

Gut: Stool Testing – Part 9

The next inflammatory marker is lysozyme.

Comprehensive Stool Analysis / Parasitology x3

DIGESTION / ABSORPTION			
	Within	Outside	Reference Range
Elastase			> 200 µg/mL
Fat Stain			None - Mod
Muscle fibers			None - Rare
Vegetable fibers			None - Few
Carbohydrates			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
Lysozyme*			<= 600 ng/mL
Lactoferrin			< 7.3 µg/mL
White Blood Cells			None - Rare
Mucus			Neg

Lysozyme* is an enzyme secreted at the site of inflammation in the GI tract and elevated levels have been identified in IBD patients. **Lactoferrin** is a quantitative GI specific marker of inflammation used to diagnose and differentiate IBD from IBS and to monitor patient inflammation levels during active and remission phases of IBD. **White Blood Cells (WBC):** in the stool are an indication of an inflammatory process resulting in the infiltration of leukocytes within the intestinal lumen. WBCs are often accompanied by mucus and blood in the stool. **Mucus** in the stool may result from prolonged mucosal irritation or in a response to parasympathetic excitability such as spastic constipation or mucous colitis.

IMMUNOLOGY			
	Within	Outside	Reference Range
Secretory IgA*			51 - 204mg/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.

You'll see in this test result that calprotectin is missing; this test result was from before calprotectin was added to this Doctor's Data panel. Lysozyme is an enzyme that catalyzes the hydrolysis of specific lysozidic bonds in mucopolysaccharides that constitute the cell wall of gram-positive bacteria. It's an antibacterial defense that's present in the GI tract and then secreted by granulocytes, macrophages, paneth cells, and Brunner's glands, as well as normal colonic crypt cells. The main source for fecal lysozyme is the intestinal granulocytes, and the important thing to know about it is

that it's a generalized marker of inflammation in the gut. Unlike calprotectin and lactoferrin, it's not specific for IBD, although it can be elevated in IBD.

So, when you see elevated lysozyme, and it's really elevated and then you see lactoferrin and calprotectin are also significantly elevated, then that would point to IBD, but if you see elevated lysozyme and lactoferrin and calprotectin are normal, then it may just be a marker of gut infection or some other problem. So the result on this test is kind of somewhat in between, because we have low fecal elastase indicating pancreatic insufficiency, we've got carbohydrate malabsorption, we've got a lysozyme of 3,800, which is quite high, and then we've got normal lactoferrin, we've got secretory IgA of 436, which is high, so there's definitely some inflammation here. In this situation, I'd probably treat any gut infections that were present, or SIBO if it's present, and then re-test, see what happens with the lysozyme. If the patient has symptoms which are indicative of inflammatory bowel disease, then I might go ahead and run the antibody panel that we just discussed on the last slide, and if there are positive markers there, I might refer to a colonoscopy if the lysozyme continued to be this high.

Fecal lysozyme disease association

600-2,000 ng/mL	>2,000 ng/mL
Yeast, dysbiotic bacteria, parasites	Active IBD

As I mentioned, moderate elevations of fecal lysozyme are commonly associated with significant overgrowth of gut pathogens or food antigens, so if you see levels between 600 and 2,000 nanograms per milliliter, you'll see that simultaneously with fungal overgrowth, dysbiotic bacteria, and parasites. But really high levels above 2,000 nanograms per milliliter are often indicators of chronic inflammatory bowel disease like Crohn's disease or ulcerative colitis, and also other non-inflammatory bowel disease, gastrointestinal disorders with diarrhea. Lysozyme is helpful in the determination of colonic inflammatory activity rather than small bowel disease, so it's specific for colon inflammation as opposed to inflammation of the small intestine. When you see the slightly elevated levels like we talked about, you would treat for any pathogens that are present, and then you would re-test and see what's happening there, if it's still slightly elevated or significantly elevated, you would be looking for other causes of gut inflammation like IBD or something that

you missed in the diagnostic workup. You also of course want to check calprotectin and lactoferrin to determine the likelihood of IBD.

