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# LABS Live 2021

The future of diagnostics

## Functional Diagnostic Evaluation of the Gastrointestinal System

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Dr. Jillian Sarno Teta has been in practice since 2007 where she primarily focuses on digestive issues. She is the author of “Natural Solutions for Digestive Health” and the creator of Fix Your Digestion.



# FUNCTIONAL EVALUATION OF THE GASTROINTESTINAL SYSTEM

Presented by Jillian Sarno Teta, ND





# WHAT WE WILL DISCUSS & WHY

- Breath, stool & blood testing: when to use them, what problems they can uncover, what insights we can glean from them.
- Why? Digestive complaints are exquisitely common. IBS alone can be found in up to a quarter of the population.
- Digestive issues are a major reason why people will come to see you, other doctors & miss work.
- Many digestive symptoms can be caused by dozens of things, and many diagnoses share symptoms. Testing can help tease things out & give direction & lasting relief.
- OTC medications and digestive aids approach \$9 billion/year. That's a lot of suffering we can help with.



# WHAT WE WILL DISCUSS & WHY, CONT.

- There is a lack of consistent, widespread knowledge of the microbiome & how to deal with imbalances (dysbiosis) in the conventional community.
- Dysbiosis underpins not only GI diagnoses (IBS, IBD, celiac) but others (DM2, neurodegenerative conditions, depression, hypertension & more).
- With specific, objective data collection combined with asking the right questions and taking a good history, you can get enormous relief for people (often quickly), saving them time, money, pain & suffering.
- The pandemic is making a lot of people chronically stressed, and for many this stress shows up in the digestive system. There are few ways better to compromise digestion than with chronic stress.





# BREATH TESTS

- Assesses: SIBO, fructose malabsorption, *H. pylori* infection.
- SIBO —> hydrogen, methane or hydrogen sulfide dominant.



# WHEN TO SUGGEST A BREATH TEST

- Upper GI symptoms, particularly around meals: bloating/distension, belching, early satiety, heartburn symptoms not relieved by heartburn treatment. Gnawing pain in stomach.
- Motility issues that correspond with upper GI symptoms.
- Belches, gas, stool have sulfur smell.
- Patient takes medication that increases risk of SIBO or has something in their history that increases risk of SIBO.
- Patient has a diagnosis often found concurrently with SIBO.



# WHAT DO BREATH TESTS DO?

- Measure gases that shouldn't be in the upper GI tract.
- A baseline level is taken, a solution is given & then serial samples are taken thereafter.
- Many can be done either at home or in the office.





# CHOOSING A MEDIUM FOR BREATH TESTS

- Fructose malabsorption testing: fructose (fructose malabsorption testing is rarely a first go-to over a lactulose/glucose test but overlaps with SIBO, IBS, celiac).
- *H. pylori* testing: urea (can also test for *H. pylori* using PCR stool testing, which overall yields more data that would arguably increase understanding of the full case).
- SIBO: lactulose or glucose.



# LACTULOSE VS. GLUCOSE FOR SIBO



- Glucose is absorbed proximally & can miss SIBO in the jejunum & ileum.
- Lactulose is absorbed distally, thus will capture SIBO in all segments. Captures more cases; fewer false negatives.
- Both lactulose & glucose are 85% + sensitive and specific.
- Will NOT capture SIFO.



# RESULTS FOR SIBO BREATH TESTING

- According to the *North American Consensus Group*:
  - A rise in H<sub>2</sub> of 20ppm or greater from baseline is a positive test.
  - A rise in CH<sub>4</sub> of 10ppm or greater from baseline is a positive test.
  - Two peaks are NOT required; you can have either/both. High methane can mask hydrogen SIBO because methanogens consume hydrogen.
  - False negatives are more common than false positives. We are more likely to miss a diagnosis than incorrectly diagnose it.
  - Equivocal results - you have a choice, to treat or not to treat.



