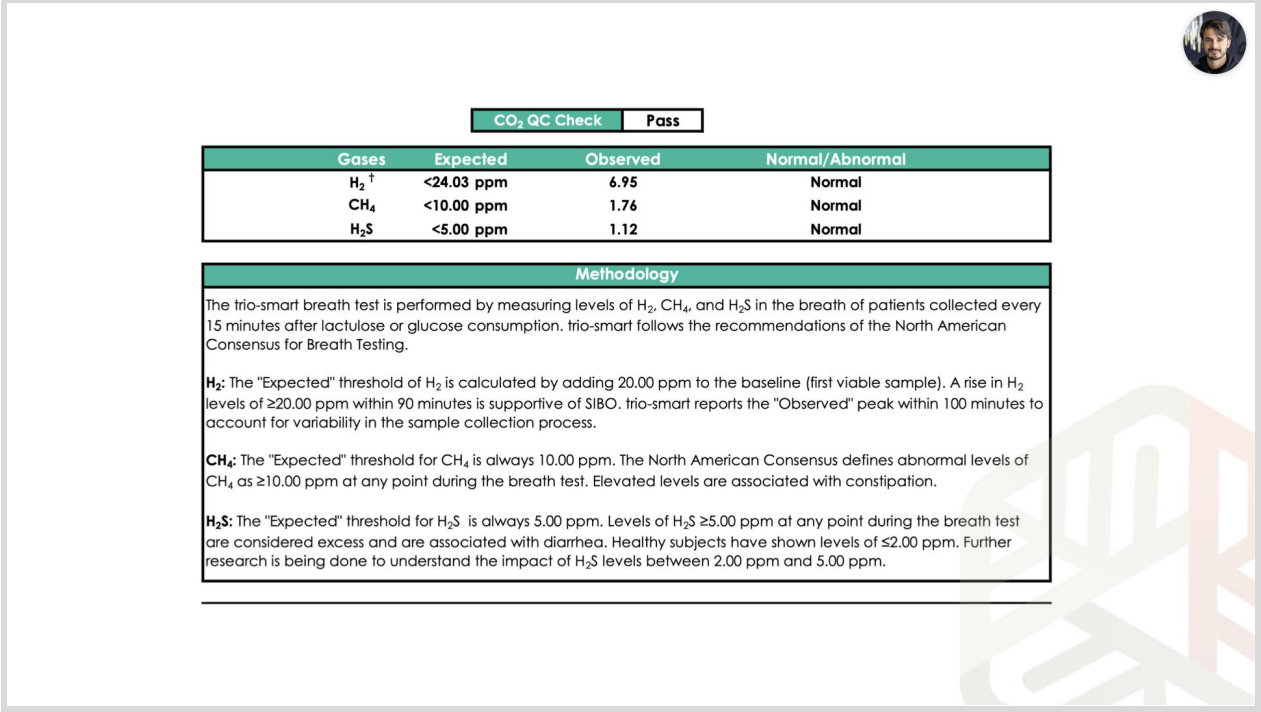
KRESSER INSTITUTE FOR FUNCTIONAL AND EVOLUTIONARY MEDICINE

Gut Case Studies, Part 3

CASE #5: 28-YEAR-OLD MALE

[The] next patient is a 28-year-old male. [His] chief complaints [are] gas with diarrhea, severe insomnia, fatigue, and brain fog. He does work a very stressful job. Also, [he] has some caregiver stress that he's dealing with. He had been working with another provider and was treated for [small intestinal bacterial overgrowth] (SIBO) without any testing. He tolerated that protocol well but didn't really have much improvement in any of his symptoms.



CO_2 QC Check	Pass

Gases	Expected	Observed	Normal/Abnormal
H_2 †	<24.03 ppm	6.95	Normal
CH_4	<10.00 ppm	1.76	Normal
H_2S	<5.00 ppm	1.12	Normal

Methodology

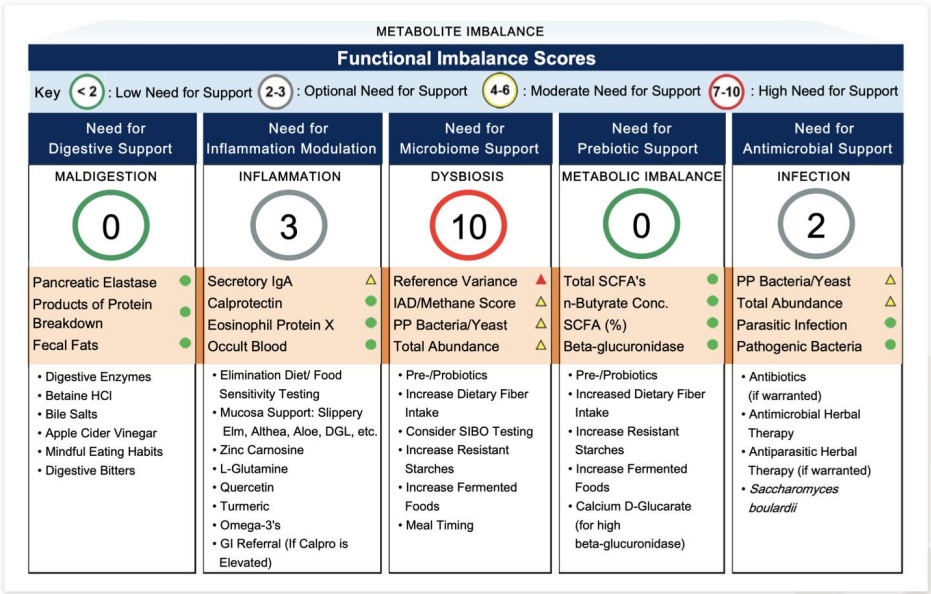
The trio-smart breath test is performed by measuring levels of H_2, CH_4, and H_2S in the breath of patients collected every 15 minutes after lactulose or glucose consumption. trio-smart follows the recommendations of the North American Consensus for Breath Testing.

H_2: The "Expected" threshold of H_2 is calculated by adding 20.00 ppm to the baseline (first viable sample). A rise in H_2 levels of ≥20.00 ppm within 90 minutes is supportive of SIBO. trio-smart reports the "Observed" peak within 100 minutes to account for variability in the sample collection process.

CH_4: The "Expected" threshold for CH_4 is always 10.00 ppm. The North American Consensus defines abnormal levels of CH_4 as ≥10.00 ppm at any point during the breath test. Elevated levels are associated with constipation.

H_2S: The "Expected" threshold for H_2S is always 5.00 ppm. Levels of H_2S ≥5.00 ppm at any point during the breath test are considered excess and are associated with diarrhea. Healthy subjects have shown levels of ≤2.00 ppm. Further research is being done to understand the impact of H_2S levels between 2.00 ppm and 5.00 ppm.

His SIBO breath test through trio-smart was negative, all these levels falling below the North American Consensus. He was super surprised by this result, actually. And as I mentioned, because he hadn't been tested before the treatment with his last provider, it's really tough to know if the treatment was effective, and that's why we're seeing a negative result, or that maybe SIBO was not a major driver of symptoms or he never had SIBO in the first place. So [it's] just tough to know in this particular case.



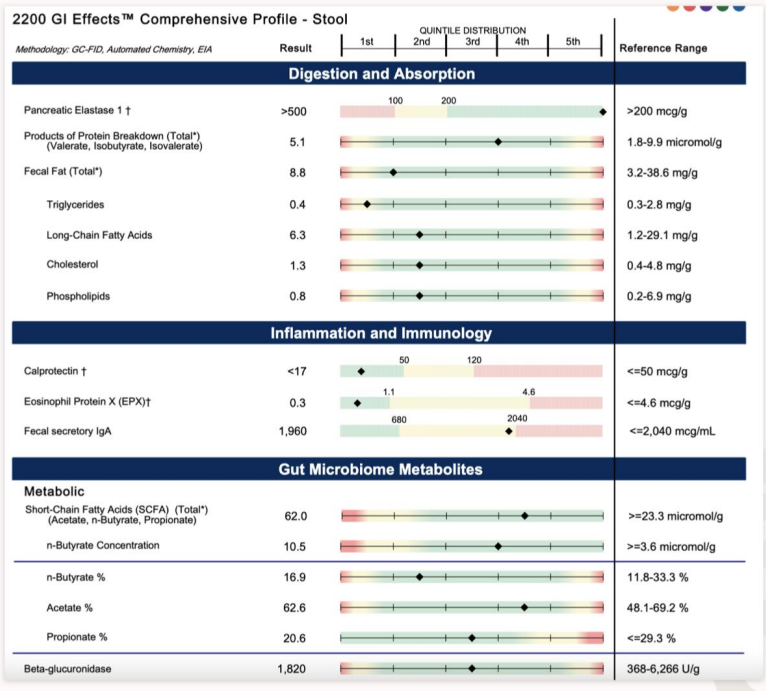
METABOLITE IMBALANCE

Functional Imbalance Scores

Key (< 2) : Low Need for Support (2-3) : Optional Need for Support (4-6) : Moderate Need for Support (7-10) : High Need for Support