Comprehensive Stool Analysis / Parasitology x1

DIGESTION / ABSORPTION				
	Within	Outside	Reference Range	
Elastase	> 500		> 200 µg/mL	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.
Fat Stain	None		None - Mod	
Muscle fibers	None		None - Rare	
Vegetable fibers	Rare		None - Few	
Carbohydrates	Neg		Neg	
INFLAMMATION				
	Within	Outside	Reference Range	
Lactoferrin		60.7	< 7.3 µg/mL	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.
Calprotectin*		406	<= 50 µg/g	
Lysozyme*	298		<= 600 ng/mL	
White Blood Cells	None		None - Rare	
Mucus	Neg		Neg	
IMMUNOLOGY				
	Within	Outside	Reference Range	
Secretory IgA*	89.1		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.

Here's another example of a 36-year-old female, and she had ulcerative colitis and was in an active flare, also had dysbiosis and SIBO. So lactoferrin was in the inactive IBD range, and then calprotectin was in the strongly active IBD range, and the lysozyme was normal. So this is a good example because it illustrates that things don't always fit perfectly into the textbook ranges. Her lysozyme was normal; in fact, it was not elevated as you'd expect with IBD, especially in an active flare, and calprotectin was definitely in the active IBD range. The lactoferrin was elevated but in the inactive range, so you have to look at each patient individually and don't get too hung up on the

ranges that are provided. You may need to do additional diagnostic work to really figure out what's going on.

Comprehensive Stool Analysis / Parasitology x3

DIGESTION / ABSORPTION			
	Within	Outside	Reference Range
Elastase	438		> 200 µg/mL
Fat Stain	Few		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		59.3	< 7.3 µg/mL
Calprotectin*		145	<= 50 µg/g
Lysozyme*		5190	<= 600 ng/mL
White Blood Cells	None		None - Rare
Mucus	Neg		Neg

Lactoferrin and **Calprotectin** are reliable markers for differentiating organic inflammation (IBD) from functional 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*		553	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.

The results on this slide are from a 22-year-old female with right lower quadrant pain and chronic loose stools. You can see big elevations in lactoferrin, calprotectin, and lysozyme. Her lysozyme put her in the active IBD category, whereas calprotectin and lactoferrin were in the inactive IBD category. But now you know that these are just guidelines and not always perfect indicators. In this case, we sent the patient to the GI doc for a colonoscopy because she'd never had one, didn't have any visible evidence, or evidence of any kind, for IBD, then we ended up doing some additional testing, repeat testing for gut pathogens, and she tested positive for a few gut pathogens. We treated her for those, we put her on an anti-inflammatory gut-healing diet, and then a few months

later, re-tested her and all of her inflammatory markers were normal and her secretory IgA had dropped into the normal range as well. So, a good example of where it can look like IBD but it isn't necessarily IBD.

Comprehensive Stool Analysis / Parasitology x3

DIGESTION / ABSORPTION				
	Within	Outside	Reference Range	
Elastase	> 500		> 200 μg/mL	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.
Fat Stain	Few		None - Mod	
Muscle fibers	None		None - Rare	
Vegetable fibers	Few		None - Few	
Carbohydrates	Neg		Neg	
INFLAMMATION				
	Within	Outside	Reference Range	
Lysozyme*		717	≤ 600 ng/mL	Lysozyme* is an enzyme secreted at the site of inflammation in the GI tract and elevated levels have been identified in IBD patients. Lactoferrin is a quantitative GI specific marker of inflammation used to diagnose and differentiate IBD from IBS and to monitor patient inflammation levels during active and remission phases of IBD. White Blood Cells (WBC): in the stool are an indication of an inflammatory process resulting in the infiltration of leukocytes within the intestinal lumen. WBCs are often accompanied by mucus and blood in the stool. Mucus in the stool may result from prolonged mucosal irritation or in a response to parasympathetic excitability such as spastic constipation or mucous colitis.
Lactoferrin		7.6	< 7.3 μg/mL	
White Blood Cells	None		None - Rare	
Mucus	Neg		Neg	
IMMUNOLOGY				
	Within	Outside	Reference Range	
Secretory IgA*		2.7	51 - 204mg/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.

