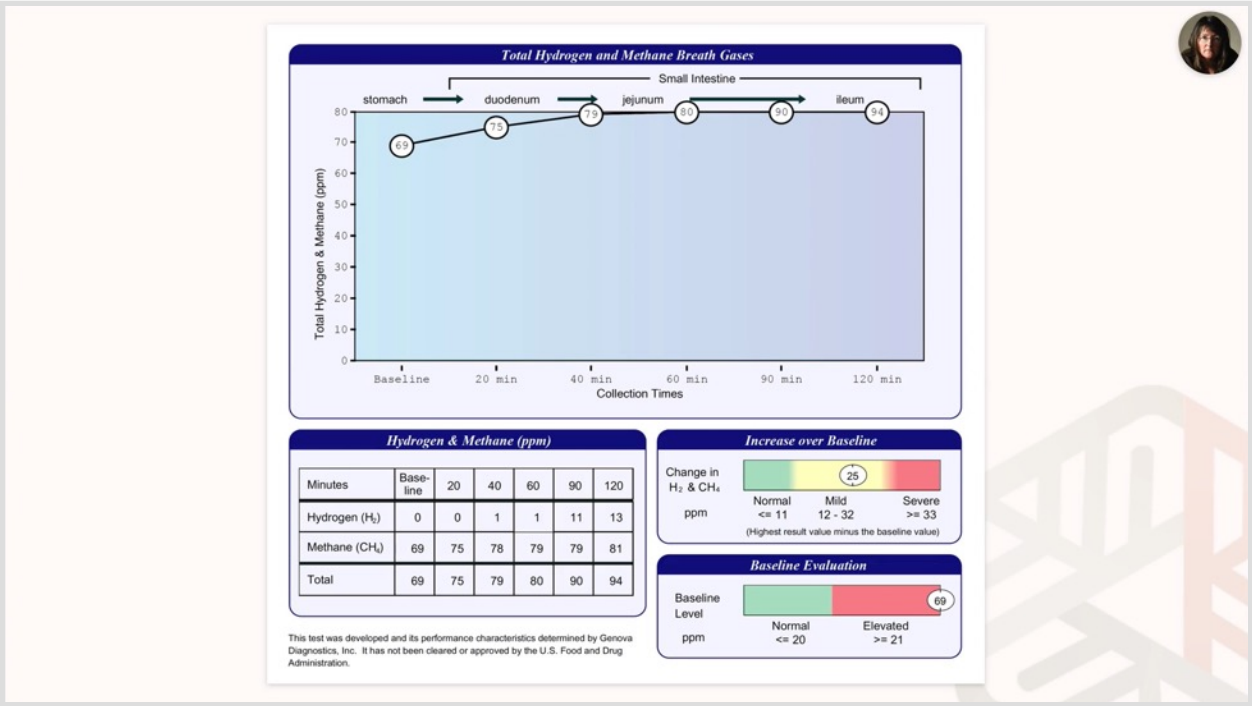
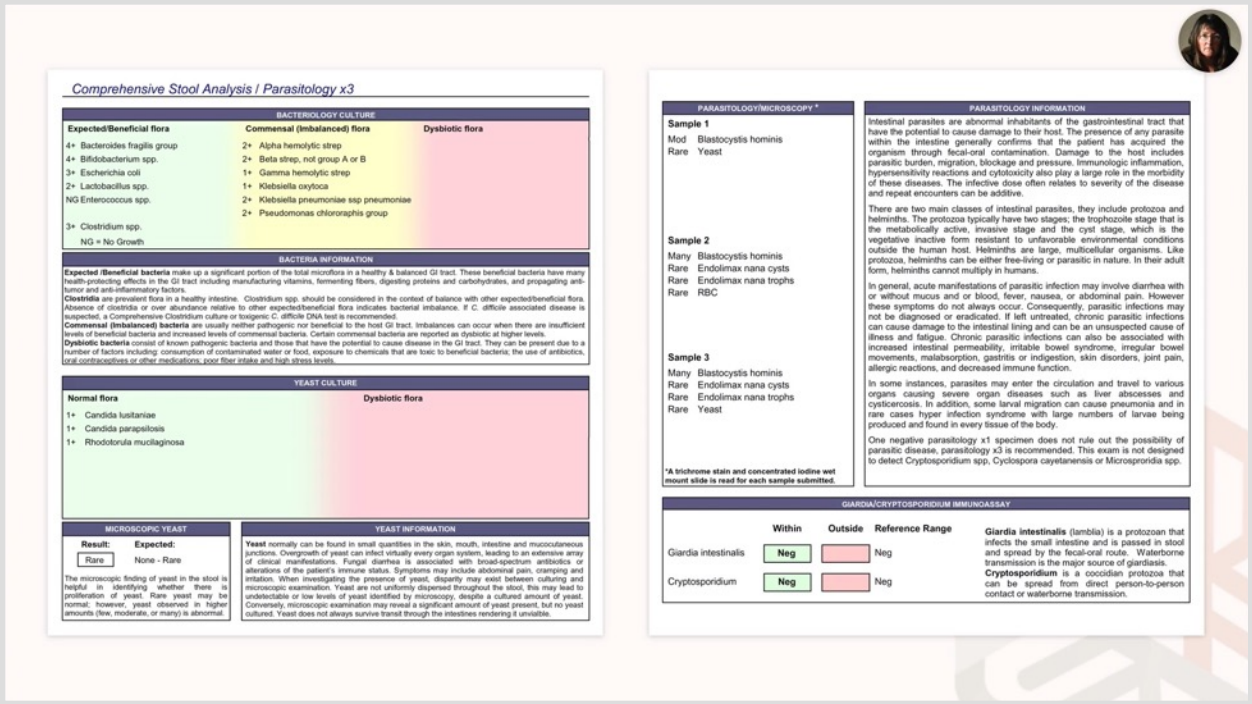
Gut Case Studies - Part 4

CASE #7: 52-YEAR-OLD FEMALE

Next patient: 52-year-old female, chief complaints, brain fog, low energy, low libido, vaginal dryness, joint pain and stiffness, bloating, and distention. She was doing a hormonal replacement therapy for menopause symptoms, had a history of parasites, had self-treated with oregano oil but didn't retest after that self-treatment, had a tendency towards constipation, and suspected issues with gluten but still consumed it occasionally.



Check out the breath test results, really high methane levels, 69 at baseline and went up to 81 at 120 minutes, definitely consistent with the constipation complaint.



Comprehensive Stool Analysis / Parasitology x3

BACTERIOLOGY CULTURE

Expected/Beneficial flora	Commensal (Imbalanced) flora	Dysbiotic flora
4+ Bacteroides fragilis group	2+ Alpha hemolytic strep	
4+ Bifidobacterium spp.	2+ Beta strep, not group A or B	
3+ Escherichia coli	1+ Gamma hemolytic strep	
2+ Lactobacillus spp.	1+ Klebsiella oxytoca	
NG Enterococcus spp.	2+ Klebsiella pneumoniae ssp pneumoniae	
	2+ Pseudomonas chlororaphis group	
3+ 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
1+ Candida lusitaniae	
1+ Candida parapsilosis	
1+ Rhodotorula mucilaginosa	

MICROSCOPIC YEAST

Result:	Expected:
Rare	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
Mod Blastocystis hominis
Rare Yeast

Sample 2
Many Blastocystis hominis
Rare Endolimax nana cysts
Rare Endolimax nana trophs
Rare RBC

Sample 3
Many Blastocystis hominis
Rare Endolimax nana cysts
Rare Endolimax nana trophs
Rare Yeast

*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 Microsproridia 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.

Really significant dysbiosis on the Doctor's Data panel, with six different species in the commensal imbalance column. Relatively low levels of lactobacilli, she had three species of yeast, all only 1+, and no microscopic overgrowth, but given the dysbiosis, could be an issue, and then had Blastocystis hominis in all three stool samples, so a lot going on here for this patient in the gut.

DIGESTION /ABSORPTION

	Within	Outside	Reference Range
Elastase	> 500		> 200 µg/mL
Fat Stain	None		None - Mod
Muscle fibers	None		None - Rare
Vegetable fibers	Rare		None - Few
Carbohydrates	Neg		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		10 - 50 µg/g
Lysozyme*	281		<= 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*	69.2		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.

SHORT CHAIN FATTY ACIDS

	Within	Outside	Reference Range
% Acetate	57		40 - 75 %
% Propionate	25		9 - 29 %
% Butyrate	15		9 - 37 %
% Valerate	3.2		0.5 - 7 %
Butyrate	1.3		0.8 - 4.8 mg/mL
Total SCFA's	8.9		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	Rare		None - Rare
pH	6.7		6 - 7.8
Occult Blood	Neg		Neg

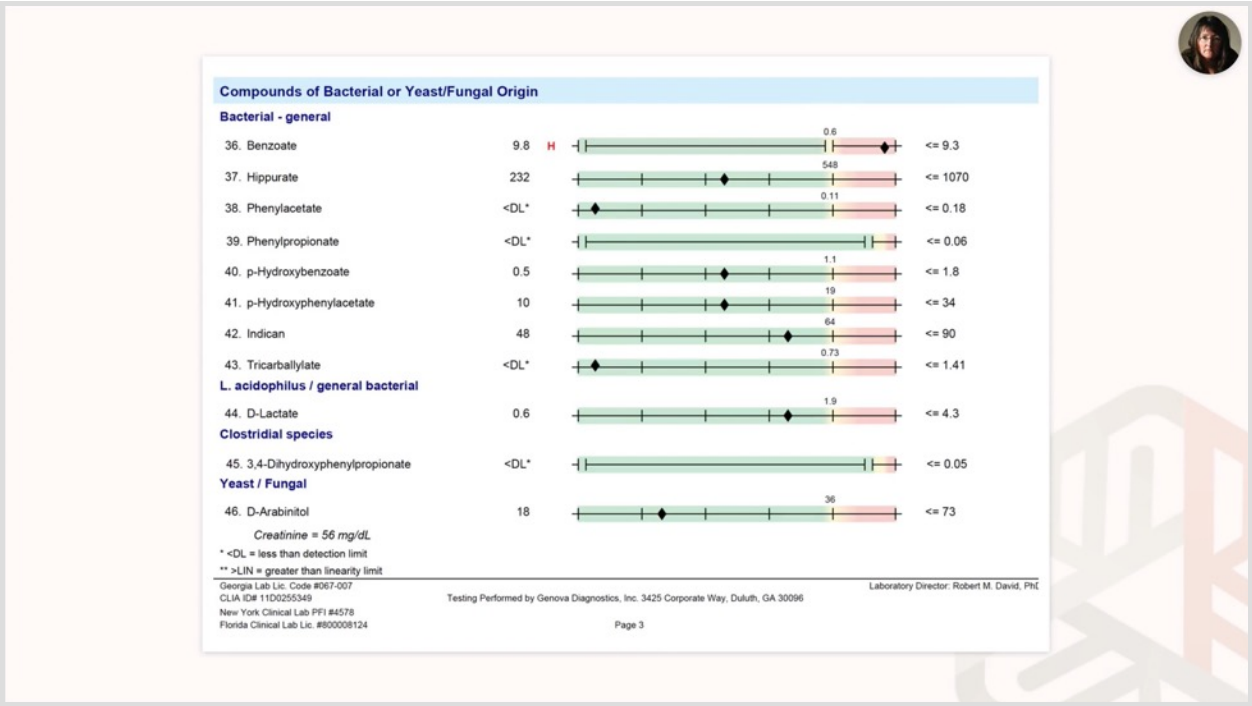
Red Blood Cells (RBC) in the stool may be associated with a parasitic or bacterial infection, or an inflammatory bowel condition such as ulcerative colitis. Colorectal cancer, anal fistulas, and hemorrhoids should also be ruled out.
pH: Fecal pH is largely dependent on the fermentation of fiber by the 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	Soft	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.

