper collection technique; for example, inhaling too deeply prior to sampling.

Here's another positive result. You can see an increase of hydrogen from five parts per million at 40 minutes to 44 parts per million at 60 minutes, 79 parts per million at 80 minutes, and then a peak value of 85 parts per million at 100 minutes. You might ask, okay, well, how do we know that lactulose isn't just entering the colon at 80 minutes or 100 minutes? Well, you don't for sure, but one of the clues is that this is another double-peak test. You see the pretty dramatic increase early on, going from five parts per million to 44 at 60 minutes. That would be an extremely fast transit time of 60 minutes, so that right there is strongly suggestive of a positive result, but then you see a decrease from the peak value at 85 parts per million at 100 minutes. You see it go down to 71, and then it jumps back to 186 parts per million at 140 minutes, so that's again a double peak and another strong indicator of a positive result.

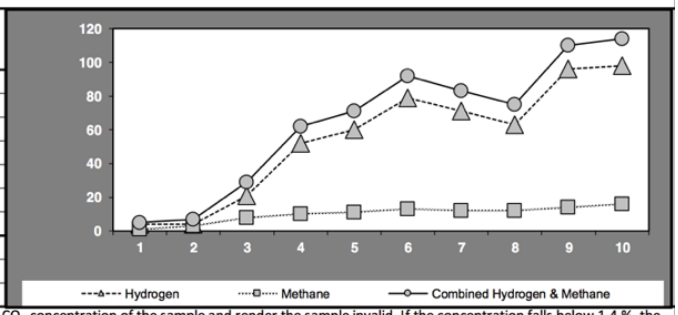
You'll notice here that there's a value highlighted in yellow. That means that there are not any values provided at 160 minutes, and that is an indication of poor sample collection for that particular sample. In this case, it seems that the patient might have inhaled too deeply before exhaling the breath for that sample, so they weren't able to get a proper sample. But in this particular result, it doesn't really change the interpretation of the test because it's clear that there is a positive even with that sample missing.

In this patient, what we see is a little bit more typical of methane. In the last patient, we saw low methane at baseline and then an increase over time throughout the test, but in this case, we see a high level of methane at baseline of 26 parts per million, and then you see a mild increase throughout the test, and that is actually more typical of what you see with methane. It's definitely indicative of a positive result, and again, of course, since methane and hydrogen were both elevated here, you see a positive for combined hydrogen and methane. This was a 24-year-old female. She had lower abdominal pain, constipation that would sometimes alternate with diarrhea, kind of classic IBS presentation, fatigue, brain fog, and rash on her arms. She also had fungal overgrowth, elevated lysozyme and sIgA, inflammatory gut markers. She had mercury toxicity, iron overload, impaired methylation, and B12 deficiency that was very likely secondary to the SIBO, given what we've talked about.

Data

H_2 = Hydrogen CH_4 = Methane CO_2 = Measured

	Sample	ppm H_2	ppm CH_4	Total H2 + CH4	CO_2 %*
1	Baseline	4	1	5	OK
2	20 min	4	3	7	OK
3	40 min	21	8	29	OK
4	60 min	52	10	62	OK
5	80 min	60	11	71	OK
6	100 min	79	13	92	OK
7	120 min	71	12	83	OK
8	140 min	63	12	75	OK
9	160 min	96	14	110	OK
10	180 min	98	16	114	OK



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Analysis

Combined baseline total =	5	-	≤20ppm
Greatest H_2 increase over the lowest preceding value within first 120 minutes =	75	H	≤20ppm
Greatest CH_4 increase over the lowest preceding value within first 120 minutes =	12	-	≤12ppm
Greatest combined H_2 & CH_4 increase over the lowest preceding value within first 120 minutes =	87	H	≤15ppm

