KRESSER INSTITUTE FOR FUNCTIONAL AND EVOLUTIONARY MEDICINE

SIBO Case Assignments

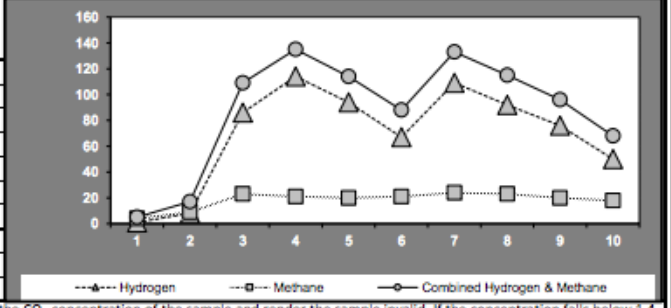
(Answers)

CASE 1:

Data

H_2 = Hydrogen CH_4 = Methane CO_2 = Measured

	Sample	ppm H_2	ppm CH_4	Total H2 + CH4	CO_2 %*
1	Baseline	1	4	5	OK
2	20 min	8	9	17	OK
3	40 min	86	23	109	OK
4	60 min	114	21	135	OK
5	80 min	94	20	114	OK
6	100 min	67	21	88	OK
7	120 min	109	24	133	OK
8	140 min	92	23	115	OK
9	160 min	76	20	96	OK
10	180 min	50	18	68	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 =	5	-	≤20ppm
Greatest H_2 increase over the lowest preceding value within first 120 minutes =	113	H	≤20ppm
Greatest CH_4 increase over the lowest preceding value within first 120 minutes =	20	H	≤12ppm
Greatest combined H_2 & CH_4 increase over the lowest preceding value within first 120 minutes =	130	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**

Answer:

This NUNM SIBO breath test is positive for small intestinal bacterial overgrowth (SIBO) based on both the QuinTron and North American Consensus interpretation criteria. Methane (CH_4) of 23 ppm at the 40-minute mark meets the positive criteria for intestinal methanogen overgrowth (IMO) based on both the QuinTron and North American Consensus critera. Hydrogen (H_2) is also positive. If you are using the North American Consensus criteria, then you can see that she is positive as of the 40-minute mark with a difference of 85 ppm (an increase of greater than or equal to 20 ppm from baseline) and would also be positive based on the QuinTron criteria with an increase of H_2 greater than 20 ppm over the lowest proceeding value within the first 120 minutes.

CASE 2:

CO_2 QC Check	Pass

Gases	Expected	Observed	Normal/Abnormal
H_2 †	<20 ppm	2.25	Normal
CH_4	<10.00 ppm	0.06	Normal
H_2S	<5.00 ppm	9.24	Abnormal

†Note: The "observed" peak for H_2 is within the first 90 minutes.