Not much to see in the digestion, inflammation intestinal health markers.



Compounds of Bacterial or Yeast/Fungal Origin

Bacterial - general			
36. Benzoate	9.8	H	<= 9.3
37. Hippurate	232		<= 1070
38. Phenylacetate	<DL*		<= 0.18
39. Phenylpropionate	<DL*		<= 0.06
40. p-Hydroxybenzoate	0.5		<= 1.8
41. p-Hydroxyphenylacetate	10		<= 34
42. Indican	48		<= 90
43. Tricarballylate	<DL*		<= 1.41
L. acidophilus / general bacterial			
44. D-Lactate	0.6		<= 4.3
Clostridial species			
45. 3,4-Dihydroxyphenylpropionate	<DL*		<= 0.05
Yeast / Fungal			
46. D-Arabinitol	18		<= 73

Creatinine = 56 mg/dL

* <DL = less than detection limit
** >LIN = greater than linearity limit

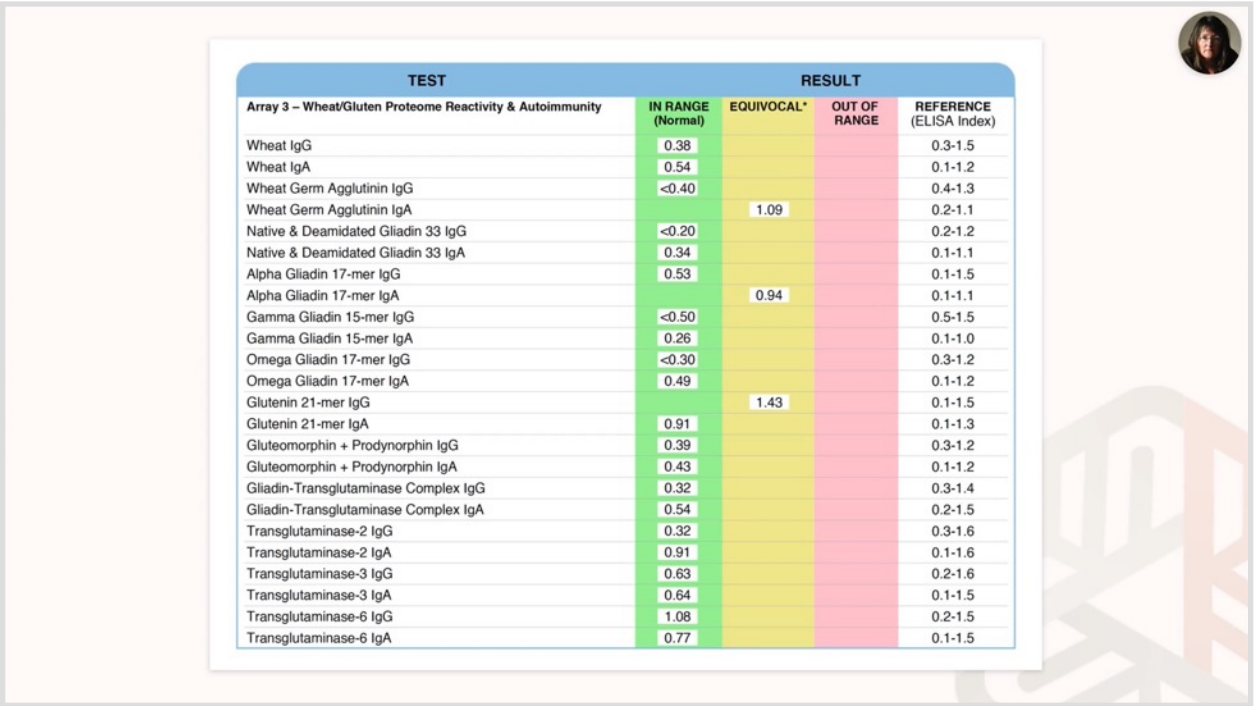
Georgia Lab Lic. Code #067-007
CLIA ID# 11D0255349
New York Clinical Lab PFI #4578
Florida Clinical Lab Lic. #800008124

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

Laboratory Director: Robert M. David, PhD

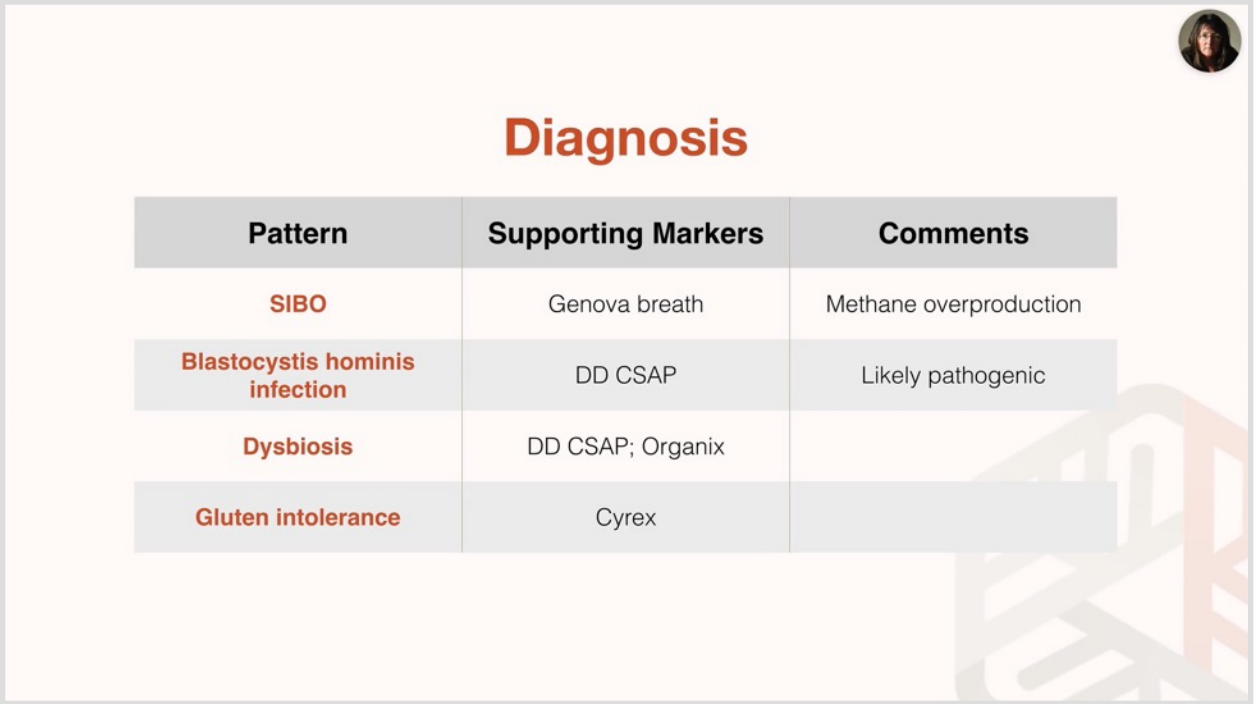
Page 3

The urine organic acids panel, also not much to see, just mildly elevated benzoate.