Need for Digestive Support	Need for Inflammation Modulation	Need for Microbiome Support	Need for Prebiotic Support	Need for Antimicrobial Support
MALDIGESTION	INFLAMMATION	DYSBIOSIS	METABOLIC IMBALANCE	INFECTION
0	3	10	0	2
Pancreatic Elastase ●	Secretory IgA △	Reference Variance ▲	Total SCFA's ●	PP Bacteria/Yeast △
Products of Protein Breakdown ●	Calprotectin ●	IAD/Methane Score △	n-Butyrate Conc. ●	Total Abundance △
Fecal Fats ●	Eosinophil Protein X ●	PP Bacteria/Yeast △	SCFA (%) ●	Parasitic Infection ●
	Occult Blood ●	Total Abundance △	Beta-glucuronidase ●	Pathogenic Bacteria ●
• Digestive Enzymes • Betaine HCl • Bile Salts • Apple Cider Vinegar • Mindful Eating Habits • Digestive Bitters	• Elimination Diet/ Food Sensitivity Testing • Mucosa Support: Slippery Elm, Althea, Aloe, DGL, etc. • Zinc Carnosine • L-Glutamine • Quercetin • Turmeric • Omega-3's • GI Referral (If Calpro is Elevated)	• Pre-/Probiotics • Increase Dietary Fiber Intake • Consider SIBO Testing • Increase Resistant Starches • Increase Fermented Foods • Meal Timing	• Pre-/Probiotics • Increased Dietary Fiber Intake • Increase Resistant Starches • Increase Fermented Foods • Calcium D-Glucarate (for high beta-glucuronidase)	• Antibiotics (if warranted) • Antimicrobial Herbal Therapy • Antiparasitic Herbal Therapy (if warranted) • *Saccharomyces boulardii*

His GI Effects test showed markers of dysbiosis based [on] this reference variance we've discussed, but also total abundance and presence of potential pathogenic bacteria. He also had a slightly elevated fecal secretory [immunoglobulin A] (IgA).

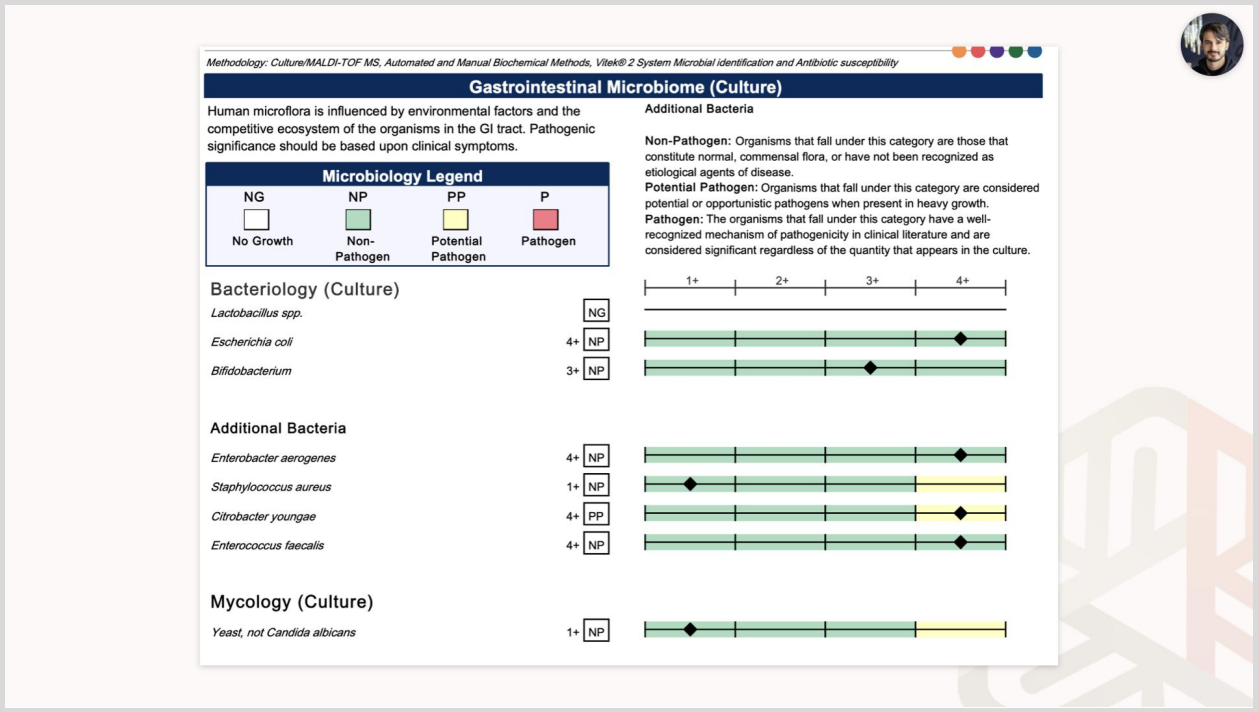


2200 GI Effects™ Comprehensive Profile - Stool

Methodology: GC-FID, Automated Chemistry, EIA

	Result	QUINTILE DISTRIBUTION 1st 2nd 3rd 4th 5th	Reference Range
Digestion and Absorption			
Pancreatic Elastase 1 †	>500	100 200	>200 mcg/g
Products of Protein Breakdown (Total*) (Valerate, Isobutyrate, Isovalerate)	5.1		1.8-9.9 micromol/g
Fecal Fat (Total*)	8.8		3.2-38.6 mg/g
Triglycerides	0.4		0.3-2.8 mg/g
Long-Chain Fatty Acids	6.3		1.2-29.1 mg/g
Cholesterol	1.3		0.4-4.8 mg/g
Phospholipids	0.8		0.2-6.9 mg/g
Inflammation and Immunology			
Calprotectin †	<17	50 120	<=50 mcg/g
Eosinophil Protein X (EPX)†	0.3	1.1 4.6	<=4.6 mcg/g
Fecal secretory IgA	1,960	680 2040	<=2,040 mcg/mL
Gut Microbiome Metabolites			
Metabolic			
Short-Chain Fatty Acids (SCFA) (Total*) (Acetate, n-Butyrate, Propionate)	62.0		>=23.3 micromol/g
n-Butyrate Concentration	10.5		>=3.6 micromol/g
n-Butyrate %	16.9		11.8-33.3 %
Acetate %	62.6		48.1-69.2 %
Propionate %	20.6		<=29.3 %
Beta-glucuronidase	1,820		368-6,266 U/g

Here you can see the breakdown a little bit more. Markers of digestion and absorption look pretty good, actually, but there's that high normal fecal secretory IgA. This is just barely below the cut-off range for an elevated secretory IgA, so I would definitely interpret this as high. And [the] markers of metabolic function were all good, with nice levels of short-chain fatty acids and beta-glucuronidase.



Here you can see the quote, "Potential Pathogen," that they described on the first page of the report. We're seeing a four-plus of *Citrobacter*. And as we talked about in lesson six, I have some reservations about using culture to identify overgrowth of certain pathogens that are thought to be commensal in certain quantities. So it's tough for me to know whether or not to get worked up about a four-plus on culture without knowing the context of this organism within the entire microbiome. So that being said, there are no other real[ly] big issues on the gut test. [The] placebo was negative. He is symptomatic and [has] a high fecal secretory IgA. So I [decided] to treat, considering all this information.