# IS IT BETTER TO START WITH BREATH OR STOOL TESTING?

- It depends!
- Determine with the patient's history, timeline and subjective experience.
- Consider prior diagnoses, testing, results & treatments.
- More upper GI symptoms? Breath.
- Symptoms below or around the bellybutton, get progressively worse as the day wears on, lots of lower gas? Stool.



# IS IT BETTER TO START WITH BREATH OR STOOL TESTING? CONT.

- Symptoms started post travel, illness or food poisoning? Stool.
- Stool testing gives a robust comprehensive picture into the GI tract, from the microbiome to digestive capacity to immune & inflammatory markers but it can NOT pinpoint overgrowth/infection in the upper GI tract.
- If you want big picture, go stool. If you are confident it's an upper GI problem or there's already been stool testing, go breath.





# STOOL TESTING

- Assesses many forms of dysbiosis, except SIBO.
- Qualifies & quantifies microbiome (the good, the bad & the in-between).
- Identifies presence of pathogens and parasites.
- Measures digestive capacity, immune activity, calprotectin, zonulin, antibiotic resistance & more.



# PCR VS MICROSCOPY STOOL TESTS



- There are advantages & disadvantages to each.
- Microscopy can over-report yeast (due to preservative medium) and miss pathogens/parasites that aren't physically in the stool.
- Microscopy will under quantify anaerobes.
- PCR testing doesn't do culture & sensitivity trials.
- PCR will detect bad guys that are not actively shedding in the stool.
- I've used both throughout my career, but am currently using PCR based tests more.



# STOOL TESTING - THE GOOD GUYS

- There's a lot about the microbiome that we don't know, but based on what we do know, we can offer great service to people in GI distress.
- A major section of stool tests whether they are PCR or microscopy based is looking at healthy, beneficial microbes.
- Who is there (qualify) & how many (quantify)?