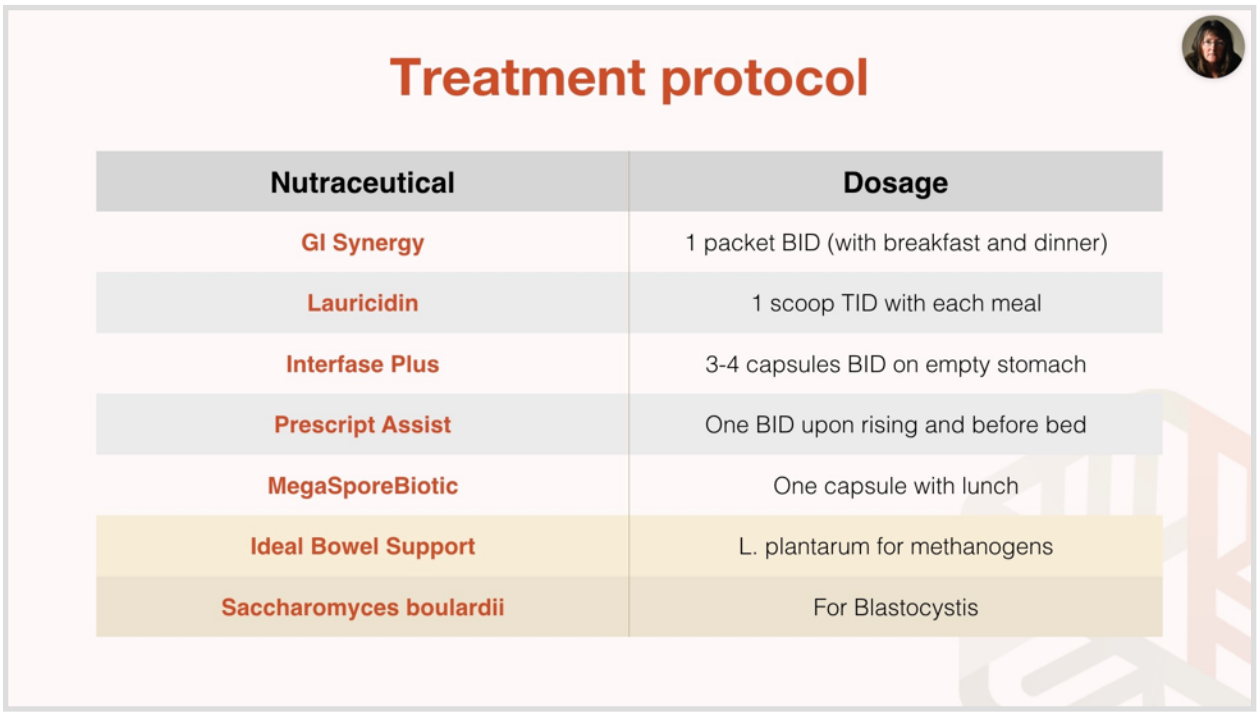


TEST	RESULT			
Array 3 – Wheat/Gluten Proteome Reactivity & Autoimmunity	IN RANGE (Normal)	EQUIVOCAL*	OUT OF RANGE	REFERENCE (ELISA Index)
Wheat IgG	0.38			0.3-1.5
Wheat IgA	0.54			0.1-1.2
Wheat Germ Agglutinin IgG	<0.40			0.4-1.3
Wheat Germ Agglutinin IgA		1.09		0.2-1.1
Native & Deamidated Gliadin 33 IgG	<0.20			0.2-1.2
Native & Deamidated Gliadin 33 IgA	0.34			0.1-1.1
Alpha Gliadin 17-mer IgG	0.53			0.1-1.5
Alpha Gliadin 17-mer IgA		0.94		0.1-1.1
Gamma Gliadin 15-mer IgG	<0.50			0.5-1.5
Gamma Gliadin 15-mer IgA	0.26			0.1-1.0
Omega Gliadin 17-mer IgG	<0.30			0.3-1.2
Omega Gliadin 17-mer IgA	0.49			0.1-1.2
Glutenin 21-mer IgG		1.43		0.1-1.5
Glutenin 21-mer IgA	0.91			0.1-1.3
Gluteomorphin + Prodynorphin IgG	0.39			0.3-1.2
Gluteomorphin + Prodynorphin IgA	0.43			0.1-1.2
Gliadin-Transglutaminase Complex IgG	0.32			0.3-1.4
Gliadin-Transglutaminase Complex IgA	0.54			0.2-1.5
Transglutaminase-2 IgG	0.32			0.3-1.6
Transglutaminase-2 IgA	0.91			0.1-1.6
Transglutaminase-3 IgG	0.63			0.2-1.6
Transglutaminase-3 IgA	0.64			0.1-1.5
Transglutaminase-6 IgG	1.08			0.2-1.5
Transglutaminase-6 IgA	0.77			0.1-1.5

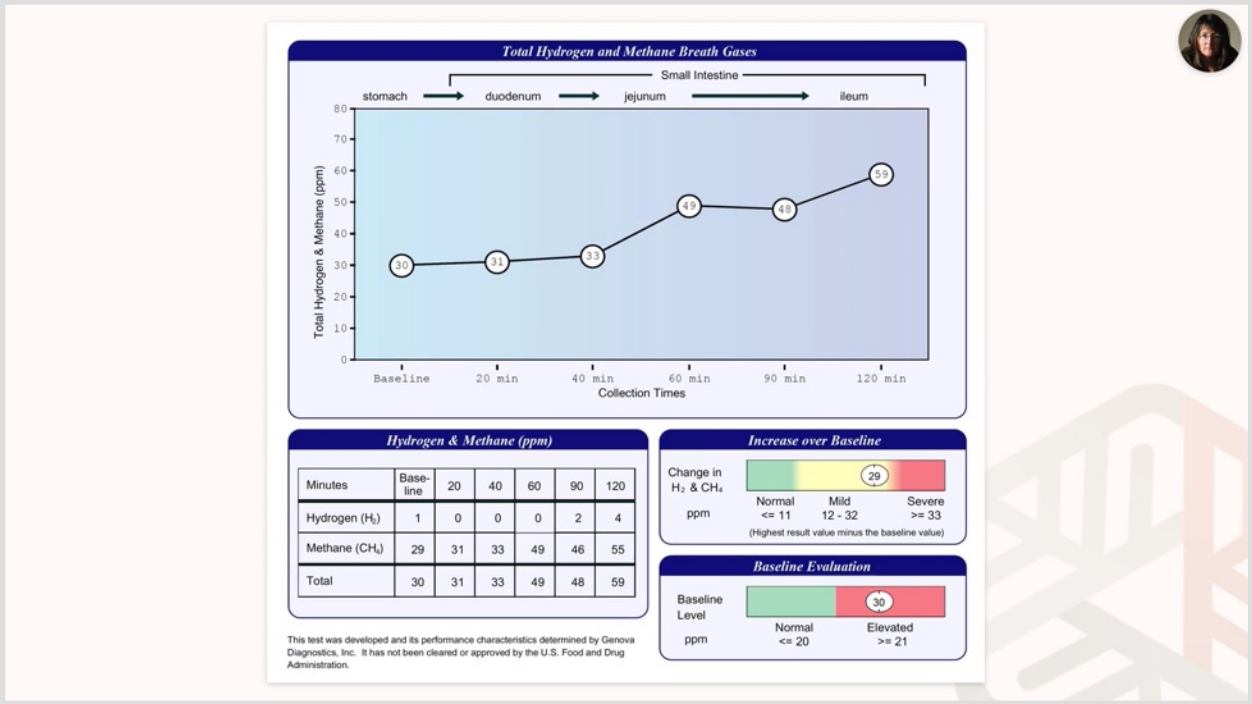
She was still consuming small amounts of gluten, so we did a Cyrex Array 3 and she had three equivocal markers of gluten intolerance, but given her suspicion and her subjective reaction to gluten and everything else that's going on, I definitely advised avoiding gluten entirely for her.



So the diagnosis was SIBO based on the breath test, significant methane overproduction, Blastocystis hominis infection, based on Doctor's Data, and it was found in all three samples and her symptoms, my guess is that it was pathogenic, although as you know, we can't know that for sure. Dysbiosis, Doctor's Data stool panel and slightly elevated benzoate, and then gluten intolerance on the Cyrex.



So we did the core protocol with two additions, Lactobacillus plantarum for methanogens and Saccharomyces boulardii for Blastocystis, and we did 60 days' duration because the SIBO was severe and the Blasto was moderate to many, so again, that's another thing that we can look at to determine whether Blasto's pathogenic, is the extent of the infection, and in her case it was moderate to many rather than just rare or few.



Total Hydrogen and Methane Breath Gases

Hydrogen & Methane (ppm)

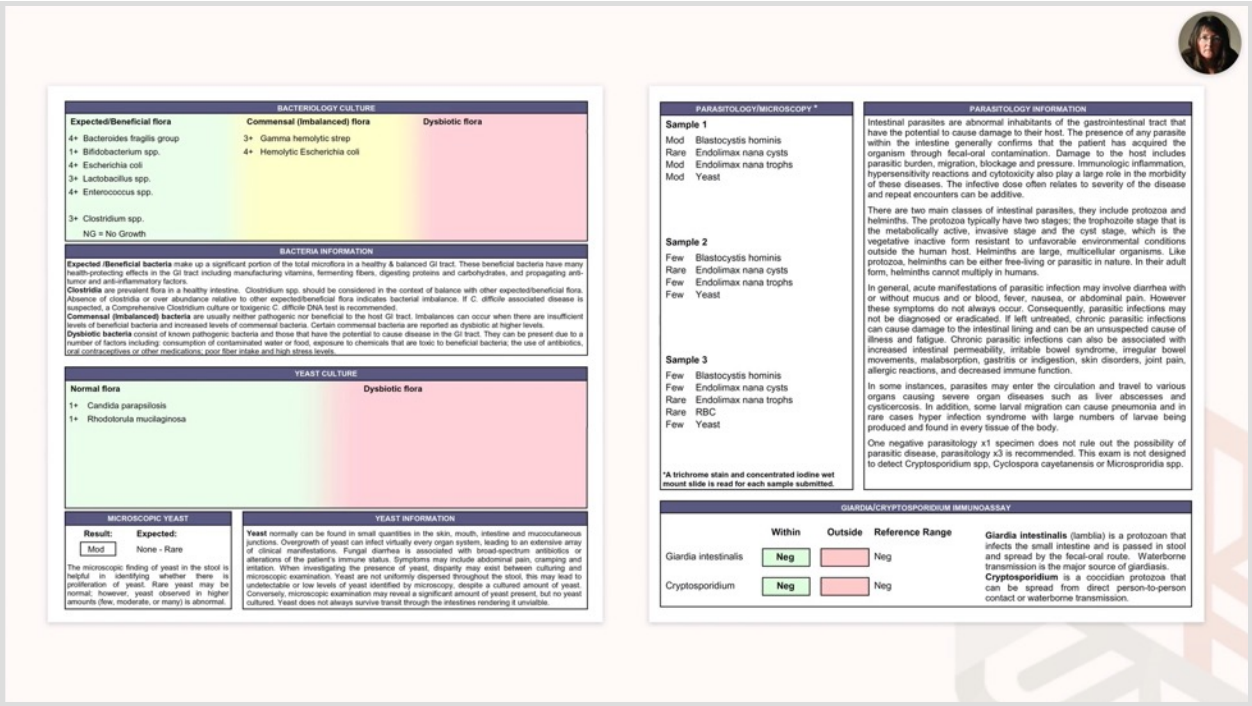
Minutes	Base-line	20	40	60	90	120
Hydrogen (H_2)	1	0	0	0	2	4
Methane (CH_4)	29	31	33	49	46	55
Total	30	31	33	49	48	59

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.

Increase over Baseline

Baseline Evaluation

Retested the breath test, and there was a really significant reduction of methane by about 50 percent, but it was still quite high, 29 at baseline and peak of 55 at 120 minutes.