Interpretation
Indicative of Excess Hydrogen Sulfide

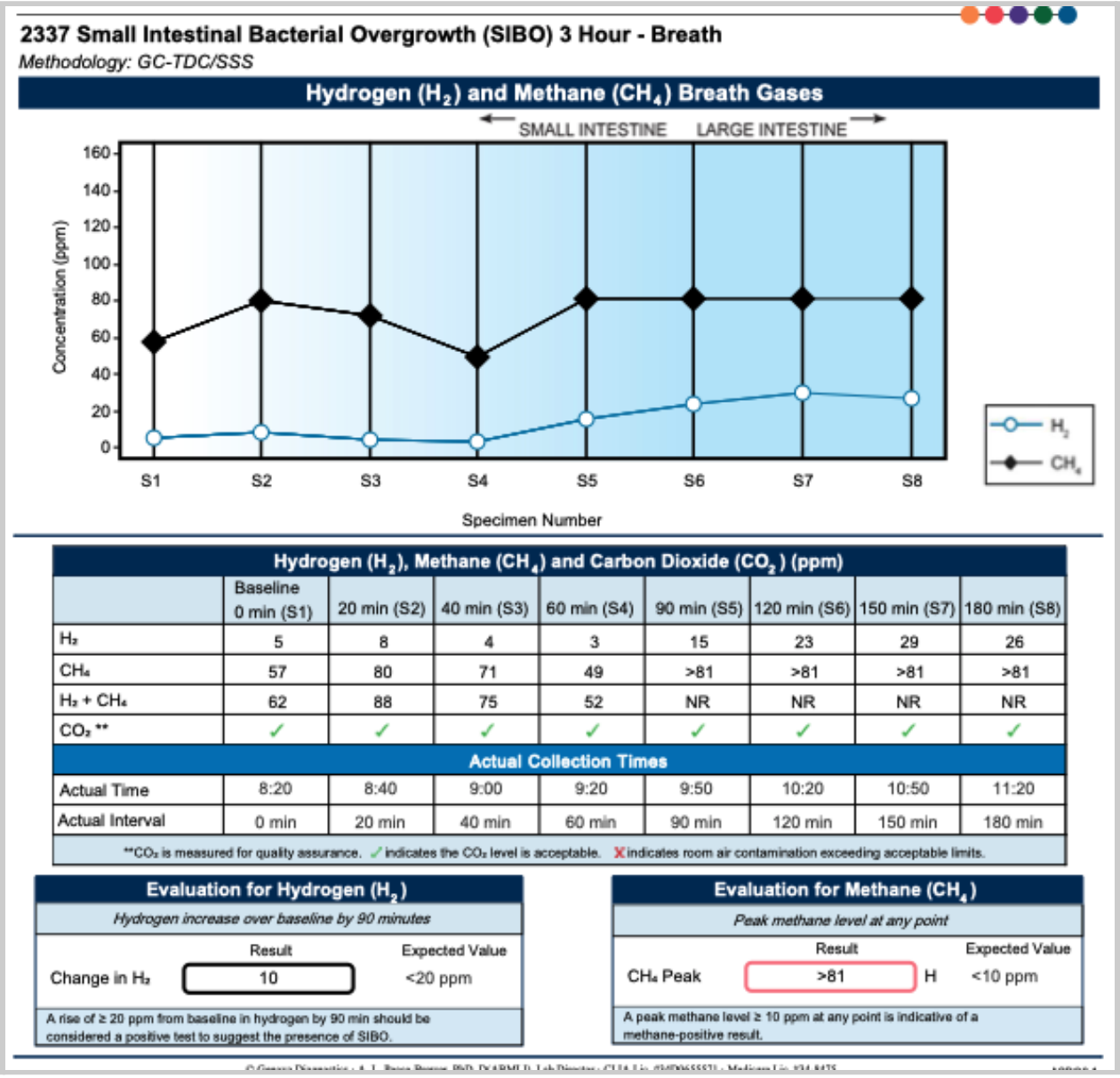
Results									
Samples	T1	T2	T3	T4	T5	T6	T7	T8	T9
Interval (hr:min)	0	17	33	49	65	80	96	111	127
Gases									
H_2 (ppm)	0.00	2.25	0.00	0.00	0.00	0.00	3.37	3.29	11.00
CH_4 (ppm)	0.06	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
H_2S (ppm)	9.24	6.21	5.81	6.61	6.97	5.43	7.07	8.08	7.25

Suboptimal Sample-Bag Deflated (T1, T6)

Answer:

This is a trio-smart breath test that is positive for hydrogen sulfide (H_2S) excess. You can see that a value greater than 5.00 ppm is characteristic of H_2S production excess. This patient had a value of 9.24 ppm with a very low CH_4 of 0.06 ppm and with mostly zero levels until the 96-minute collection. This is a great example of the competitive hydrogen gas model, where we see CH_4 and H_2S producers competing for H_2. You can see that H_2S producers are the dominant form of overgrowth being represented on this test with little to no CH_4 present and very little H_2 left over.

CASE 3:



2337 Small Intestinal Bacterial Overgrowth (SIBO) 3 Hour - Breath

Methodology: GC-TDC/SSS

Hydrogen (H_2) and Methane (CH_4) Breath Gases

Hydrogen (H_2), Methane (CH_4) and Carbon Dioxide (CO_2) (ppm)

	Baseline 0 min (S1)	20 min (S2)	40 min (S3)	60 min (S4)	90 min (S5)	120 min (S6)	150 min (S7)	180 min (S8)
H_2	5	8	4	3	15	23	29	26
CH_4	57	80	71	49	>81	>81	>81	>81
H_2 + CH_4	62	88	75	52	NR	NR	NR	NR
CO_2 **	✓	✓	✓	✓	✓	✓	✓	✓
Actual Collection Times								
Actual Time	8:20	8:40	9:00	9:20	9:50	10:20	10:50	11:20
Actual Interval	0 min	20 min	40 min	60 min	90 min	120 min	150 min	180 min

**CO_2 is measured for quality assurance. ✓ indicates the CO_2 level is acceptable. X indicates room air contamination exceeding acceptable limits.

Evaluation for Hydrogen (H_2)

Hydrogen increase over baseline by 90 minutes

	Result	Expected Value
Change in H_2	10	<20 ppm

A rise of ≥ 20 ppm from baseline in hydrogen by 90 min should be considered a positive test to suggest the presence of SIBO.