# COMMON TRENDS WITH BENEFICIAL BACTERIA

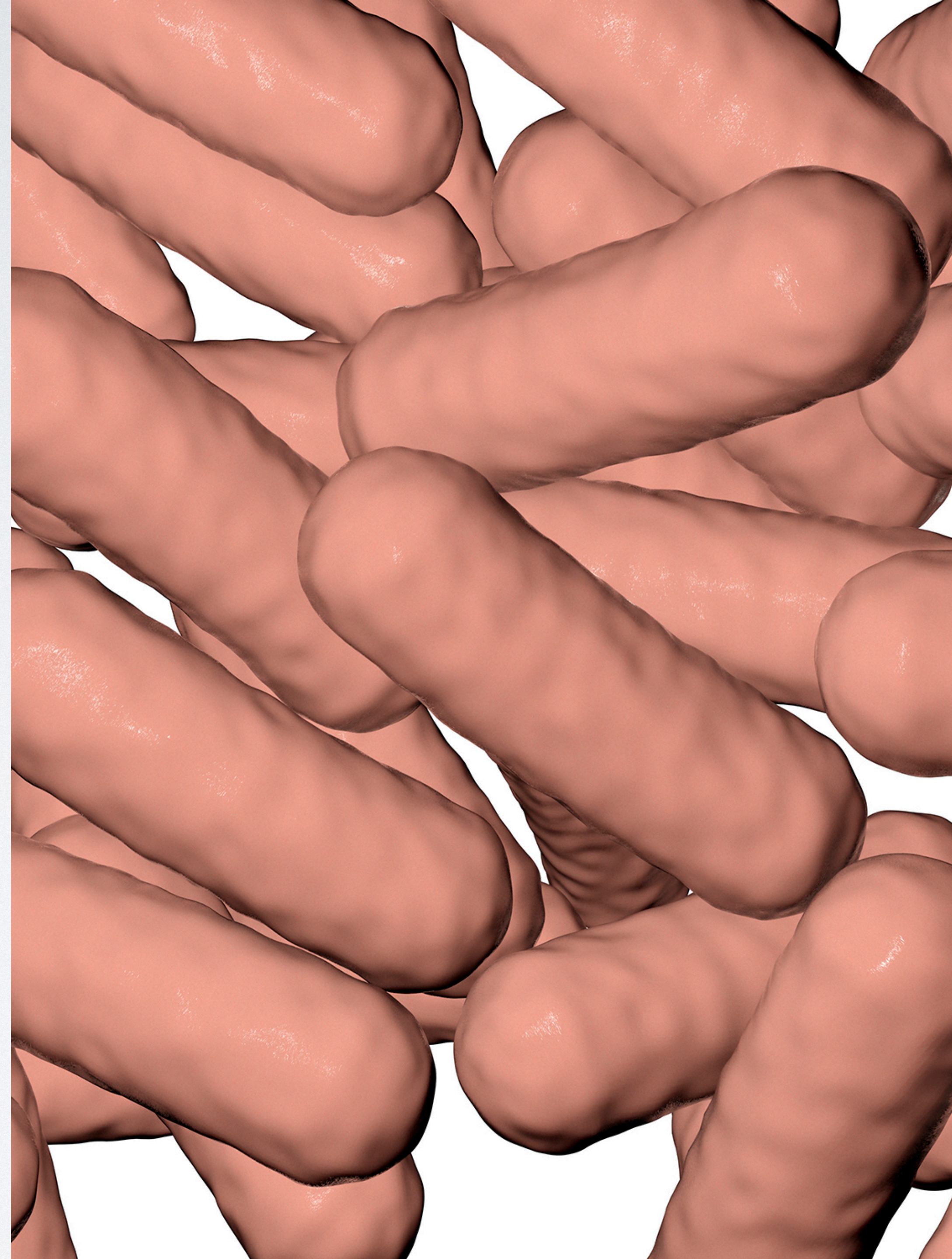
## SECTION OF STOOL TESTING

- Low flora. Numbers can be low in any taxonomic group, with the most clinically relevant being deficiencies in phyla (*Bacteroidetes/Firmicutes*). Low flora mimics overgrowth & infection symptoms.
- Overgrown flora. This most commonly happens hand in hand with growth of opportunists that are driving numbers up.
- High *Firmicutes*, and or high ratio of *Firmicutes* to *Bacteroidetes*. This phyla (or a high ratio) is associated with increased caloric extraction from food, insulin signaling/blood sugar issues & all associated fallout. Often occurs with overgrowth of opportunists.
- Take thorough history on nutrition (throughout the lifetime), antibiotic, PPI, laxative & atypical antipsychotic use, travel, illness, employment, exposure to pets, farm animals, wild animals, gardening, camping, drinking from hoses.



# STOOL TESTING: OPPORTUNISTIC BACTERIA

- Emphasis on opportune!
- Symptoms can vary from zero to severe.
- Presence of certain organisms can confer symptoms specific to them, and it is also important to understand many symptoms overlap.





# HIGHLIGHTS OF BACTERIAL OPPORTUNISTS

- This is not a comprehensive list!
- Some opportunists are associated with antacid use: *Enterococcus faecalis* & *faecium*, *Prevotella*.
- Some are associated with antibiotic resistance and/or can easily overgrow when antibiotics are taken: *Enterococcus faecalis* & *faecium*, *Streptococcus spp.*
- Some are associated with releasing histamine in the gut: *Morganella*, *Klebsiella spp.*, *Klebsiella pneumoniae*.
- Some are associated with SIBO: *Bacillus*, *Methanobacteriaceae*.
- Some can harm the lining of the gut and/or are associated with IBD/colitis: *Morganella*, *Pseudomonas spp.*, *Streptococcus spp.*, *Citrobacter spp.*, *Fusobacterium*, *Mycobacterium avian paratuberculosis* (MAP).





# STOOL TESTING: FUNGI & YEAST

- Types tested can be part of normal microbiome, including *Candida spp.* & *Candida albicans*.
- Over-diagnosed with microscopy.
- Many yeasts present are dietary artifacts without clinical presentation (*Geotrichum*).
- Some yeast can be dangerous for immunocompromised people (*Rhodotulola*, found in soil, plants & contaminated milk, juice & water).
- Release CO<sub>2</sub>, which is diffused in the blood & exhaled through the lungs. For this reason yeast doesn't cause gas/bloating like bacteria & other organisms can.
- Yeast is one of the easiest microorganisms to treat, when overgrown: high dose probiotics, *S. boulardii*, allicillin, nystatin.