BACTERIOLOGY CULTURE

Expected/Beneficial flora	Commensal (Imbalanced) flora	Dysbiotic flora
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NG = No Growth		

BACTERIA INFORMATION

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YEAST CULTURE

Normal flora	Dysbiotic flora
1+ Candida parapsilosis	
1+ Rhodotorula mucilaginosa	

MICROSCOPIC YEAST

Result:	Expected:
Mod	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

Mod	Blastocystis hominis
Rare	Endolimax nana cysts
Mod	Endolimax nana trophs
Mod	Yeast

Sample 2

Few	Blastocystis hominis
Rare	Endolimax nana cysts
Few	Endolimax nana trophs
Few	Yeast

Sample 3

Few	Blastocystis hominis
Few	Endolimax nana cysts
Rare	Endolimax nana trophs
Rare	RBC
Few	Yeast

***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.

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GIARDIA/CRYPTOSPORIDIUM IMMUNOASSAY

	Within	Outside	Reference Range
Giardia intestinalis	Neg		Neg
Cryptosporidium	Neg		Neg

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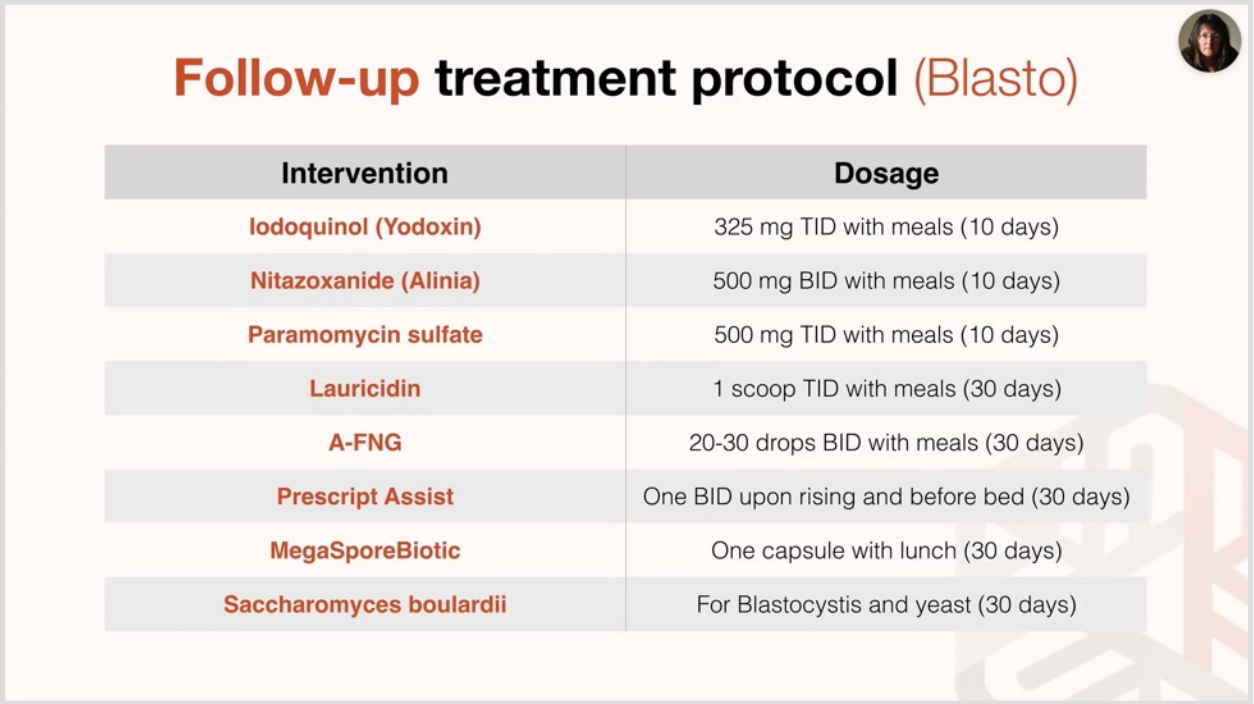
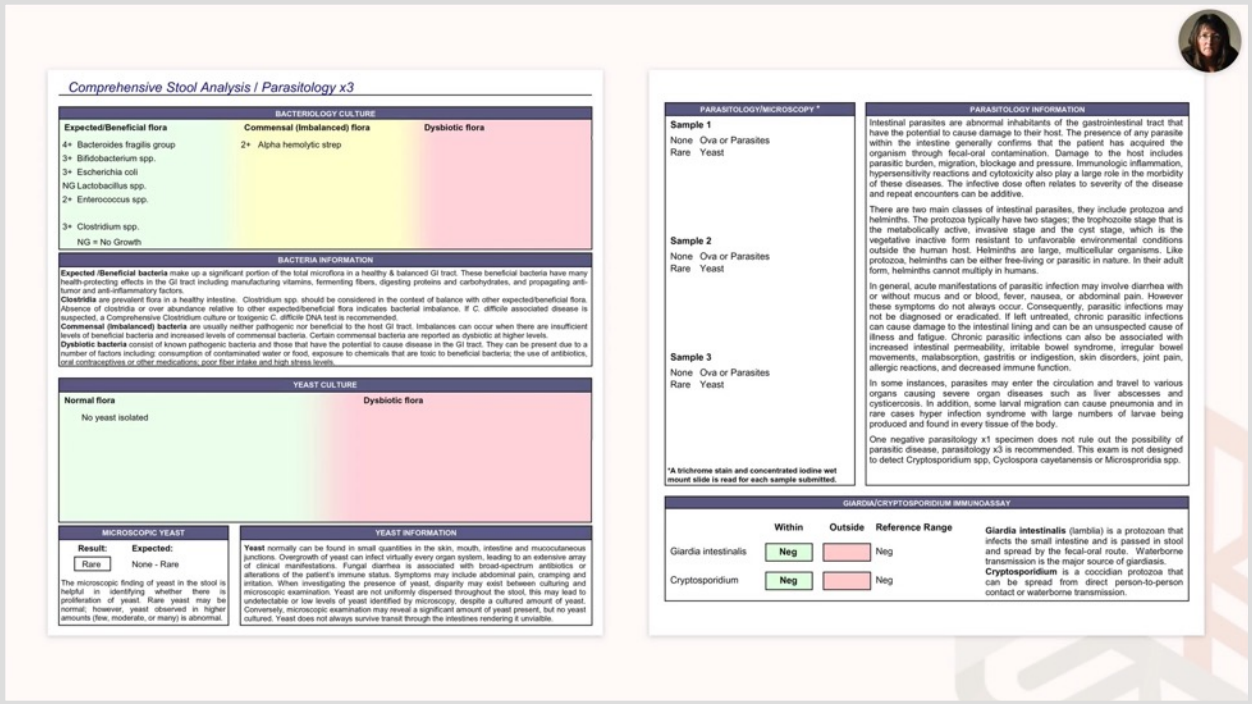
Cryptosporidium is a coccidian protozoa that can be spread from direct person-to-person contact or waterborne transmission.

There was a reduction in commensal imbalance bacteria and improvement in some of the species of beneficial bacteria, although bifidobacteria went down, which you can see sometimes on the antimicrobial protocol. Strangely enough, we're now seeing moderate fungal overgrowth, so some of the same species that were detected, but before the microscopic exams had said rare, but now we're seeing moderate, and sometimes you'll see that. It is a microscopic examination, and so depending on what section of stool they get and what they see, the results can vary. Blasto went from many to moderate to moderate to few, so there was some reduction in population. Symptoms went from constipation toward tendency toward looser stool, actually, during treatment. About a 30 to 40 percent improvement in gas and bloating, and energy slightly improved.



So in this situation where the patient improves a little bit but doesn't reach their goal or maybe doesn't improve at all or even gets worse, which can happen in certain situations, you have a few options. You could continue with the botanical protocol, see if you make further progress, or you can try pharmaceuticals, and again, like the last patient, this patient wanted to try the drugs. She'd done a lot of botanical therapy before herself; I mentioned she had self-treated with oregano oil. So for Blasto, the options are monotherapy with Alinia, which we talked about, or the triple drug protocol for the Centre for Digestive Diseases in Australia. So this was iodoquinol, Yodoxin, 325 milligrams, two of those three times a day; nitazoxanide, or Alinia, 500 milligrams twice a day; and then paramomycin sulfate, 500 milligrams three times a day with meals. I recommended continuing with probiotics including Saccharomyces boulardii for its antiparasitic effect, increase the efficacy and protect the gut flora. Also, Prescript-Assist and MegaSporeBiotic, and here we just elected to really focus on Blasto first, and then return to treat SIBO after that.