Diagnosis

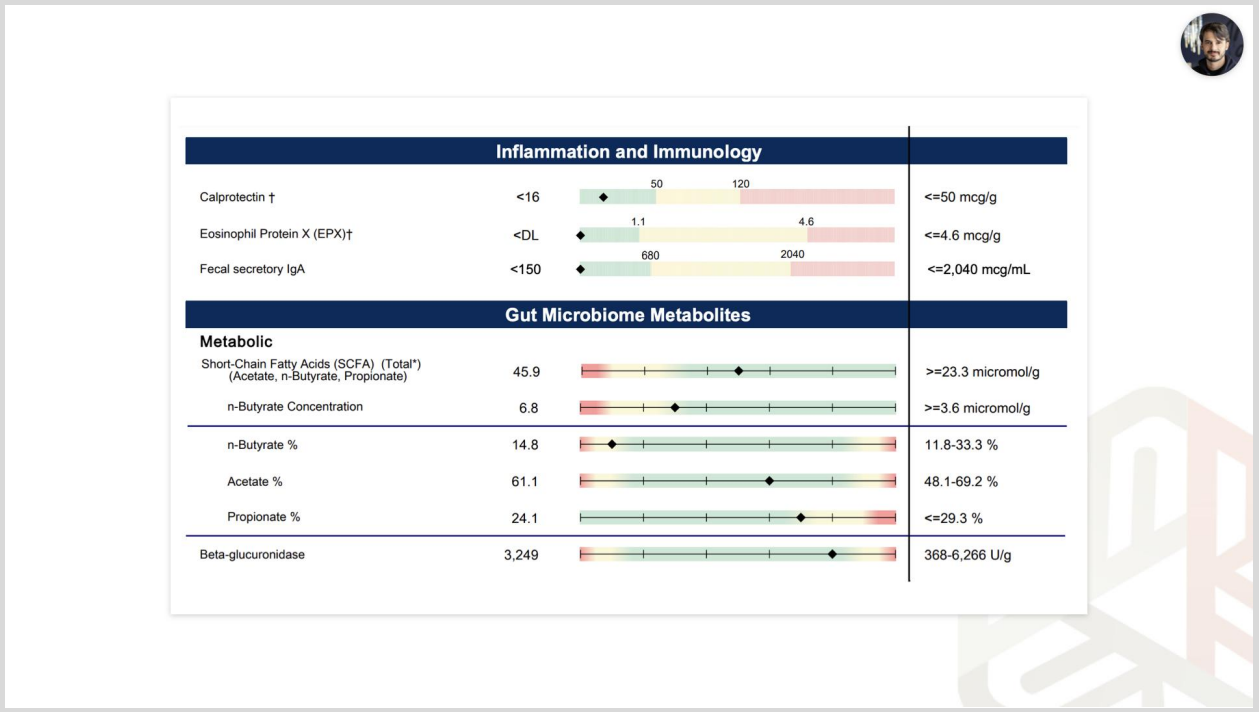
Pattern	Supporting Markers	Comments
Dysbiosis with immune dysregulation	GI Effects	Fecal sIgA high
Citrobacter	GI Effects	4+ culture

My patterns of imbalance would be dysbiosis with immune dysregulation, given the abundance markers and the high fecal secretory IgA and then *Citrobacter* as a potential pathogen.

Treatment protocol

Nutraceutical	Dosage
Biocidin LSF	Begin with 1 pump and gradually increase to 3 pumps per day.
Lauricidin	1 scoop TID with each meal
Interfase Plus	3-4 capsules BID on empty stomach
SEED	2 capsules daily
Glucomannan (powder)	Start with 1/8 tsp once a day with at least 8 oz. of water. Build up slowly to 1/2 tsp once a day.
Saccharomyces boulardii	3 billion CFU BID at lunch and before bed

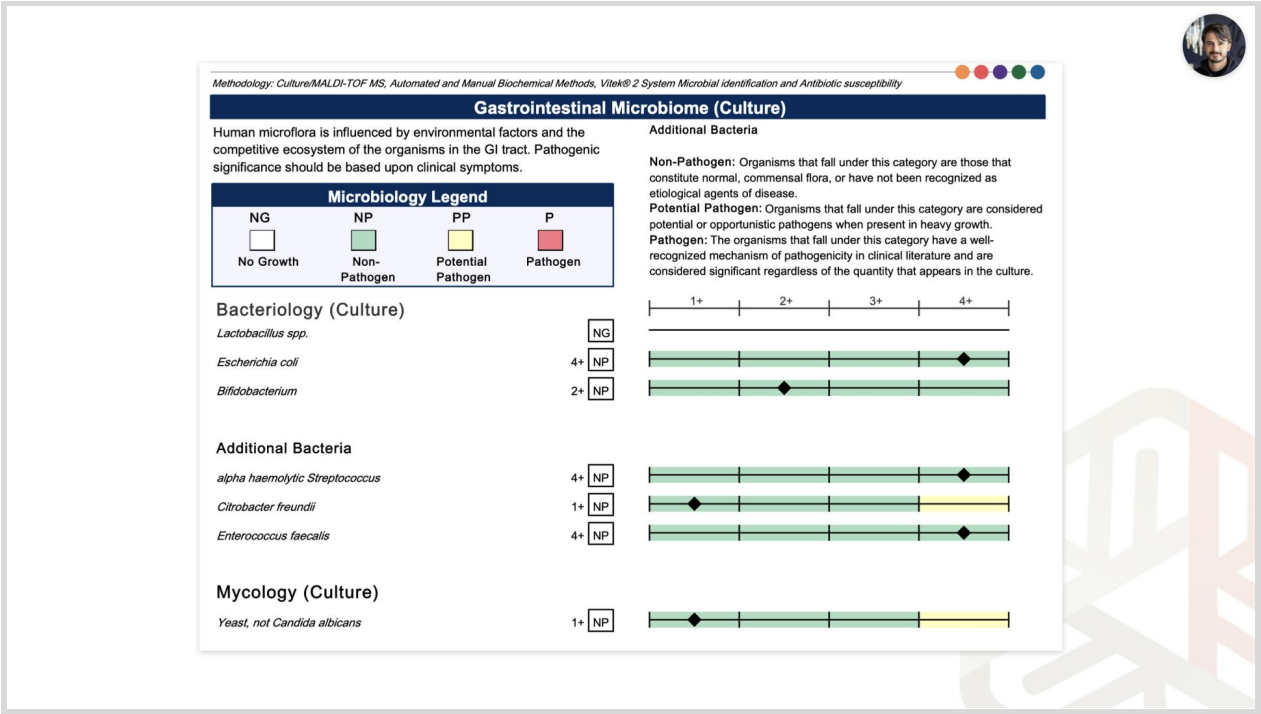
Because this patient has been through previous treatment for SIBO, I [reviewed] what he had been on prior to make sure we weren't duplicating the same protocol. I also put a little more emphasis on gut restoration and support, considering his dysbiosis markers and coming off of treatment right before coming to see me. He also expressed having some aversion to swallowing lots of pills, so I did my best to find some products that would be easier for him to take and, therefore, hopefully, more compliant. So I have the Biocidin LSF, the [inaudible] Interfase Plus, and two probiotics. One is Seed for diversity and multi-strain and then [inaudible] to see if this will help with diarrhea. I also added Glucomannan to help with the prebiotic support, and I gave him a list of prebiotic foods that we could slowly introduce to try and help support the microbiome variety and abundance.



Inflammation and Immunology			
Calprotectin †	<16	50 / 120	<=50 mcg/g
Eosinophil Protein X (EPX)†	<DL	1.1 / 4.6	<=4.6 mcg/g
Fecal secretory IgA	<150	680 / 2040	<=2,040 mcg/mL

Gut Microbiome Metabolites			
Metabolic			
Short-Chain Fatty Acids (SCFA) (Total*) (Acetate, n-Butyrate, Propionate)	45.9		>=23.3 micromol/g
n-Butyrate Concentration	6.8		>=3.6 micromol/g
n-Butyrate %	14.8		11.8-33.3 %
Acetate %	61.1		48.1-69.2 %
Propionate %	24.1		<=29.3 %
Beta-glucuronidase	3,249		368-6,266 U/g

Follow-up testing showed improvement in fecal secretory IgA, which is really nice to see. Sometimes it doesn't always happen as quickly [as] we talked about before.



Methodology: Culture/MALDI-TOF MS, Automated and Manual Biochemical Methods, Vitek® 2 System Microbial identification and Antibiotic susceptibility

Gastrointestinal Microbiome (Culture)

Human microflora is influenced by environmental factors and the competitive ecosystem of the organisms in the GI tract. Pathogenic significance should be based upon clinical symptoms.

Microbiology Legend

NG	NP	PP	P
No Growth	Non-Pathogen	Potential Pathogen	Pathogen

Additional Bacteria

Non-Pathogen: Organisms that fall under this category are those that constitute normal, commensal flora, or have not been recognized as etiological agents of disease.
Potential Pathogen: Organisms that fall under this category are considered potential or opportunistic pathogens when present in heavy growth.
Pathogen: The organisms that fall under this category have a well-recognized mechanism of pathogenicity in clinical literature and are considered significant regardless of the quantity that appears in the culture.