Here's another example of a more moderate elevation. This is a 44-year-old male with IBS and SIBO, and also fungal overgrowth, which is possibly contributing to the really low secretory IgA that you see there. Earlier, we talked about how Candidas can secrete substances that break down secretory IgA. Lysozyme is only mildly elevated, 717, so that's definitely in the active IBD range. Lactoferrin was just barely out of the reference range, again not in the active IBD range by any stretch. Calprotectin wasn't on the test when we did this, but in this case I would not refer out for colonoscopy, at least certainly not immediately. I would just treat the underlying gut issues, which

we did, and then re-test, and if markers are normal, then you move on to the next thing, and that's what happened in this case.

Comprehensive Stool Analysis / Parasitology x3

DIGESTION / ABSORPTION				
	Within	Outside	Reference Range	
Elastase	> 500		> 200 µg/mL	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.
Fat Stain	Few		None - Mod	
Muscle fibers	None		None - Rare	
Vegetable fibers	Rare		None - Few	
Carbohydrates		Int	Neg	
INFLAMMATION				
	Within	Outside	Reference Range	
Lactoferrin	< 0.5		< 7.3 µg/mL	Lactoferrin and Calprotectin are reliable markers for differentiating organic inflammation (IBD) from functional 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.
Calprotectin*	< 10		10 - 50 µg/g	
Lysozyme*	324		<= 600 ng/mL	
White Blood Cells	None		None - Rare	
Mucus		Pos	Neg	
IMMUNOLOGY				
	Within	Outside	Reference Range	
Secretory IgA*		50.0	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.

There are two other inflammatory markers we haven't discussed yet: white blood cells and mucus. These can occur with bacterial and parasite infections or gut inflammation. 34-year-old female results on this slide, chief complaint was difficulty with weight loss, inflamed lymph nodes, poor dental health, and fatigue. She also had chronic constipation with dry, hard stool, and she had SIBO, which was impairing her carbohydrate absorption as you can see by the positive result for carbohydrate malabsorption. So, all of these markers normalized after she was successfully treated for the SIBO.

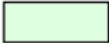
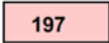


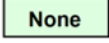

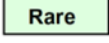


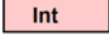
Secretory IgA roles

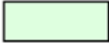
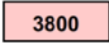
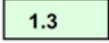

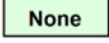

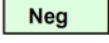

- 1 Regulates balance of **beneficial bacteria**
- 2 Prevents colonization by **pathogens**
- 3 Promotes recognition and tolerance of **commensals**
(Protects against autoimmunity, IBD)
- 4 Maintains GI **barrier** function
- 5 Promotes formation of **healthy biofilms** in gut
(containing beneficial organisms)

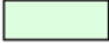
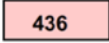
All right, let's talk about secretory IgA, since I've already mentioned it several times. This we refer to as sIgA so we don't have to refer to it as secretory IgA every time. It's a class of antibodies produced by and secreted from mucosal surfaces, especially the gastrointestinal and respiratory tract. IgA is the first line of defense against the entry of enteric toxins and pathogenic organisms from the colon, and secretory IgA, or sIgA, plays a number of important roles. It regulates the balance of beneficial bacteria, it prevents colonization by pathogens, it promotes recognition and tolerance of commensal organisms, so in that sense it could protect against inflammatory bowel disease, which is thought to be an autoimmune attack against commensal bacteria. It maintains gastrointestinal barrier function, and it promotes the formation of healthy biofilms in the gut, which contain beneficial organisms.

It's important to understand that sIgA is not an independent marker of anything. It's best used as a marker to determine the outcome of treatments of gut pathologies, and it's also important to note that it can take several months after the removal of the trigger to normalize, and addressing high or low sIgA requires rebuilding the gut and stress management and all the things that we're going to talk about in the treatment protocol section.