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PARASITOLOGY/MICROSCOPY *

Sample 1
None Ova or Parasites
Rare Yeast

Sample 2
None Ova or Parasites
Rare Yeast

Sample 3
None Ova or Parasites
Rare Yeast

***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.

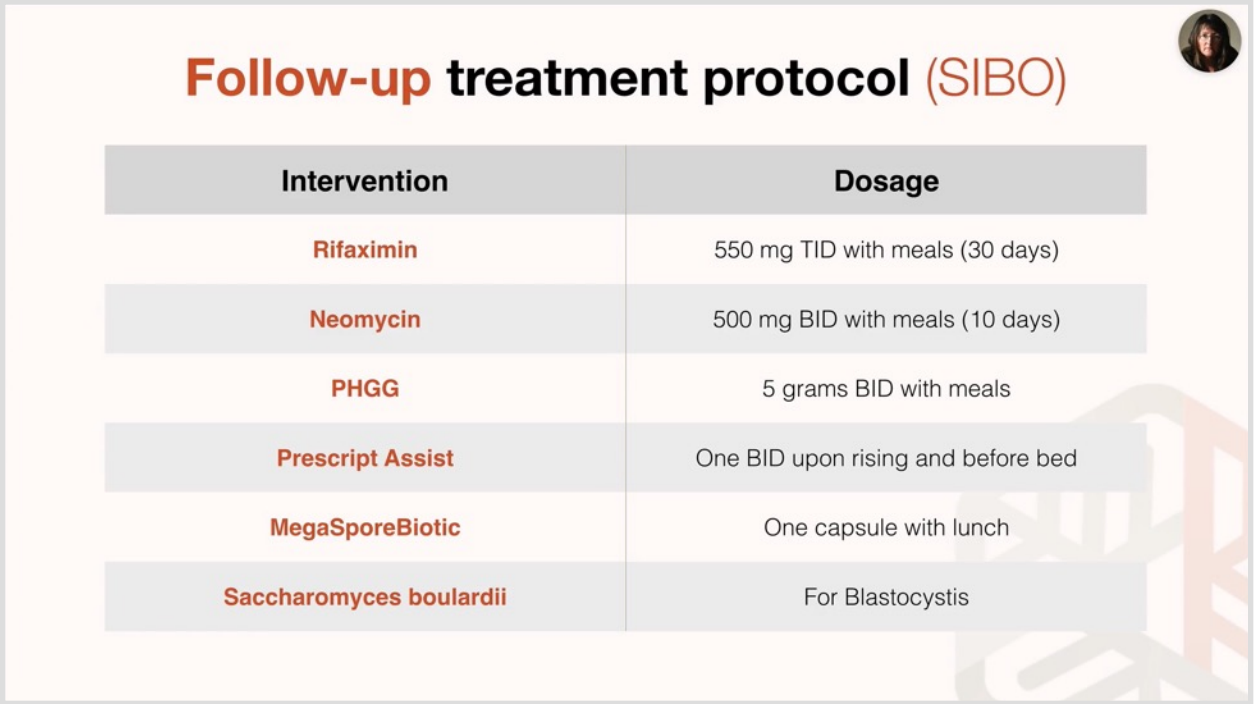
One negative parasitology x1 specimen does not rule out the possibility of parasitic disease, parasitology x3 is recommended. This exam is not designed to detect Cryptosporidium spp, Cyclospora cayetanensis or Microsporidia spp.

GIARDIA/CRYPTOSPORIDIUM IMMUNOASSAY

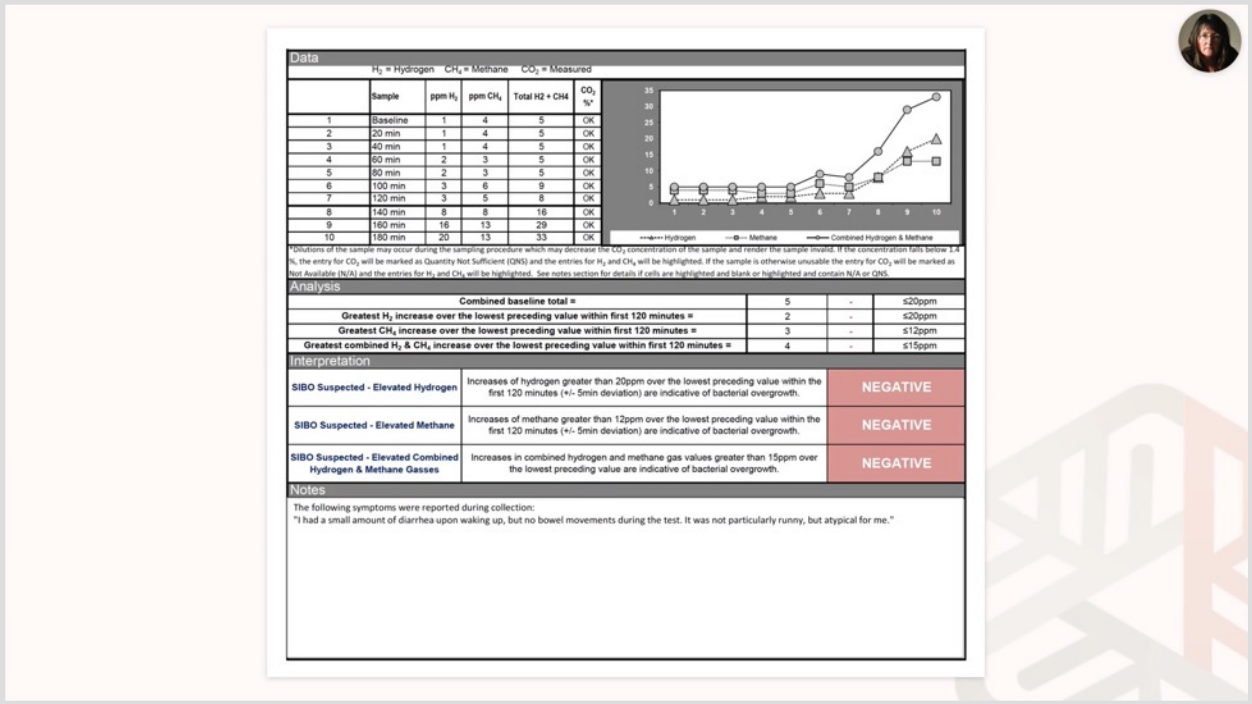
	Within	Outside	Reference Range
Giardia intestinalis	Neg		Neg
Cryptosporidium	Neg		Neg

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.

Here's the retest after the triple drug protocol with some of the additions. Dysbiosis improved further, Lactobacillus was now really low, probably due to the antibiotics, Blastocystis and Endolimax nana were gone. She had about an 80 to 90 percent improvement in bloating and distention, stools were more regular, though still had some tendency to constipation, and her energy was better.



Once Blasto was treated, we moved on to SIBO, and she took rifaximin, 550 milligrams three times a day with meals, and neomycin, 500 milligrams twice a day with meals for 10 days. She did rifaximin for 30 days; partially hydrolyzed guar gum, five grams twice a day with meal. The study that was used, I believe, was five grams once a day; sometimes we do once and sometimes twice depending on the patient's tolerance of soluble fiber; and then Prescript-Assist, MegaSporeBiotic, and Saccharomyces we continued with.



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	1	4	5	OK
3	40 min	1	4	5	OK
4	60 min	2	3	5	OK
5	80 min	2	3	5	OK
6	100 min	3	6	9	OK
7	120 min	3	5	8	OK
8	140 min	8	8	16	OK
9	160 min	16	13	29	OK
10	180 min	20	13	33	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 =	2	-	≤20ppm
Greatest CH_4 increase over the lowest preceding value within first 120 minutes =	3	-	≤12ppm
Greatest combined H_2 & CH_4 increase over the lowest preceding value within first 120 minutes =	4	-	≤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

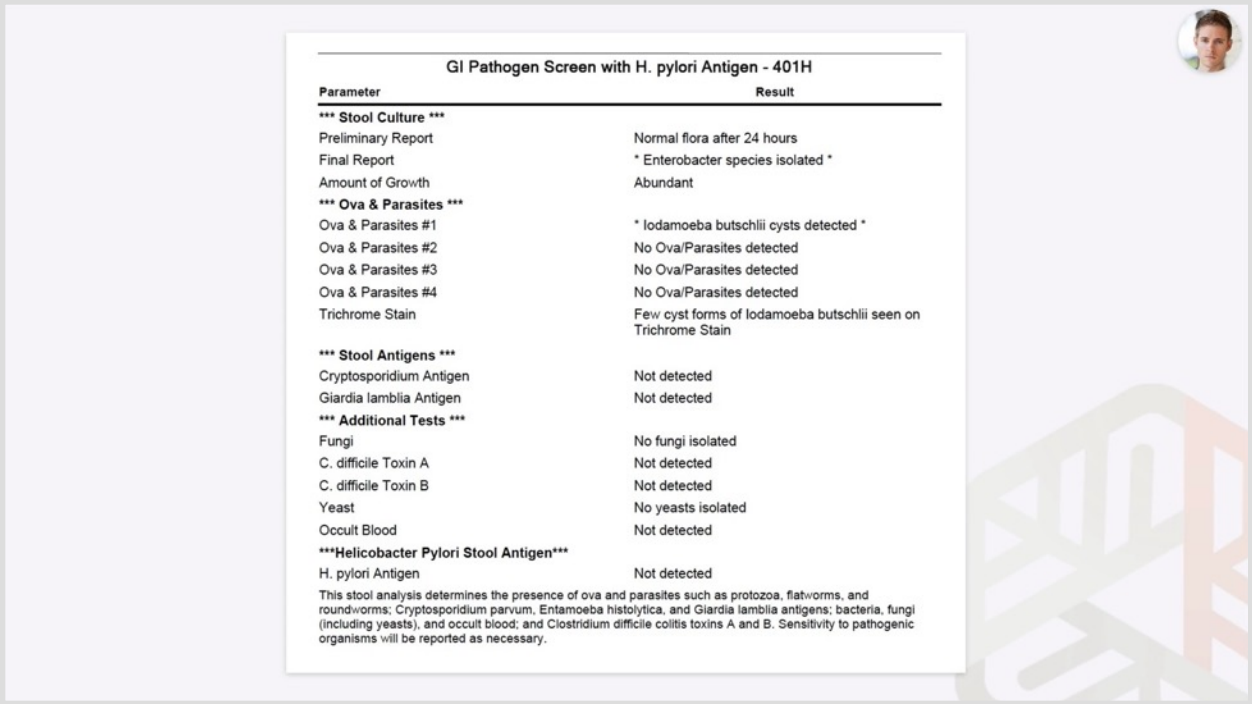
Notes

The following symptoms were reported during collection:
"I had a small amount of diarrhea upon waking up, but no bowel movements during the test. It was not particularly runny, but atypical for me."

Here's her follow-up SIBO test. Results were now normal for methane according to the Quintron criteria, although positive according to Pimentel, but the patient at this point reported almost complete symptom resolution, so we decided to stop there.

CASE #8: 27-YEAR-OLD MALE

Okay, next case: 27-year-old male, chief complaints, anxiety, panic, depression, GERD, and low back pain. He had a tendency towards loose stools and fast transit time, had been on leave from work since his symptoms had become so severe. He worked at Qualcomm as an engineer. Did benefit from a Paleo reset diet, cut his symptoms by about 30 percent, but he was still struggling quite a bit.