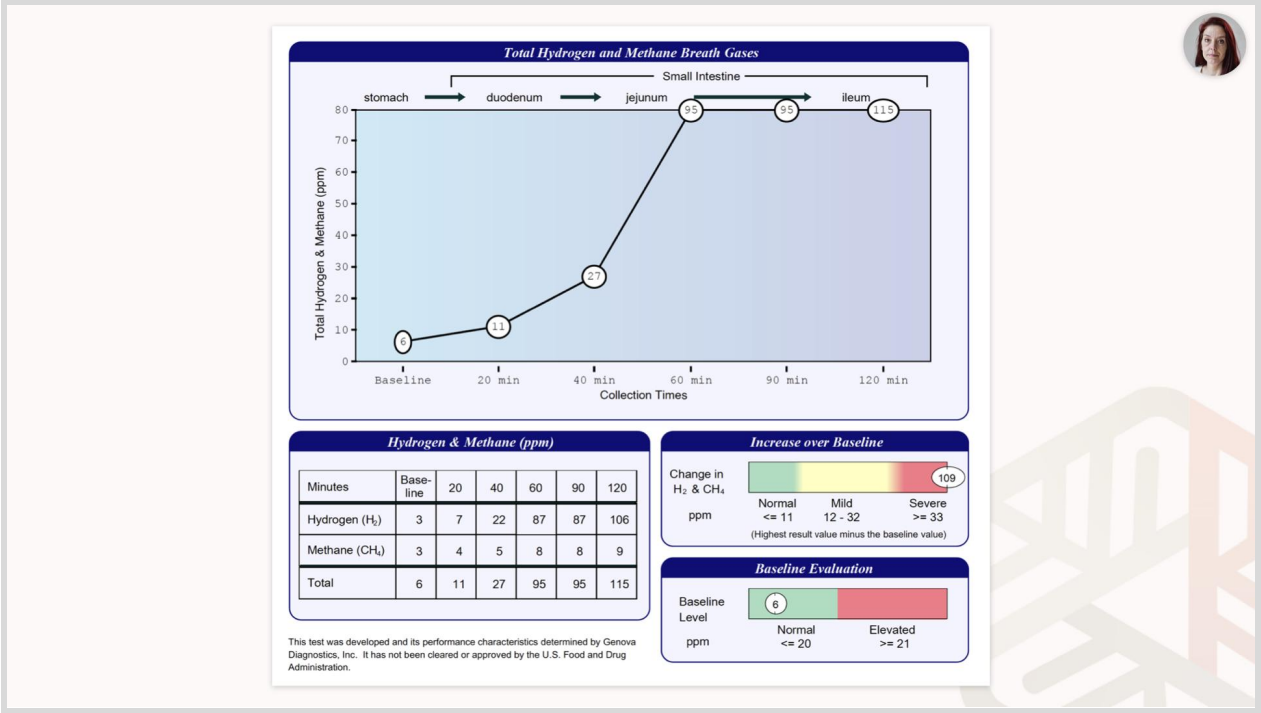
		1+	2+	3+	4+
Bacteriology (Culture)					
Lactobacillus spp.	NG				
Escherichia coli	4+ NP				◆
Bifidobacterium	2+ NP		◆		
Additional Bacteria					
alpha haemolytic Streptococcus	4+ NP				◆
Citrobacter freundii	1+ NP	◆			
Enterococcus faecalis	4+ NP				◆
Mycology (Culture)					
Yeast, not Candida albicans	1+ NP	◆			

And [there were] improvements in *Citrobacter freundii*. Not pictured here were improvements in his dysbiosis scores because of the fecal secretory IgA and the dysbiosis retreated. He also had some shifts in diversity and abundance. So overall, he reports [gastrointestinal] symptoms improving by 80 percent and continuing to improve. [I] kept him on the Seed and started rotating out different prebiotics until his diet was more expanded. He [had] some slight improvements in insomnia, but not much.

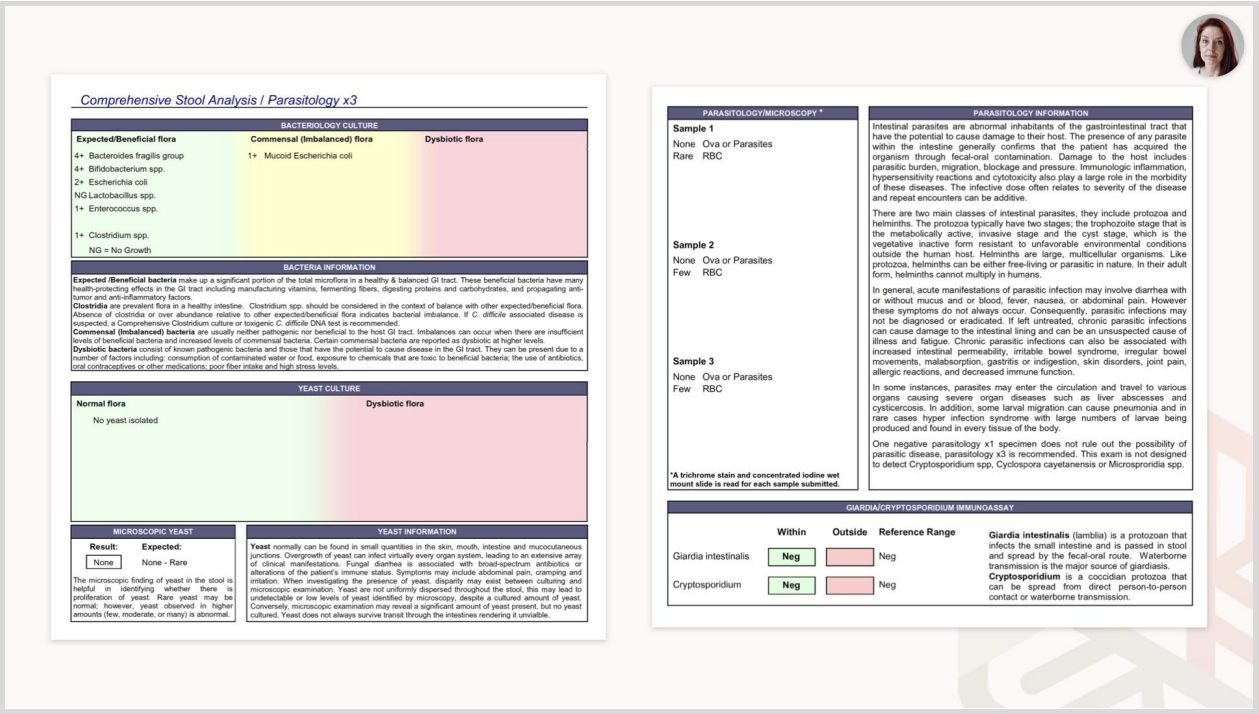
CASE #6: 43-YEAR-OLD FEMALE

[The] next patient is a 43-year-old female that Chris and I saw a couple of years ago. [Her] chief complaints were mood imbalance, general fatigue, [and] exercise intolerance. She had multiple sclerosis [(MS)] early stage, low libido, constipation, gas, and bloating. Her MS is relatively well-controlled with the Wahls Protocol by Dr. Terry Wahls, the physician who significantly improved her own MS with that Paleo type of diet and is [nutrient-dense], meaning lots of vegetables. I think you are probably familiar with that. If not, make sure you Google “Wahls Protocol.” And prior to 2011, this patient was doing triathlons, eating a lot of gluten and grains, [and carbohydrate] loading, which is common in endurance athletes on mostly a vegetarian diet. But she crashed with chronic fatigue episodes. [She] switched her diet to Paleo after

doing some research after that episode. And she did have ovarian cancer in her early 20s, and her ovaries were removed [(one] in 2001 and another in 2009).



So here's Genova's two-hour breath test. As you can see here, [it's] strongly positive. It goes from 7 at 20 minutes to 22 at 40 minutes. And then from 22 to 87 at 60 minutes. And then, she's at 106 at 120 minutes, which is off the charts. They just do a flatline at the top there because the chart tops off at 80 parts per million total breath gases. Now, with the North American Consensus, we'd be using the 90 minutes value as our marker. And by all standards, that would still be positive. She was constipated with slow transit time. So we could argue that hydrogen was almost certainly still in the small intestine when it jumped up there at 60 minutes versus some may be asking if it was fast transit and the lactulose being in the colon by that time. Methane was negative for [the] North American Consensus. A reminder that this is an older test. So you'll see the total of the combined changes of hydrogen and methane reported here, but that's no longer used as part of the North American Consensus guidelines.