Comprehensive Stool Analysis / Parasitology x3

DIGESTION / ABSORPTION				
	Within	Outside	Reference Range	
Elastase			> 200 µg/mL	<p>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.</p>
Fat Stain			None - Mod	
Muscle fibers			None - Rare	
Vegetable fibers			None - Few	
Carbohydrates			Neg	

INFLAMMATION				
	Within	Outside	Reference Range	
Lysozyme*			<= 600 ng/mL	<p>Lysozyme* is an enzyme secreted at the site of inflammation in the GI tract and elevated levels have been identified in IBD patients. Lactoferrin is a quantitative GI specific marker of inflammation used to diagnose and differentiate IBD from IBS and to monitor patient inflammation levels during active and remission phases of IBD. White Blood Cells (WBC): in the stool are an indication of an inflammatory process resulting in the infiltration of leukocytes within the intestinal lumen. WBCs are often accompanied by mucus and blood in the stool. Mucus in the stool may result from prolonged mucosal irritation or in a response to parasympathetic excitability such as spastic constipation or mucous colitis.</p>
Lactoferrin			< 7.3 µg/mL	
White Blood Cells			None - Rare	
Mucus			Neg	

IMMUNOLOGY				
	Within	Outside	Reference Range	
Secretory IgA*			51 - 204mg/dL	<p>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.</p>

There are no validated correlations between sIgA levels and disease states. It's most commonly used as an outcome measure in clinical trials, so, for example, they measure it before they do an intervention and then they measure it after an intervention, and they use that as the marker to determine the effect of that intervention. That said, there are some general inferences that we can make from sIgA levels. High levels may indicate activation of the gut immune system, and this may be a normal transit response to intestinal viral or bacterial pathogens, or it may indicate something more chronic, pathological. The patient on this slide, we saw this result before, he had a history of GERD and GI issues, and lysozyme was significantly elevated, suggesting inflammation. Also had mild fungal overgrowth and Blastocystis hominis, so it's not surprising to see that elevated sIgA.

Comprehensive Stool Analysis / Parasitology x3

DIGESTION / ABSORPTION				<p>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.</p>
	Within	Outside	Reference Range	
Elastase	333		> 200 µg/mL	
Fat Stain	None		None - Mod	
Muscle fibers	Rare		None - Rare	
Vegetable fibers	Few		None - Few	
Carbohydrates	Neg		Neg	

INFLAMMATION				<p>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.</p>
	Within	Outside	Reference Range	
Lactoferrin	< 0.5		< 7.3 µg/mL	
Calprotectin*	< 10		<= 50 µg/g	
Lysozyme*	361		<= 600 ng/mL	
White Blood Cells	None		None - Rare	
Mucus	Neg		Neg	

IMMUNOLOGY				<p>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.</p>
	Within	Outside	Reference Range	
Secretory IgA*		15.1	51 - 204 mg/dL	

Low sIgA may be more indicative of a chronic problem, though the research isn't clear on this. As mentioned, sIgA has several important functions. If it's low, there's a risk of dysbiosis, pathogen invasion, and intestinal permeability. On this slide, this is a 52-year-old female with biotoxin illness, chronic inflammatory response syndrome, she had Lyme disease and then developed an inflammatory condition caused by the toxins produced by *Borrelia*, the bacteria that causes Lyme, and the low sIgA is probably related to that. You can see that there's not a lot of other things going on this part of her GI panel, and there wasn't much on any other part of the panel, either.

Comprehensive Stool Analysis / Parasitology x3

DIGESTION / ABSORPTION				
	Within	Outside	Reference Range	
Elastase	268		> 200 µg/mL	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.
Fat Stain	Few		None - Mod	
Muscle fibers	None		None - Rare	
Vegetable fibers	Rare		None - Few	
Carbohydrates	Neg		Neg	

INFLAMMATION				
	Within	Outside	Reference Range	
Lactoferrin	< 0.5		< 7.3 µg/mL	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.
Calprotectin*	< 10		<= 50 µg/g	
Lysozyme*	292		<= 600 ng/mL	
White Blood Cells	None		None - Rare	
Mucus	Neg		Neg	

IMMUNOLOGY				
	Within	Outside	Reference Range	
Secretory IgA*		< 0.1	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.

Sometimes you'll see undetectable levels of sIgA, as you do on this test result. The range is 51 to 204, and this patient had less than 0.1, so that was literally undetectable. So a 45-year-old male with a *Blastocystis hominis*, *Endolimax nana*, and *Entamoeba hartmanii*, so this patient was under severe GI distress. In this case, when we see undetectable sIgA levels, we'll run a quantitative immunoglobulin panel that measures total levels of IgG, IgE, IgA, and IgM, with either LabCorp or Quest, because some people have a genetic deficiency in IgA production where they can't make any at all, and we want to know about that if it's present.