Evaluation for Methane (CH_4)

Peak methane level at any point

	Result		Expected Value
CH_4 Peak	>81	H	<10 ppm

A peak methane level ≥ 10 ppm at any point is indicative of a methane-positive result.

Answer:

This Genova Diagnostics SIBO breath test shows a strong IMO-positive result, maxing out the system with CH_4 levels greater than 81 ppm after the 90-minute mark.

CASE 4:

CO_2 QC Check	Pass

Gases	Expected	Observed	Normal/Abnormal
H_2 †	<20 ppm	7.99	Normal
CH_4	<10.00 ppm	24.90	Abnormal
H_2S	<5.00 ppm	10.00	Abnormal

†Note: The "observed" peak for H_2 is within the first 90 minutes.

Interpretation
Indicative of Intestinal Methanogenic Overgrowth and Excess Hydrogen Sulfide

Results									
Samples	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**
Interval (hr:min)	0	15	30	45	60	75	90	105	120
Gases									
H_2 (ppm)	0.00	0.08	0.00	7.99	4.54	1.65	0.50	3.03	1.36
CH_4 (ppm)	3.99	4.70	9.53	5.37	16.33	10.50	24.90	11.91	13.16
H_2S (ppm)	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00

Answer:

This trio-smart breath test is positive for IMO and H_2S excess. Although we typically see either methanogens or H_2S producers dominate, there are instances where we see both present on the breath test. In this case, you would correlate symptoms with the test results before deciding what to focus most on with treatment.

CASE 5:

CO_2 QC Check	Pass

Gases	Expected	Observed	Normal/Abnormal
H_2 †	<20.09 ppm	44.23	Abnormal
CH_4	<10.00 ppm	23.13	Abnormal
H_2S	<5.00 ppm	10.00	Abnormal

†Note: The "observed" peak for H_2 is within the first 90 minutes.

Interpretation

Indicative of Small Intestinal Bacterial Overgrowth, Intestinal Methanogenic Overgrowth, and Excess Hydrogen Sulfide

Results

Samples	T1	T2	T3	T4	T5	T6	T7	T8	T9
Interval (hr:min)	0	17	32	47	62	77	92	107	122
Gases									
H_2 (ppm)	0.09	1.81	1.77	2.21	8.61	44.23	56.45	59.95	45.22
CH_4 (ppm)	23.13	22.78	22.45	20.52	21.47	21.87	21.31	20.23	17.89
H_2S (ppm)	8.83	10.00	10.00	10.00	9.48	9.01	10.00	10.00	10.00

Suboptimal Sample-Bag Deflated (T1-T3)

RESULTS

Antibody Detected	Patient Value (OD)	Antibody Levels
Anti-CdtB Ab	0.35	**Not Elevated**
Anti-Vinculin Ab	2.81	**Elevated**

ABOUT THE ASSAY

Diarrhea-predominant irritable bowel syndrome (IBS-D) is a gastrointestinal disorder affecting 10-15% of the population. Host antibodies to CdtB cross-react with vinculin, a protein in the intestinal lining, leading to a small intestinal bacterial overgrowth (SIBO) and IBS-like phenotype. Elevated levels of anti-CdtB and anti-vinculin antibodies have been identified in IBS-D and IBS-M patients compared to patients with inflammatory bowel disease (IBD).[1,2]

Results were achieved using ELISA test methodology. An elevated result supports the diagnosis of diarrhea-predominant or mixed-typed IBS. A normal result does not preclude the diagnosis of IBS-D or IBS-M due to the low negative predictive value. The ibs.smart™ assay has a specificity of 94% for anti-CdtB and 91% for anti-vinculin and a positive predictive value of 96% for anti-CdtB and 91% for anti-vinculin. An indeterminate result is denoted as (*) and indicates a level beyond the measurable range of the assay.

	Reference Interval	Reportable Range
Anti-CdtB Ab	0.00 – 1.56	0.00 – 4.00
Anti-Vinculin Ab	0.00 – 1.60	0.00 – 4.00

Answer:

This trio-smart breath test is positive for SIBO, IMO, and H_2S excess. In my experience, this is less common of a result where all 3 are elevated but still possible. Again, correlating symptoms would be important in this case. You can also see an ibs-smart test result above. This person

had a significant history of multiple food poisoning episodes, and you can see the pretty high positive anti-vinculin antibody of 2.81. I would diagnose this person with post-infectious IBS and SIBO based on these results.