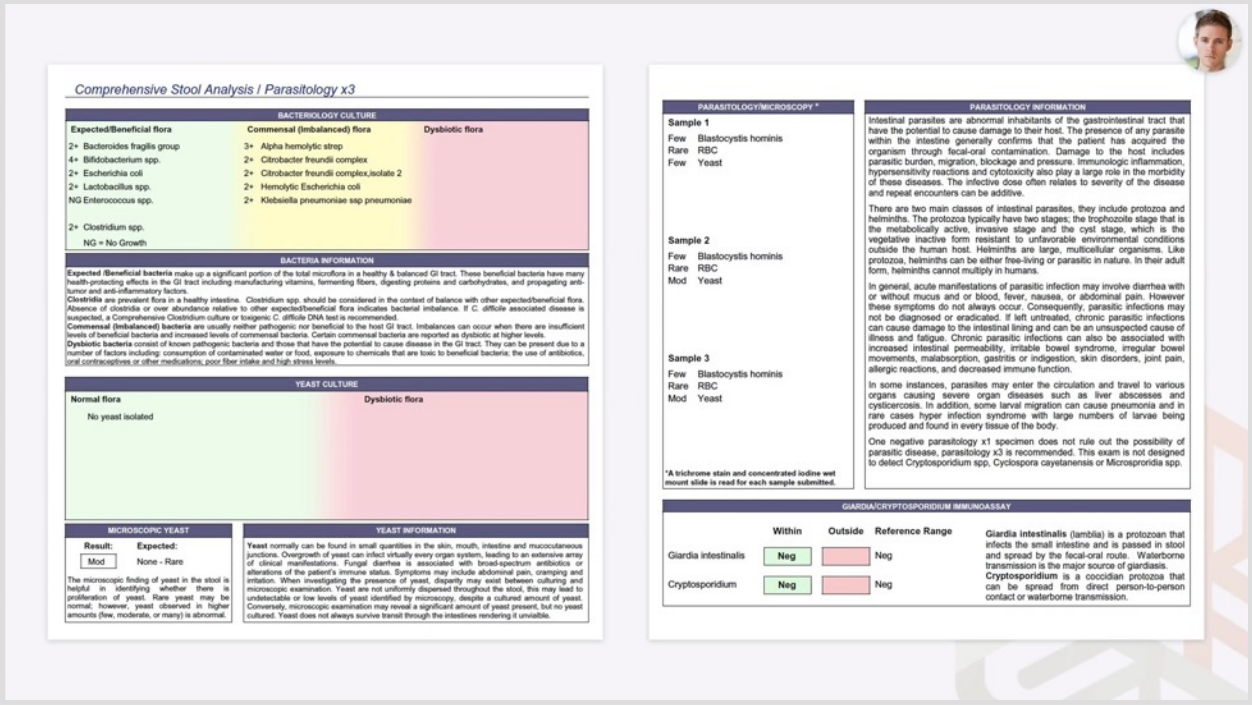


GI Pathogen Screen with H. pylori Antigen - 401H

Parameter	Result
***** Stool Culture *****	
Preliminary Report	Normal flora after 24 hours
Final Report	* Enterobacter species isolated *
Amount of Growth	Abundant
***** Ova & Parasites *****	
Ova & Parasites #1	* Iodamoeba butschlii cysts detected *
Ova & Parasites #2	No Ova/Parasites detected
Ova & Parasites #3	No Ova/Parasites detected
Ova & Parasites #4	No Ova/Parasites detected
Trichrome Stain	Few cyst forms of Iodamoeba butschlii seen on Trichrome Stain
***** Stool Antigens *****	
Cryptosporidium Antigen	Not detected
Giardia lamblia Antigen	Not detected
***** Additional Tests *****	
Fungi	No fungi isolated
C. difficile Toxin A	Not detected
C. difficile Toxin B	Not detected
Yeast	No yeasts isolated
Occult Blood	Not detected
*****Helicobacter Pylori Stool Antigen*****	
H. pylori Antigen	Not detected

This stool analysis determines the presence of ova and parasites such as protozoa, flatworms, and roundworms; Cryptosporidium parvum, Entamoeba histolytica, and Giardia lamblia antigens; bacteria, fungi (including yeasts), and occult blood; and Clostridium difficile colitis toxins A and B. Sensitivity to pathogenic organisms will be reported as necessary.

The BioHealth stool test showed iodamoeba butschlii, which most consider to be non-pathogenic but can be an indicator of fecal-oral transmission and the presence of other parasites.



Comprehensive Stool Analysis / Parasitology x3

BACTERIOLOGY CULTURE

Expected/Beneficial flora	Commensal (Imbalanced) flora	Dysbiotic flora
2+ Bacteroides fragilis group	3+ Alpha hemolytic strep	
4+ Bifidobacterium spp.	2+ Citrobacter freundii complex	
2+ Escherichia coli	2+ Citrobacter freundii complex,isolate 2	
2+ Lactobacillus spp.	2+ Hemolytic Escherichia coli	
NG Enterococcus spp.	2+ Klebsiella pneumoniae ssp pneumoniae	
2+ 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:
Mod	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	Sample 2	Sample 3
Few Blastocystis hominis	Few Blastocystis hominis	Few Blastocystis hominis
Rare RBC	Rare RBC	Rare RBC
Few Yeast	Mod Yeast	Mod Yeast

*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.

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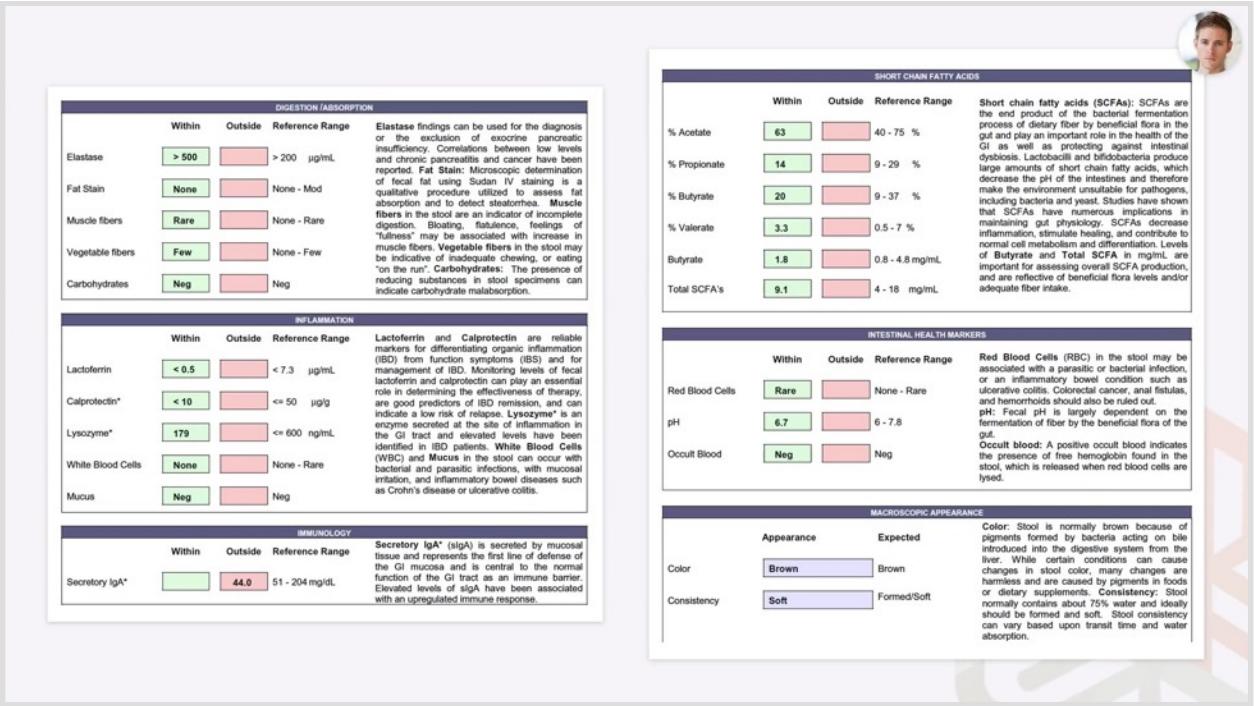
In this case, the Doctor's Data stool test did catch other parasites, so iodamoeba was an indicator. It caught Blastocystis hominis in all three stool samples, also moderate fungal overgrowth and significant commensal imbalance bacteria.



DIGESTION /ABSORPTION

	Within	Outside	Reference Range
Elastase	> 500		> 200 µg/mL
Fat Stain	None		None - Mod
Muscle fibers	Rare		None - Rare
Vegetable fibers	Few		None - Few
Carbohydrates	Neg		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*	179		<= 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*		44.0	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.

SHORT CHAIN FATTY ACIDS

	Within	Outside	Reference Range
% Acetate	63		40 - 75 %
% Propionate	14		9 - 29 %
% Butyrate	20		9 - 37 %
% Valerate	3.3		0.5 - 7 %
Butyrate	1.8		0.8 - 4.8 mg/mL
Total SCFA's	9.1		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	Rare		None - Rare
pH	6.7		6 - 7.8
Occult Blood	Neg		Neg

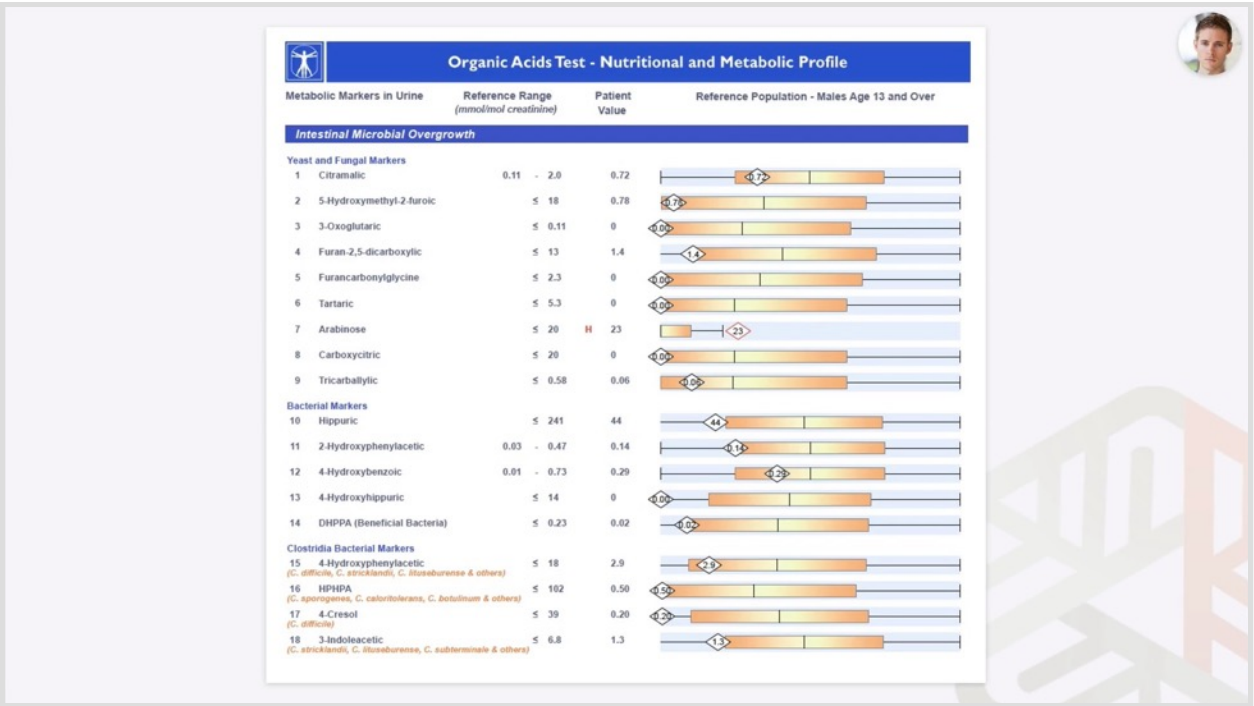
Red Blood Cells (RBC) in the stool may be associated with a parasitic or bacterial infection, or an inflammatory bowel condition such as ulcerative colitis. Colorectal cancer, anal fistulas, and hemorrhoids should also be ruled out.
pH: Fecal pH is largely dependent on the fermentation of fiber by the 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	Soft	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.