# STOOL TESTING: PARASITES & PATHOGENS

- Parasites live within & feed on the host, at the expense of the host. Pathogens are organisms that cause gastroenteritis.
- Stool tests qualify/quantify protozoal & worm parasites, and bacterial/viral and parasitic pathogens.
- If parasites or pathogens are present, correlate with sIgA, calprotectin & native flora.
- Most are straightforward to treat; for some antibiotic therapy is contraindicated due to hyperemic syndrome (HUS) so always look them up if they show up.



# PARASITES: HIGHLIGHTS

- *Blastocystis hominis* (protozoa)
  - Very common.
  - Many sources say non-pathogenic.
  - Can be difficult to eradicate.
- *Cyclospora* (protozoa)
  - Common source of traveler's diarrhea, abx ok.
- *Ancylostoma duodenale* & *Necatur americanus* (worms)
  - From soil contamination, cats & dogs.
- *Ascaris* (worm)
  - Roundworm, contamination of food/water, international travel.





# PATHOGENS: HIGHLIGHTS

- Can be bacterial, parasitic or viral. This is not a comprehensive list. This is where PCR shines over microscopy testing.
- Bacterial
  - *Campylobacter* - pain, diarrhea.
  - EHEC - do not use antibiotics for threat of HUS. Other bacterial pathogens that should not be treated with abx: *E. coli*, *Shigella*, *Enterotoxigenic E. coli*, Shiga like toxin.



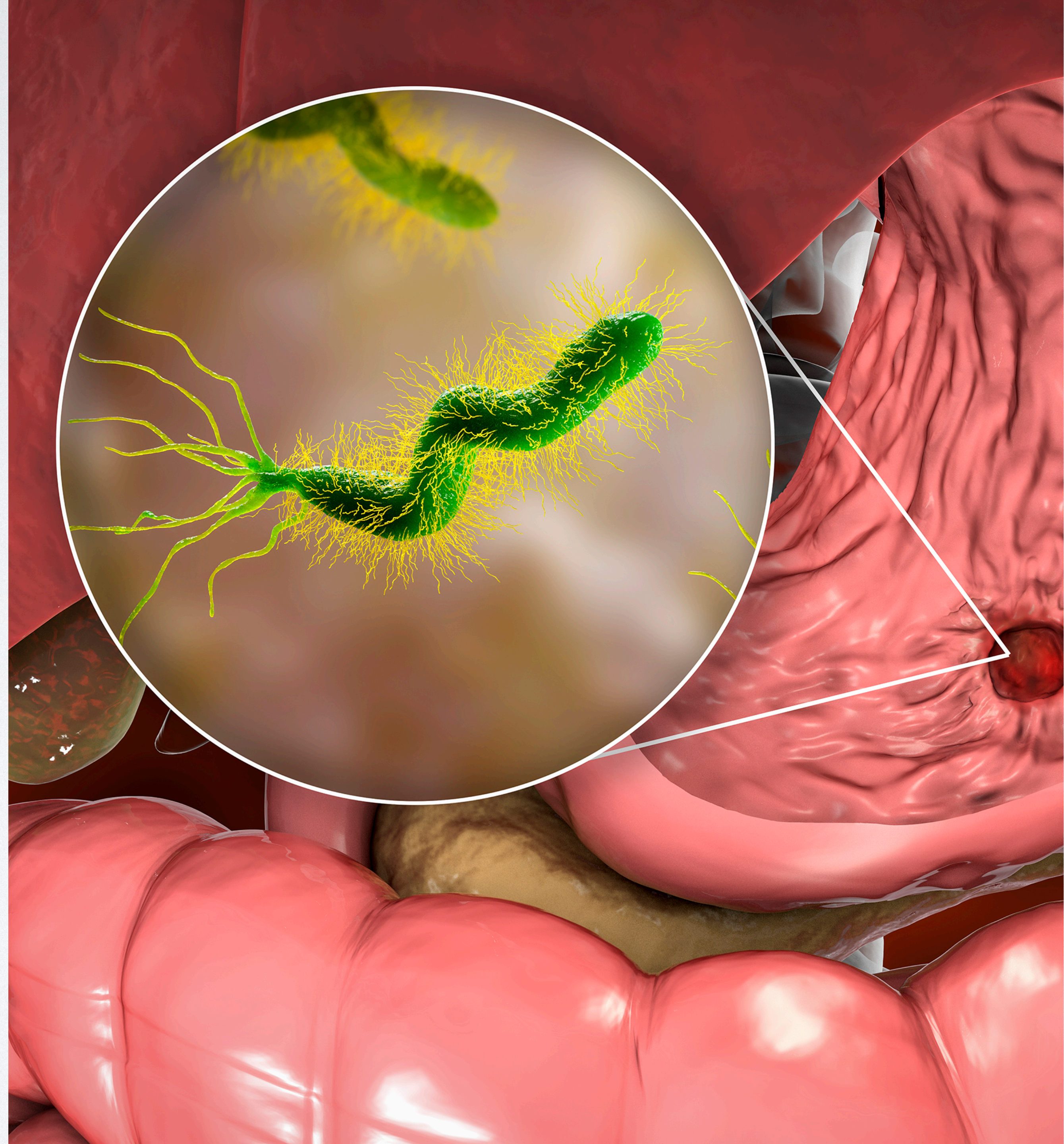
# PATHOGENS: HIGHLIGHTS, CONT.