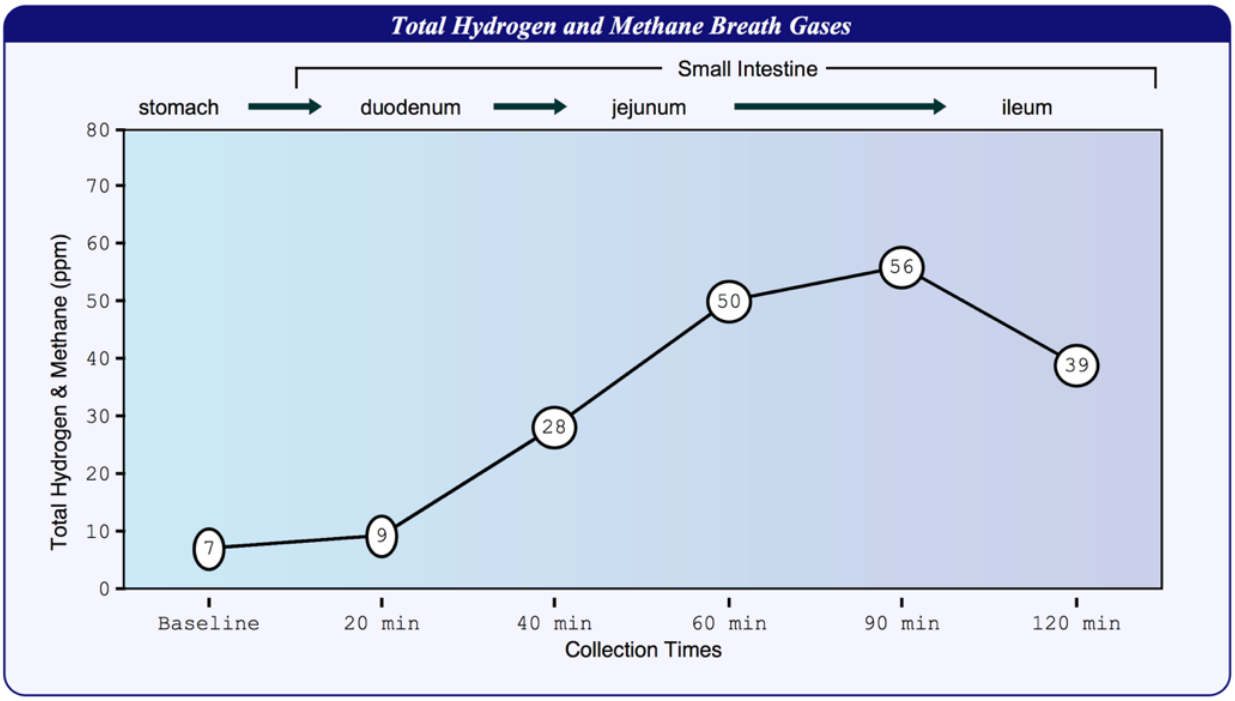
Interpretation

SIBO Suspected - Elevated Hydrogen	Increases of hydrogen greater than 20ppm over the lowest preceding value within the first 120 minutes (+/- 5min deviation) are indicative of bacterial overgrowth.	**POSITIVE**
SIBO Suspected - Elevated Methane	Increases of methane greater than 12ppm over the lowest preceding value within the first 120 minutes (+/- 5min deviation) are indicative of bacterial overgrowth.	**NEGATIVE**
SIBO Suspected - Elevated Combined Hydrogen & Methane Gasses	Increases in combined hydrogen and methane gas values greater than 15ppm over the lowest preceding value are indicative of bacterial overgrowth.	**POSITIVE**

Notes

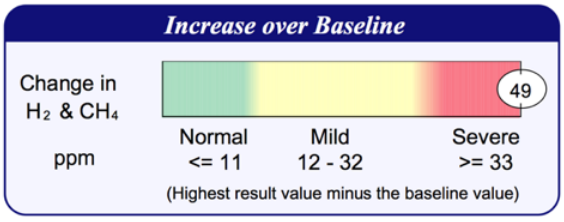
The following symptoms were reported during collection: "none."

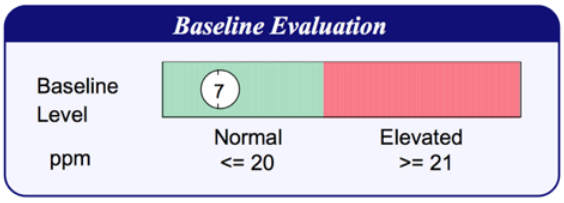
Here is another positive result. This patient went from a baseline hydrogen value of 4 to a value of 52 at 60 minutes, so that is already clearly positive. That is an increase of 48 in just 60 minutes, so that is a significant positive result. Then they a baseline value of 1 for methane, and then that went up to 11 at 80 minutes, so again, at any point if it goes above 10, that is problematic. This patient is positive for both methane and hydrogen. This patient is a 4-year-old girl with constipation, gas, abdominal pain, dark circles under her eyes, fatigue, muscle aches at night, and mood swings. I mentioned that kids can have faster orocecal transit time, so we might wonder whether these results are normal based on that, but this is, I think, a very clear positive even with potentially faster transit time. It is highly unlikely that lactulose would have made it to the colon by 60 minutes. You see a very strong rise here in hydrogen in that initial 60-minute period. You also have the positive result for methane independently of that, so I think it is definitely a strong positive.



Hydrogen & Methane (ppm)