Comprehensive Stool Analysis / Parasitology x3

BACTERIOLOGY CULTURE

Expected/Beneficial flora	Commensal (Imbalanced) flora	Dysbiotic flora
4+ Bacteroides fragilis group	1+ Mucoid Escherichia coli	
4+ Bifidobacterium spp.		
2+ Escherichia coli		
NG Lactobacillus spp.		
1+ Enterococcus spp.		
1+ Clostridium spp.		
NG = No Growth		

BACTERIA INFORMATION

Expected /Beneficial bacteria make up a significant portion of the total microflora in a healthy & balanced GI tract. These beneficial bacteria have many health-protecting effects in the GI tract including manufacturing vitamins, fermenting fibers, digesting proteins and carbohydrates, and propagating anti-tumor and anti-inflammatory factors.
Clostridia are prevalent flora in a healthy intestine. Clostridium spp. should be considered in the context of balance with other expected/beneficial flora. Absence of clostridia or over abundance relative to other expected/beneficial flora indicates bacterial imbalance. If *C. difficile* associated disease is suspected, a Comprehensive Clostridium culture or toxigenic *C. difficile* DNA test is recommended.
Commensal (Imbalanced) bacteria are usually neither pathogenic nor beneficial to the host GI tract. Imbalances can occur when there are insufficient levels of beneficial bacteria and increased levels of commensal bacteria. Certain commensal bacteria are reported as dysbiotic at higher levels.
Dysbiotic bacteria consist of known pathogenic bacteria and those that have the potential to cause disease in the GI tract. They can be present due to a number of factors including: consumption of contaminated water or food, exposure to chemicals that are toxic to beneficial bacteria; the use of antibiotics, oral contraceptives or other medications; poor fiber intake and high stress levels.

YEAST CULTURE

Normal flora	Dysbiotic flora
No yeast isolated	

MICROSCOPIC YEAST

Result:	Expected:
None	None - Rare

The microscopic finding of yeast in the stool is helpful in identifying whether there is proliferation of yeast. Rare yeast may be normal; however, yeast observed in higher amounts (few, moderate, or many) is abnormal.

YEAST INFORMATION

Yeast normally can be found in small quantities in the skin, mouth, intestine and mucocutaneous junctions. Overgrowth of yeast can infect virtually every organ system, leading to an extensive array of clinical manifestations. Fungal diarrhea is associated with broad-spectrum antibiotics or alterations of the patient's immune status. Symptoms may include abdominal pain, cramping and irritation. When investigating the presence of yeast, disparity may exist between culturing and microscopic examination. Yeast are not uniformly dispersed throughout the stool, this may lead to undetectable or low levels of yeast identified by microscopy, despite a cultured amount of yeast. Conversely, microscopic examination may reveal a significant amount of yeast present, but no yeast cultured. Yeast does not always survive transit through the intestines rendering it unviable.

PARASITOLOGY/MICROSCOPY *

Sample 1	
None	Ova or Parasites
Rare	RBC
Sample 2	
None	Ova or Parasites
Few	RBC
Sample 3	
None	Ova or Parasites
Few	RBC

***A trichrome stain and concentrated iodine wet mount slide is read for each sample submitted.**

PARASITOLOGY INFORMATION

Intestinal parasites are abnormal inhabitants of the gastrointestinal tract that have the potential to cause damage to their host. The presence of any parasite within the intestine generally confirms that the patient has acquired the organism through fecal-oral contamination. Damage to the host includes parasitic burden, migration, blockage and pressure. Immunologic inflammation, hypersensitivity reactions and cytotoxicity also play a large role in the morbidity of these diseases. The infective dose often relates to severity of the disease and repeat encounters can be additive.

There are two main classes of intestinal parasites, they include protozoa and helminths. The protozoa typically have two stages; the trophozoite stage that is the metabolically active, invasive stage and the cyst stage, which is the vegetative inactive form resistant to unfavorable environmental conditions outside the human host. Helminths are large, multicellular organisms. Like protozoa, helminths can be either free-living or parasitic in nature. In their adult form, helminths cannot multiply in humans.

In general, acute manifestations of parasitic infection may involve diarrhea with or without mucus and or blood, fever, nausea, or abdominal pain. However these symptoms do not always occur. Consequently, parasitic infections may not be diagnosed or eradicated. If left untreated, chronic parasitic infections can cause damage to the intestinal lining and can be an unsuspected cause of illness and fatigue. Chronic parasitic infections can also be associated with increased intestinal permeability, irritable bowel syndrome, irregular bowel movements, malabsorption, gastritis or indigestion, skin disorders, joint pain, allergic reactions, and decreased immune function.

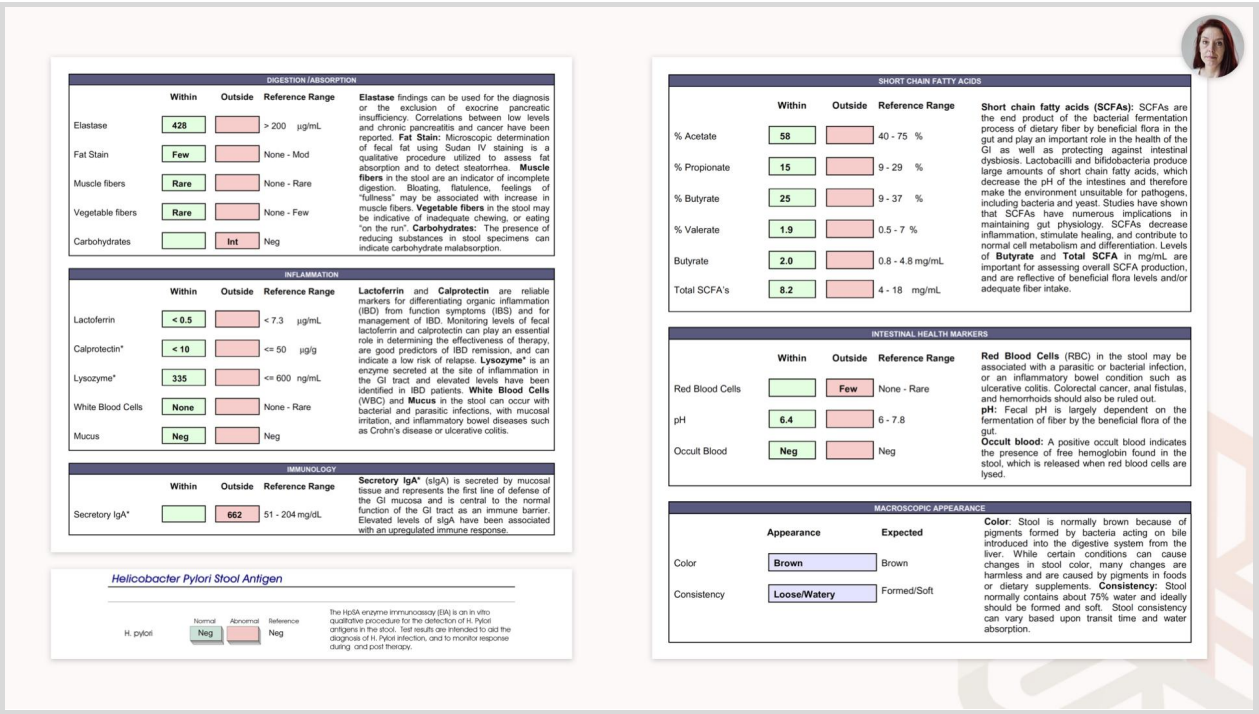
In some instances, parasites may enter the circulation and travel to various organs causing severe organ diseases such as liver abscesses and cysticercosis. In addition, some larval migration can cause pneumonia and in rare cases hyper infection syndrome with large numbers of larvae being produced and found in every tissue of the body.

One negative parasitology x1 specimen does not rule out the possibility of parasitic disease, parasitology x3 is recommended. This exam is not designed to detect Cryptosporidium spp, Cyclospora cayetanensis or Microsporidia spp.

GIARDIA/CRYPTOSPORIDIUM IMMUNOASSAY

	Within	Outside	Reference Range
Giardia intestinalis	Neg		Neg
Cryptosporidium	Neg		Neg

Giardia intestinalis (lamblia) is a protozoan that infects the small intestine and is passed in stool and spread by the fecal-oral route. Waterborne transmission is the major source of giardiasis. **Cryptosporidium** is a coccidian protozoa that can be spread from direct person-to-person contact or waterborne transmission.