Not much on the other Doctor's Data pages other than a borderline low secretory IgA.

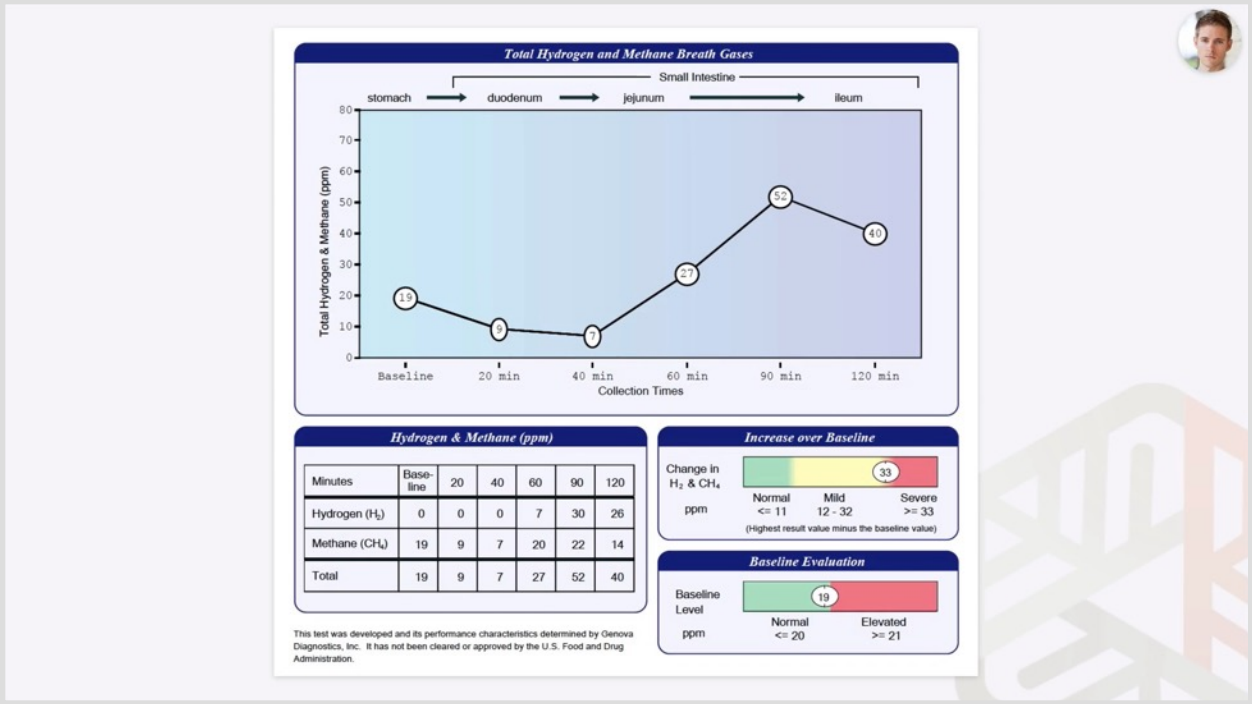


Organic Acids Test - Nutritional and Metabolic Profile

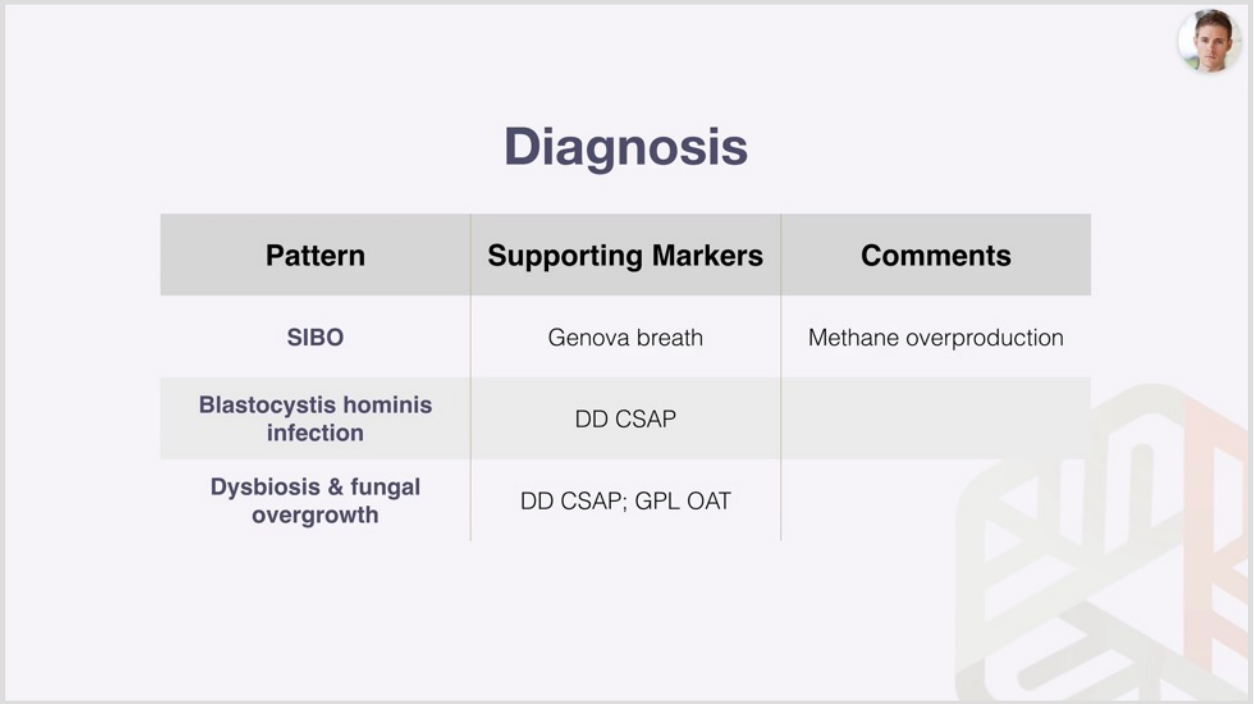
Metabolic Markers in Urine	Reference Range (mmol/mol creatinine)	Patient Value
Intestinal Microbial Overgrowth		
Yeast and Fungal Markers		
1 Citramalic	0.11 - 2.0	0.72
2 5-Hydroxymethyl-2-furoic	≤ 18	0.78
3 3-Oxoglutaric	≤ 0.11	0
4 Furan-2,5-dicarboxylic	≤ 13	1.4
5 Furancarbonylglycine	≤ 2.3	0
6 Tartaric	≤ 5.3	0
7 Arabinose	≤ 20 H	23
8 Carboxycitric	≤ 20	0
9 Tricarballylic	≤ 0.58	0.06
Bacterial Markers		
10 Hippuric	≤ 241	44
11 2-Hydroxyphenylacetic	0.03 - 0.47	0.14
12 4-Hydroxybenzoic	0.01 - 0.73	0.29
13 4-Hydroxyhippuric	≤ 14	0
14 DHPPA (Beneficial Bacteria)	≤ 0.23	0.02
Clostridia Bacterial Markers		
15 4-Hydroxyphenylacetic (C. difficile, C. stricklandii, C. litusoburense & others)	≤ 18	2.9
16 HPHPA (C. sporogenes, C. caloritolerans, C. botulinum & others)	≤ 102	0.50
17 4-Cresol (C. difficile)	≤ 39	0.20
18 3-Indoleacetic (C. stricklandii, C. litusoburense, C. subterminale & others)	≤ 6.8	1.3

Here's an organic acids panel from Great Plains lab; as I mentioned before, I will often run the Great Plains organic acids when depression, anxiety, or cognitive behavioral disorders are at play, and

this shows high arabinose, which is considered a marker for fungal overgrowth, but it's only a little bit elevated. I don't trust arabinose as a marker on its own; I think we talked about this, if only arabinose is elevated and no other indicator of fungal overgrowth is present on the stool or urine test, I wouldn't treat, probably based on that alone. I think d-arabinitol has more research behind it, which is why I primarily use the organics test for organic acids.



SIBO results were positive. He had a high baseline value of methane. A high baseline methane is less likely to be improper test prep, especially if you see methane go up again later in the test like it did with him. There was a significant increase in hydrogen at 90 minutes, and then it went down at 120 minutes, and this is a case where having the third hour would be helpful, because if we had that third hour and we saw hydrogen go up again, that would be a classic double hydrogen peak, which would be the criteria that was used to define a positive breath test result. But regardless, methane is positive here, even by the Quintron criteria. More than a 12 part per million increase from the lowest preceding value; he went from 7 at 40 to 22 at 90, so that would be positive.



Diagnosis was SIBO based on the breath test, Blastocystis hominis based on the Doctor's Data test, and then dysbiosis and fungal overgrowth, mostly based on the Doctor's Data test, but if you believe the arabinose marker, that was present on the Great Plains lab organic acids test.