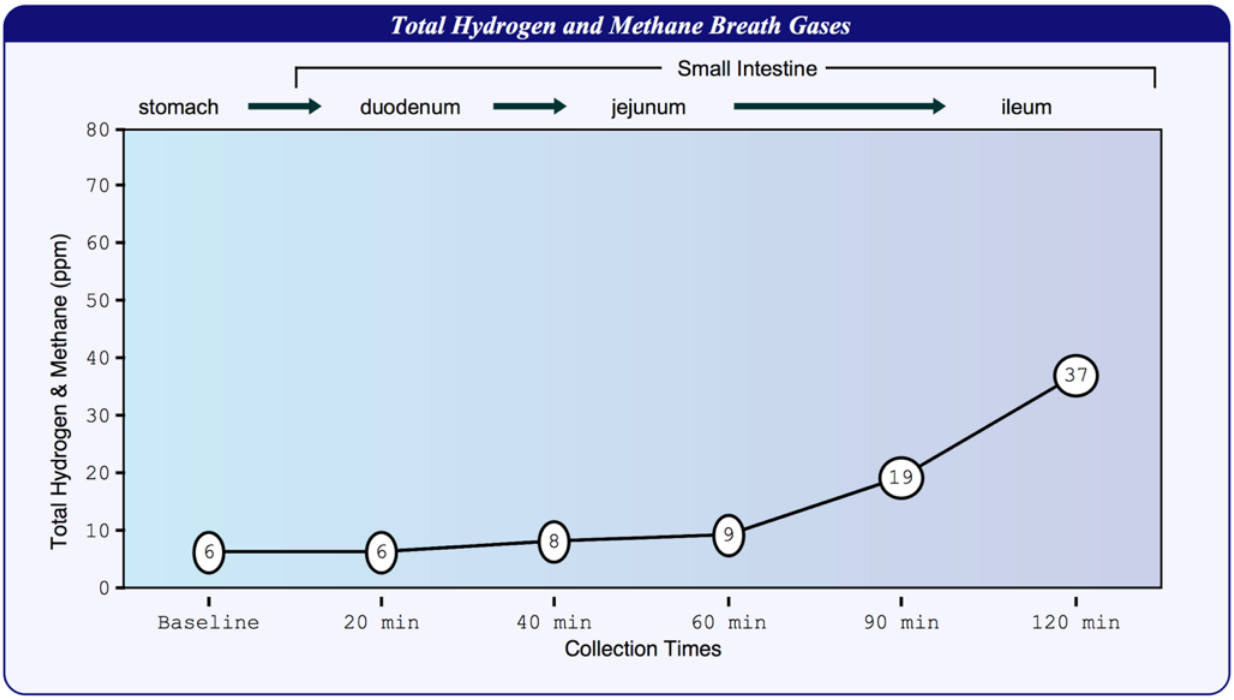
Minutes	Base-line	20	40	60	90	120
Hydrogen (H_2)	5	7	25	45	53	36
Methane (CH_4)	2	2	3	5	3	3
Total	7	9	28	50	56	39





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.

Here's an example of a Genova positive result that suggests a double peak, but you can't know that it's a double peak without having that extra hour, so I just wanted to illustrate how important that is with this particular Genova result. We see an increase of hydrogen from 5 parts per million to then 25 at 40 minutes, 45 at 60 minutes, 53 at 90 minutes, but then it drops down to 36 at 120 minutes. What I would expect to see if there was a third hour is another increase at maybe 140 minutes and 160 minutes, which would indicate a double peak and indicate a positive result. Now, you could argue that it's a bit of a moot point with this result because there was a pretty clear and early rise in hydrogen at 40 and 60 minutes, and I would agree with you, but I wanted to at least illustrate what the additional hour can show in this situation. If you had a lower rise in hydrogen and maybe it was a little bit later, so let's say the rise in hydrogen didn't happen until 60 minutes or 70 minutes, and then it went back down a little bit at 120 minutes, that would be less clear because that could just be someone with fast transit time, and having that additional hour would be really crucial for that particular person.



Hydrogen & Methane (ppm)

Minutes	Base-line	20	40	60	90	120
Hydrogen (H_2)	6	6	8	9	19	37
Methane (CH_4)	0	0	0	0	0	0
Total	6	6	8	9	19	37

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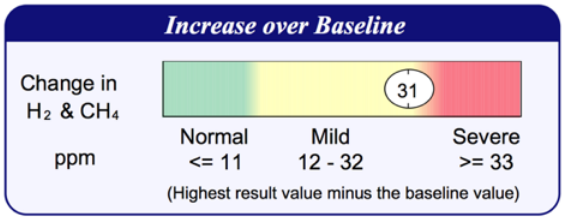

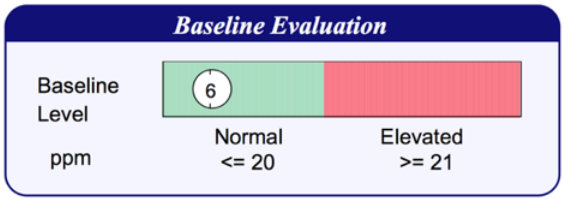

Here is an example of where having the additional hour would really be helpful. You can see a late rise in hydrogen happening at 120 minutes. The baseline value is 6, and then it goes up to 19 at 90 minutes. That is only an increase of 13 in the first 90 minutes, so that would be negative for hydrogen. There are zeros for methane throughout, but we don't know what is happening for the last hour. Maybe methane goes up in that patient, above 10, and maybe they would be positive from that perspective. Maybe if the patient is really constipated and only has a bowel movement every two or three days, that would suggest their transit time is reduced. In that case, seeing what happens in the last hour might be helpful as well because if we see a pretty significant increase, that might be bacterial overgrowth in the terminal ileum in that patient that is not showing up in the first 90 minutes. This patient is a 52-year-old female with chief complaint of weight gain, fatigue, insomnia, poor exercise recovery, and hair loss. She did have

a significant tendency towards constipation and hard, dry stool, often only having a bowel movement every two or three days without intervention. This makes it more likely that she could be positive for SIBO, and we might want to see that third hour.