DIGESTION /ABSORPTION

	Within	Outside	Reference Range
Elastase	428		> 200 µg/mL
Fat Stain	Few		None - Mod
Muscle fibers	Rare		None - Rare
Vegetable fibers	Rare		None - Few
Carbohydrates		Int	Neg

Elastase findings can be used for the diagnosis or the exclusion of exocrine pancreatic insufficiency. Correlations between low levels and chronic pancreatitis and cancer have been reported. **Fat Stain:** Microscopic determination of fecal fat using Sudan IV staining is a qualitative procedure utilized to assess fat absorption and to detect steatorrhea. **Muscle fibers** in the stool are an indicator of incomplete digestion. Bloating, flatulence, feelings of "fullness" may be associated with increase in muscle fibers. **Vegetable fibers** in the stool may be indicative of inadequate chewing, or eating "on the run". **Carbohydrates:** The presence of reducing substances in stool specimens can indicate carbohydrate malabsorption.

INFLAMMATION

	Within	Outside	Reference Range
Lactoferrin	< 0.5		< 7.3 µg/mL
Calprotectin*	< 10		<= 50 µg/g
Lysozyme*	335		<= 600 ng/mL
White Blood Cells	None		None - Rare
Mucus	Neg		Neg

Lactoferrin and **Calprotectin** are reliable markers for differentiating organic inflammation (IBD) from function symptoms (IBS) and for management of IBD. Monitoring levels of fecal lactoferrin and calprotectin can play an essential role in determining the effectiveness of therapy, are good predictors of IBD remission, and can indicate a low risk of relapse. **Lysozyme*** is an enzyme secreted at the site of inflammation in the GI tract and elevated levels have been identified in IBD patients. **White Blood Cells** (WBC) and **Mucus** in the stool can occur with bacterial and parasitic infections, with mucosal irritation, and inflammatory bowel diseases such as Crohn's disease or ulcerative colitis.

IMMUNOLOGY

	Within	Outside	Reference Range
Secretory IgA*		662	51 - 204 mg/dL

Secretory IgA* (sIgA) is secreted by mucosal tissue and represents the first line of defense of the GI mucosa and is central to the normal function of the GI tract as an immune barrier. Elevated levels of sIgA have been associated with an upregulated immune response.

Helicobacter Pylori Stool Antigen

	Normal	Abnormal	Reference
H. pylori	Neg		Neg

The HpSA enzyme immunoassay (EIA) is an in vitro qualitative procedure for the detection of H. Pylori antigens in the stool. Test results are intended to aid the diagnosis of H. Pylori infection, and to monitor response during and post therapy.

SHORT CHAIN FATTY ACIDS

	Within	Outside	Reference Range
% Acetate	58		40 - 75 %
% Propionate	15		9 - 29 %
% Butyrate	25		9 - 37 %
% Valerate	1.9		0.5 - 7 %
Butyrate	2.0		0.8 - 4.8 mg/mL
Total SCFA's	8.2		4 - 18 mg/mL

Short chain fatty acids (SCFAs): SCFAs are the end product of the bacterial fermentation process of dietary fiber by beneficial flora in the gut and play an important role in the health of the GI as well as protecting against intestinal dysbiosis. Lactobacilli and bifidobacteria produce large amounts of short chain fatty acids, which decrease the pH of the intestines and therefore make the environment unsuitable for pathogens, including bacteria and yeast. Studies have shown that SCFAs have numerous implications in maintaining gut physiology. SCFAs decrease inflammation, stimulate healing, and contribute to normal cell metabolism and differentiation. Levels of **Butyrate** and **Total SCFA** in mg/mL are important for assessing overall SCFA production, and are reflective of beneficial flora levels and/or adequate fiber intake.

INTESTINAL HEALTH MARKERS

	Within	Outside	Reference Range
Red Blood Cells		Few	None - Rare
pH	6.4		6 - 7.8
Occult Blood	Neg		Neg

Red Blood Cells (RBC) in the stool may be associated with a parasitic or bacterial infection, or an inflammatory bowel condition such as ulcerative colitis. Colorectal cancer, anal fistulas, and hemorrhoids should also be ruled out.
pH: Fecal pH is largely dependent on the fermentation of fiber by the beneficial flora of the gut.
Occult blood: A positive occult blood indicates the presence of free hemoglobin found in the stool, which is released when red blood cells are lysed.

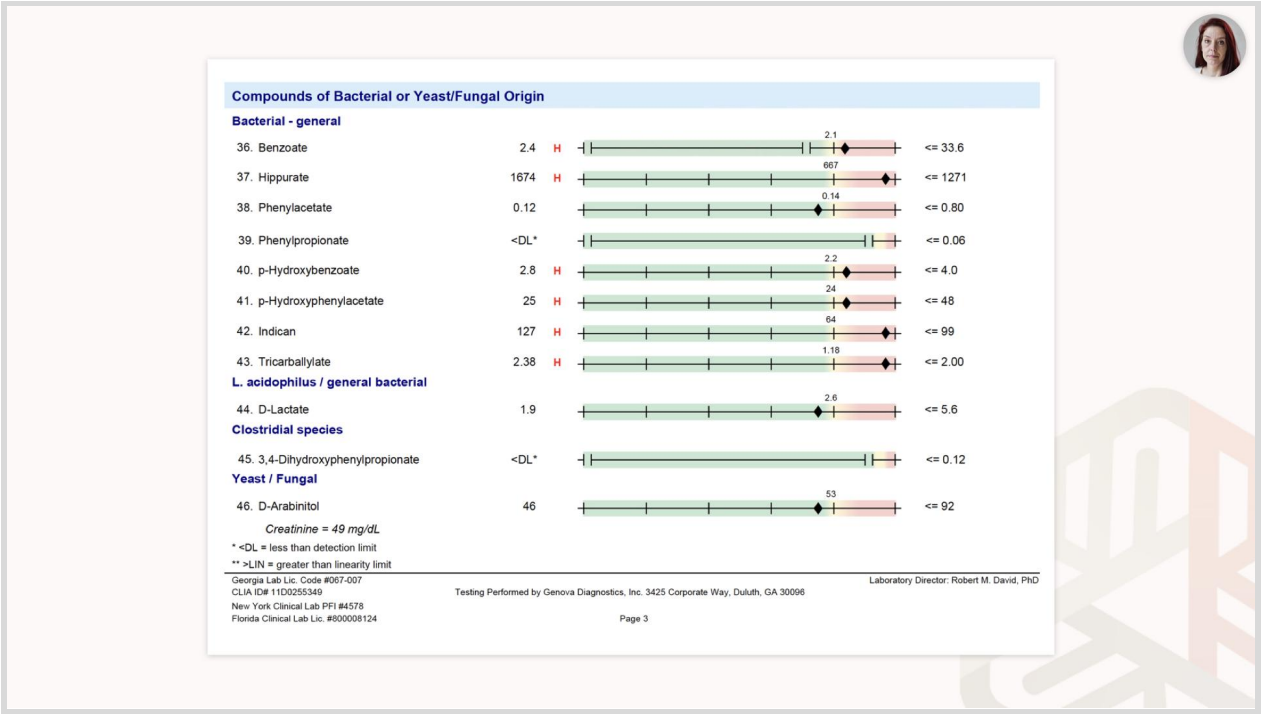
MACROSCOPIC APPEARANCE

	Appearance	Expected
Color	Brown	Brown
Consistency	Loose/Watery	Formed/Soft

Color: Stool is normally brown because of pigments formed by bacteria acting on bile introduced into the digestive system from the liver. While certain conditions can cause changes in stool color, many changes are harmless and are caused by pigments in foods or dietary supplements. **Consistency:** Stool normally contains about 75% water and ideally should be formed and soft. Stool consistency can vary based upon transit time and water absorption.

Here's the Doctor's Data stool test. It doesn't look too bad, actually, other than no growth of *Lactobacillus*. I was surprised based on the SIBO results. This is a good example sometimes that problems show up much more on one test than another. The digestion markers were fairly normal, except she had carbohydrate malabsorption. The secretory IgA, look at that, it was

over 3 times higher than the upper limit at 662. And then, she did have some red blood cells in her stool, indicating an inflammatory response. And the [*Helicobacter*] *pylori* antigen on Doctor's Data was negative.