Treatment protocol

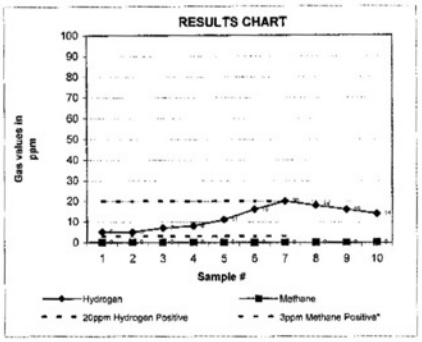
Nutraceutical	Dosage
GI Synergy	1 packet BID (with breakfast and dinner)
Lauricidin	1 scoop TID with each meal
Interfase Plus	3-4 capsules BID on empty stomach
Prescript Assist	One BID upon rising and before bed
MegaSporeBiotic	One capsule with lunch
A-FNG	Slowly build to 20-30 drops BID with meals
Saccharomyces boulardii	3 billion CFU BID at lunch and before bed

We did a core botanical protocol plus two additions, A-FNG and Saccharomyces boulardii, both for fungal overgrowth and also for Blastocystis, and we did 30 days duration.

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
Control	1	5	0	1.27
20 min.	2	6	0	1.70
40 min.	3	7	0	1.71
60 min.	4	8	0	1.48
80 min.	5	11	0	1.66
100 min.	6	15	0	1.52
120 min.	7	20	0	1.52
140 min.	8	18	0	1.78
160 min.	9	16	0	1.69
180 min.	10	14	0	1.53



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

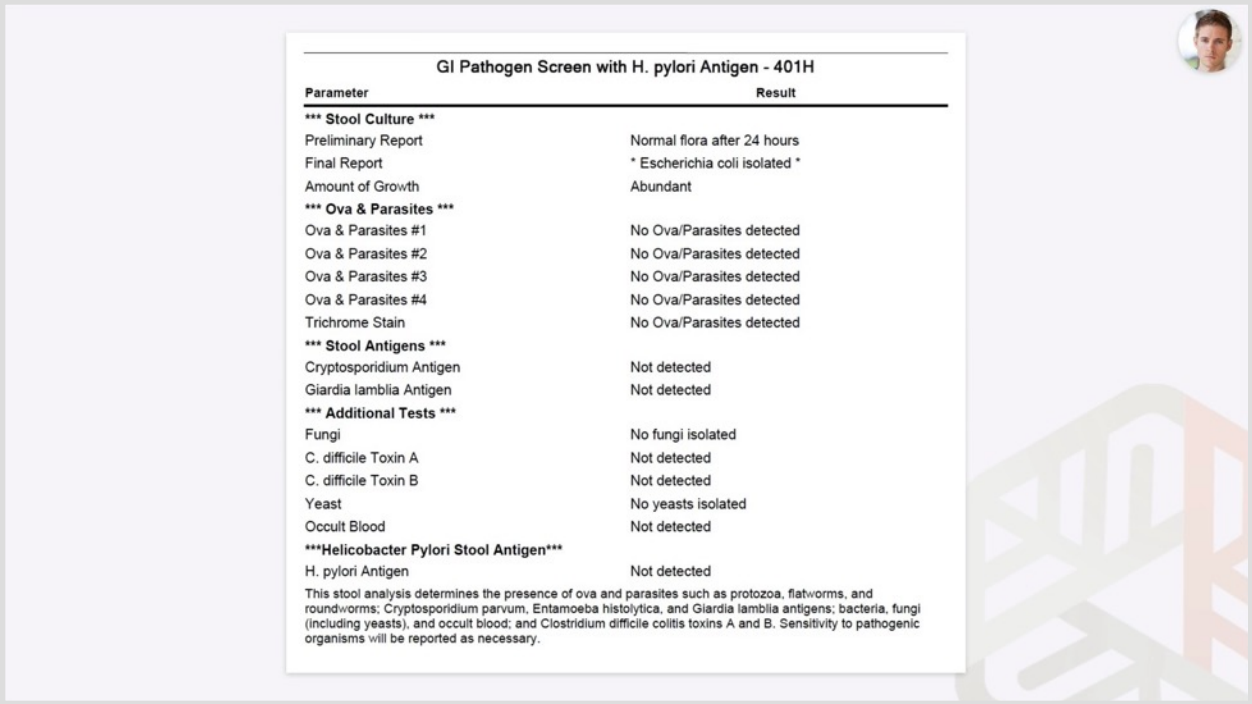
Summary of 2 Hour Results
Peak increase values for each trace gas are presented below:

Peak Hydrogen (H2) Production:	15 ppm	Normal <20 ppm
Peak Methane (CH4) Production:	0 ppm	Normal <3 ppm*
Peak Combined Gas Production:	15 ppm	Normal <20 ppm

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

NOTES:

Here's the follow-up breath test. Methane went completely down to zero, and the hydrogen normalized as well.

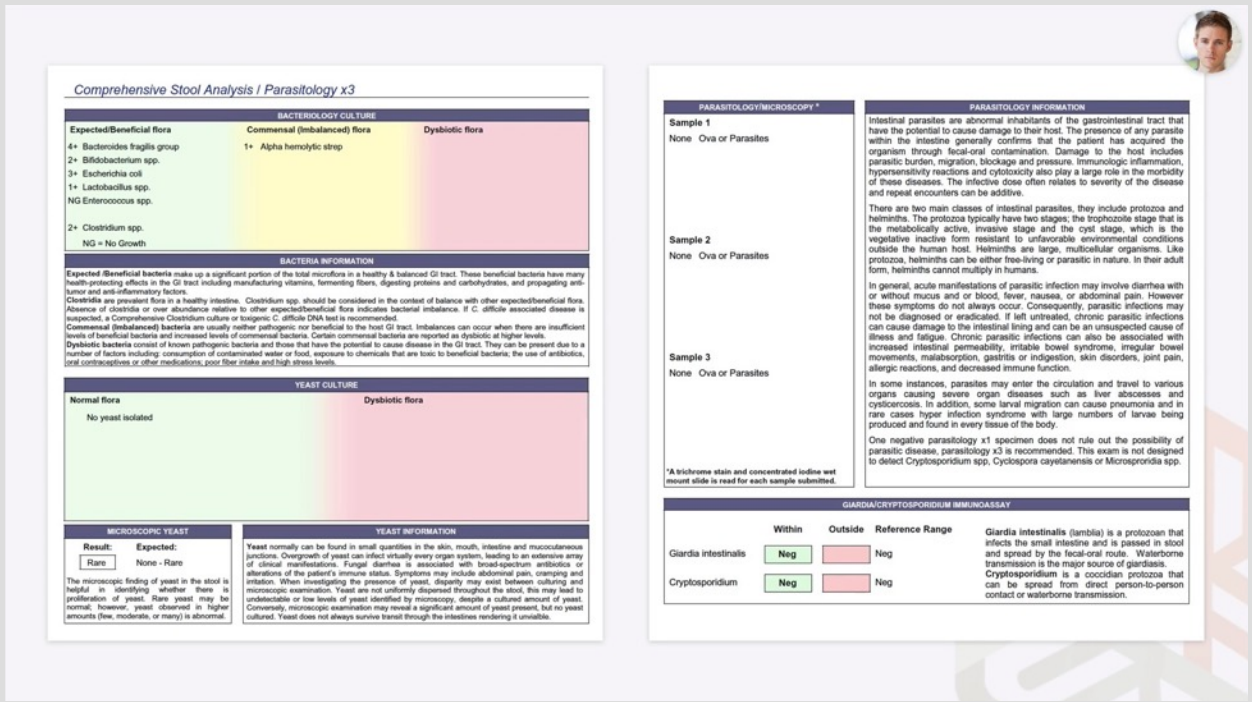


GI Pathogen Screen with H. pylori Antigen - 401H

Parameter	Result
***** Stool Culture *****	
Preliminary Report	Normal flora after 24 hours
Final Report	* Escherichia coli isolated *
Amount of Growth	Abundant
***** Ova & Parasites *****	
Ova & Parasites #1	No Ova/Parasites detected
Ova & Parasites #2	No Ova/Parasites detected
Ova & Parasites #3	No Ova/Parasites detected
Ova & Parasites #4	No Ova/Parasites detected
Trichrome Stain	No Ova/Parasites detected
***** Stool Antigens *****	
Cryptosporidium Antigen	Not detected
Giardia lamblia Antigen	Not detected
***** Additional Tests *****	
Fungi	No fungi isolated
C. difficile Toxin A	Not detected
C. difficile Toxin B	Not detected
Yeast	No yeasts isolated
Occult Blood	Not detected
*****Helicobacter Pylori Stool Antigen*****	
H. pylori Antigen	Not detected

This stool analysis determines the presence of ova and parasites such as protozoa, flatworms, and roundworms; Cryptosporidium parvum, Entamoeba histolytica, and Giardia lamblia antigens; bacteria, fungi (including yeasts), and occult blood; and Clostridium difficile colitis toxins A and B. Sensitivity to pathogenic organisms will be reported as necessary.

Here's the BioHealth stool test follow-up. There was basically nothing detected here other than beneficial E. coli.



Comprehensive Stool Analysis / Parasitology x3

BACTERIOLOGY CULTURE

Expected/Beneficial flora	Commensal (Imbalanced) flora	Dysbiotic flora
4+ Bacteroides fragilis group	1+ Alpha hemolytic strep	
2+ Bifidobacterium spp.		
3+ Escherichia coli		
1+ Lactobacillus spp.		
NG Enterococcus spp.		
2+ 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:
Rare	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

Sample 2
None Ova or Parasites

Sample 3
None Ova or Parasites

*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.

Fungal overgrowth was gone on the Doctor's Data stool test. Levels of beneficial bacteria were a bit low and needed some support following up treatment. Blasto was gone. Patient reported

complete resolution of GERD and gut symptoms and was very proud of what he called his “all-star poops.” Anxiety and panic improved by about 50 percent, so there’s the gut-brain axis for you. Back pain also improved by about 60 percent, and that was probably due to a reduction of gut inflammation leading to systemic inflammation. So for this patient we would now move into phase two: rebuilding a healthy gut ecosystem with pre- and probiotics, and we do this, of course, with all of the patients once the pathogens have been addressed, and we would also to continue to investigate other causes of anxiety like poor methylation.