Compounds of Bacterial or Yeast/Fungal Origin

Bacterial - general				
36. Benzoate	2.4	H	2.1	<= 33.6
37. Hippurate	1674	H	667	<= 1271
38. Phenylacetate	0.12		0.14	<= 0.80
39. Phenylpropionate	<DL*			<= 0.06
40. p-Hydroxybenzoate	2.8	H	2.2	<= 4.0
41. p-Hydroxyphenylacetate	25	H	24	<= 48
42. Indican	127	H	64	<= 99
43. Tricarballylate	2.38	H	1.18	<= 2.00
L. acidophilus / general bacterial				
44. D-Lactate	1.9		2.6	<= 5.6
Clostridial species				
45. 3,4-Dihydroxyphenylpropionate	<DL*			<= 0.12
Yeast / Fungal				
46. D-Arabinitol	46		53	<= 92

Creatinine = 49 mg/dL

* <DL = less than detection limit

** >LIN = greater than linearity limit

Georgia Lab Lic. Code #067-007
CLIA ID# 11D0255349
New York Clinical Lab PFI #4578
Florida Clinical Lab Lic. #800008124

Testing Performed by Genova Diagnostics, Inc. 3425 Corporate Way, Duluth, GA 30096

Laboratory Director: Robert M. David, PhD

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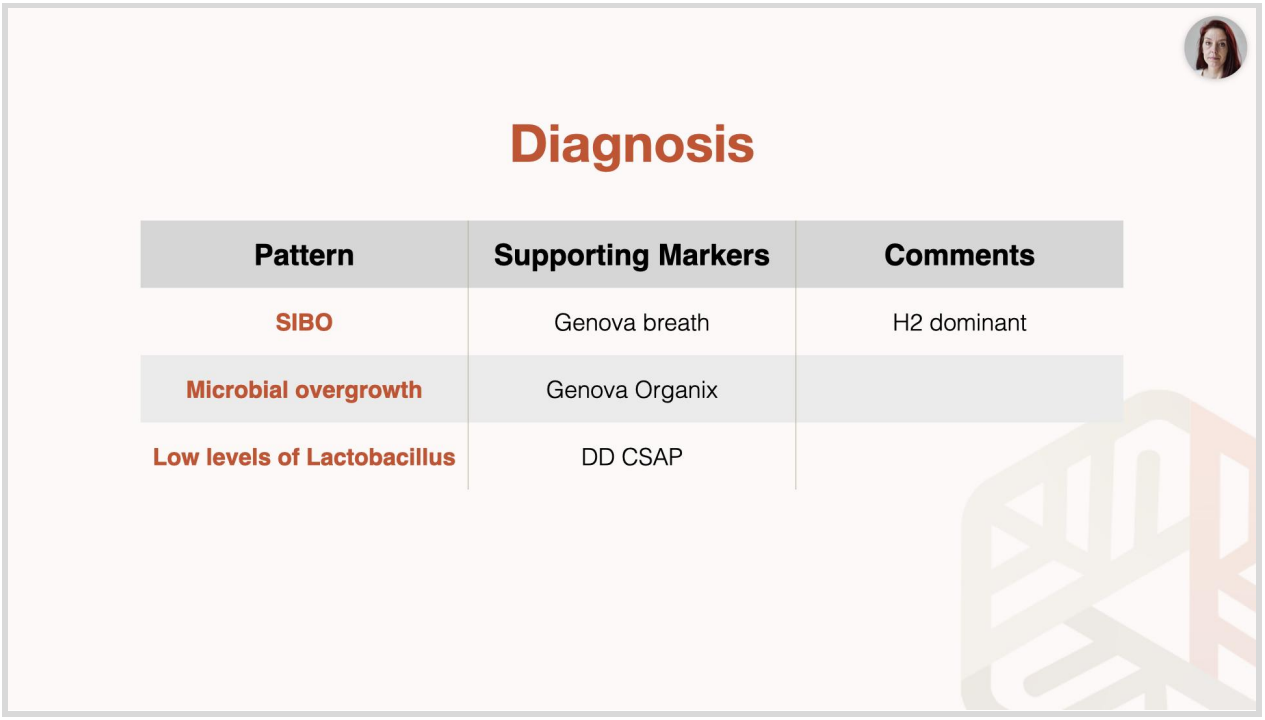
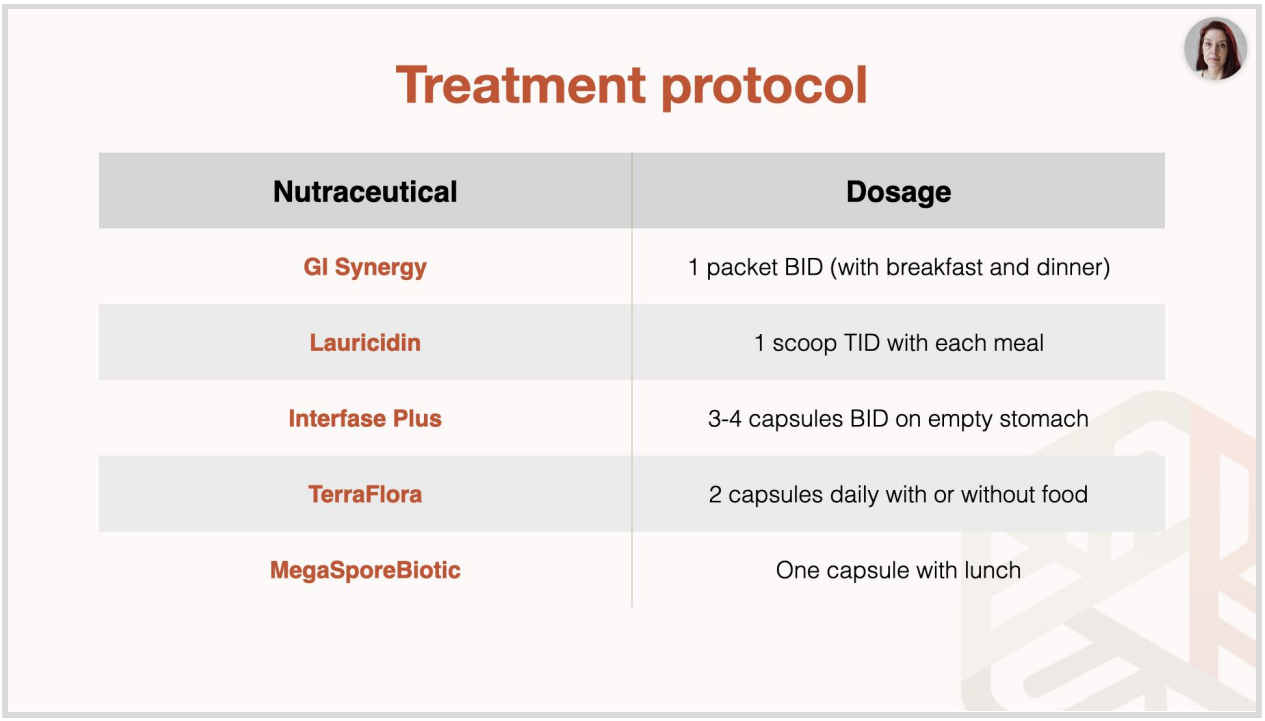
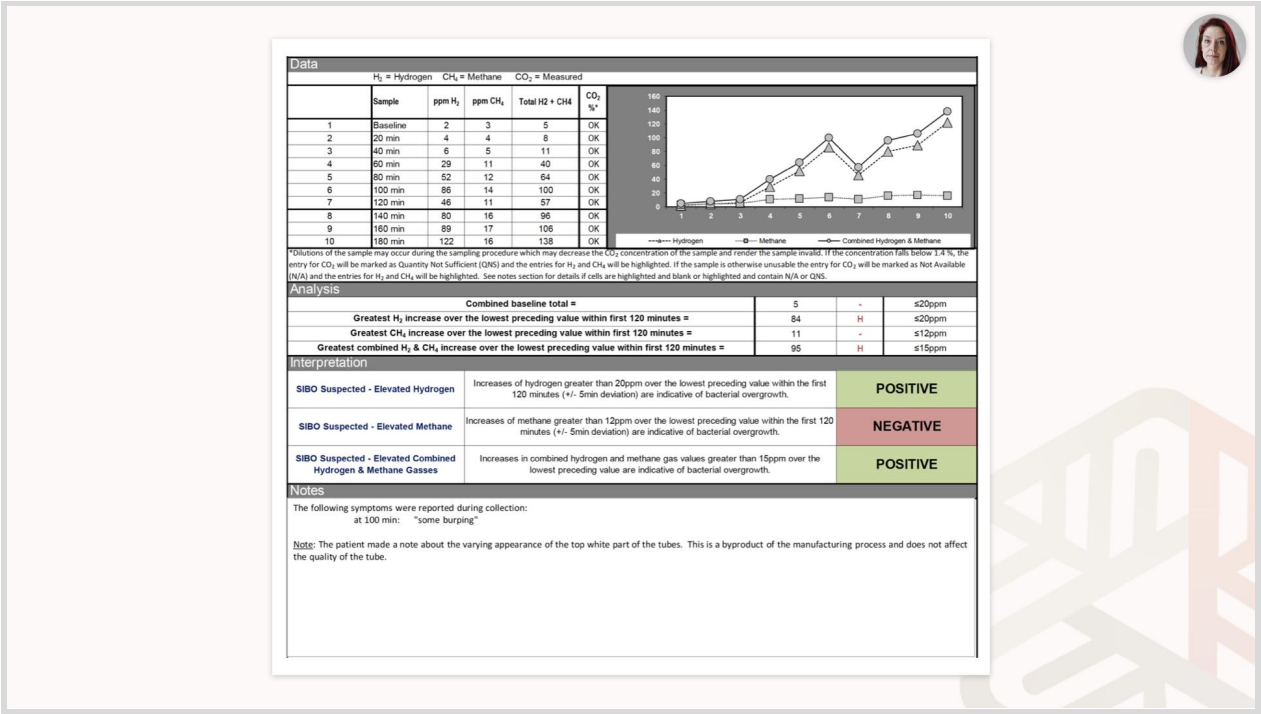
Looking at her organic acid results, though, she's got a lot going on here. Several markers [are] in the high normal range. Some elevated out of the range. [It] definitely supports that idea that something's going on in the intestine and some imbalance and dysbiosis in these microbial organisms.



So the diagnosis here was SIBO, based on the Genova breath [test] results; microbial overgrowth, based on the organic acids panel; and then low levels of *Lactobacillus* [were] on the Doctor's Data stool test.



Here's the protocol. We have a basic core protocol. We did 60 days based on the severity of the breath test. You could easily do 90 days even before retesting here, considering how symptomatic she was and how high that level is. But I often like to retest after that 60-day mark, and we take a break in between. But I've been known to extend the treatment depending on how they're going. So we can make sure we're making progress by retesting, and we don't have to wait a full three months to find out what the level of progress is with treatments. So, as I mentioned in the past, I often find that by the time they titrate up on the full dose, it ends up being close to 90 days. So often, you will get a little bit more time on the protocol anyway.



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	3	5	OK
2	20 min	4	4	8	OK
3	40 min	6	5	11	OK
4	60 min	29	11	40	OK
5	80 min	52	12	64	OK
6	100 min	86	14	100	OK
7	120 min	46	11	57	OK
8	140 min	80	16	96	OK
9	160 min	89	17	106	OK
10	180 min	122	16	138	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 =	84	H	≤20ppm
Greatest CH_4 increase over the lowest preceding value within first 120 minutes =	11	-	≤12ppm
Greatest combined H_2 & CH_4 increase over the lowest preceding value within first 120 minutes =	95	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

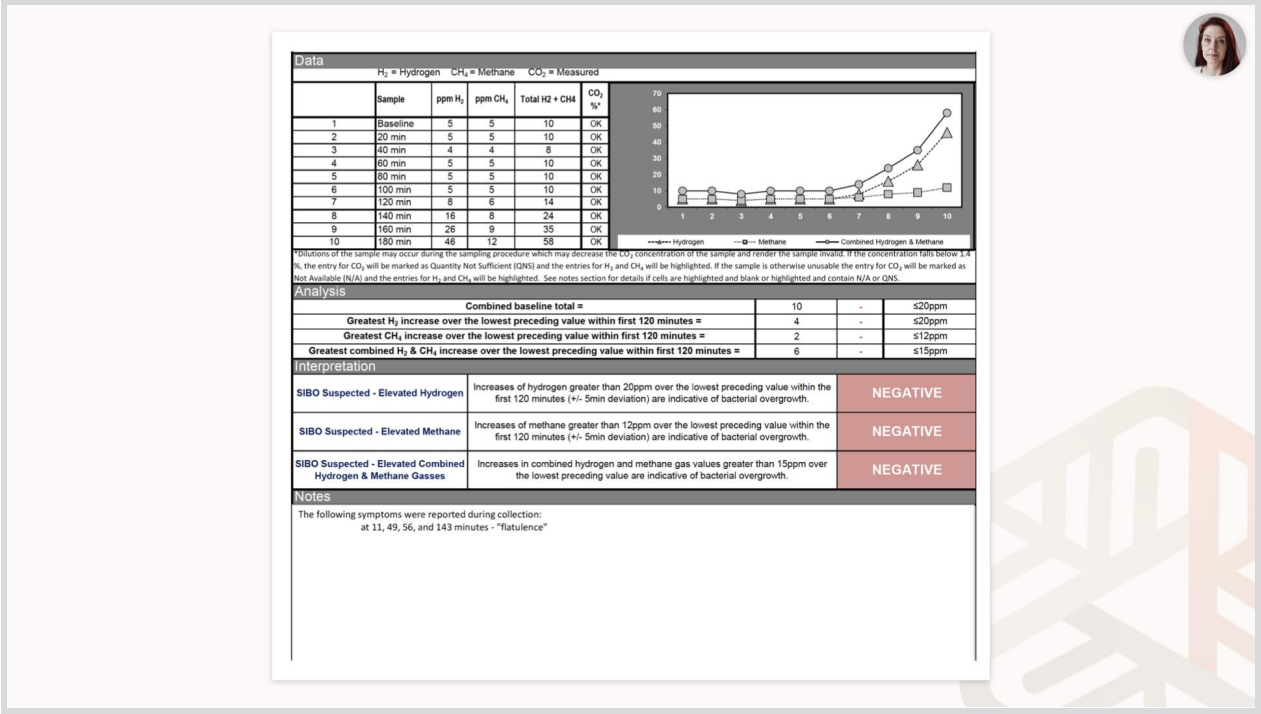
Notes

The following symptoms were reported during collection:
at 100 min: "some burping"

Note: The patient made a note about the varying appearance of the top white part of the tubes. This is a byproduct of the manufacturing process and does not affect the quality of the tube.

Here's the retest. Symptoms improved by about 30 to 40 percent with treatment. But follow-up testing did show that she was still positive for hydrogen SIBO, and methane levels even increased a little bit more here. So [there was] not much improvement on the test, though definitely some. It went down from a peak of over 186. I think at 100 minutes is where we would probably put that. And as I mentioned in the protocol section, it's not entirely clear why some patients improve significantly on a botanical protocol and others don't. In this case, you could continue with another round of botanicals. As I mentioned before, when I said 60 days, given how severe the gases were, 90 days was my expectation at the least, just with how long it might take for her to ramp up. And you could switch to rifaximin plus neomycin if methane is present, in this case, as you're around two.

This patient did want to try rifaximin and neomycin because she had self-treated with botanical[s] before and didn't get as much response as she was hoping for. And at this point, she's already done two botanical protocols. So we had a discussion about the risks and benefits of pharmaceutical treatment, and that's what she decided to do. So we did rifaximin 550 mg three times a day plus partially hydrolyzed guar gum for a month, and she did neomycin for the first 10 days of that 30-day period.



Data

H_2 = Hydrogen CH_4 = Methane CO_2 = Measured

	Sample	ppm H_2	ppm CH_4	Total H2 + CH4	CO_2 %*
1	Baseline	5	5	10	OK
2	20 min	5	5	10	OK
3	40 min	4	4	8	OK
4	60 min	5	5	10	OK
5	80 min	5	5	10	OK
6	100 min	5	5	10	OK
7	120 min	8	6	14	OK
8	140 min	16	8	24	OK
9	160 min	26	9	35	OK
10	180 min	46	12	58	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 =	10	-	≤20ppm
Greatest H_2 increase over the lowest preceding value within first 120 minutes =	4	-	≤20ppm
Greatest CH_4 increase over the lowest preceding value within first 120 minutes =	2	-	≤12ppm
Greatest combined H_2 & CH_4 increase over the lowest preceding value within first 120 minutes =	6	-	≤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.	NEGATIVE
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.	NEGATIVE

Notes

The following symptoms were reported during collection:
at 11, 49, 56, and 143 minutes - "flatulence"

Here are the results of follow-ups. Big improvement. You can see the hydrogen didn't go above 8 in the first 120 minutes or 90 minutes based [on] the North American Consensus, and her methane levels came back down, also. So this in-patient actually improved pretty significantly, reporting 80 to 90 percent resolution of her main complaints. So we decided not to continue with additional treatment at this time, and she was feeling pretty good.