- Parasitic
  - *Entamoeba* - from pets, farms, little kids/daycare & sexual partners.
  - Most can be treated with metronidazole, paramyocin or similar, and of course the natural stuff.
- Protozoal
  - *Giardia* - very common from camping & contaminated water/food. Can be treated with conventional or natural antimicrobials.



# STOOL TESTING: *HELICOBACTER PYLORI*

- *H. pylori* is present in 50% of the global population.
- It can be asymptomatic to being responsible for creating ulcers, gastritis & increasing risk for gastric cancers.
- In some populations, it is protective.
- PCR testing checks for virulence factors that increase risk for concomitant disease or make treatment more difficult.
- Integrate these findings with symptoms, other signs of overgrowth/infection, inflammatory & immune markers.





# STOOL TESTING: MARKERS FOR INTESTINAL HEALTH

- Digestive capacity (ability to break down macronutrients)
- Fecal occult blood
- slga/anti-gliadin slgA
- Calprotectin
- Zonulin
- Antibiotic resistant genes





# DIGESTIVE CAPACITY

- Why care? Low digestive capacity increases gas & bloating from the top to bottom of the GI tract, can create motility issues & if goes on long enough, nutritional deficiencies (B12, B6, folate & iron for decreased acid, fat soluble ADEK for bile insufficiency/fat maldigestion).
- Symptoms of dysbiosis & low digestive capacity can mimic & exacerbate one another.
- Evaluates ability to break down macronutrients. Measures in stool testing are Elastase-I, steatocrit & protein fibers (the latter is in microscopy testing but not PCR, and can signal low acid output).



# DIGESTIVE CAPACITY, CONT.

- Elastase-I: pancreatic enzyme independent of enzyme supplementation. Crucial for protein & generalized digestion. Low is below 200; associated w/ decreased pancreatic function, gallstones, *H. pylori* infection, cystic fibrosis, celiac disease, IBD, chronic stress, vegetarianism/veganism.
- Steatocrit: when high, there is increased fecal fat. Fecal fats could be present due to maldigestion (lack of great bile in quality or availability when needed) or malabsorption (too much fat from dietary sources, maldigestion or from issues at the lining).



# STOOL TESTS: IMMUNE AND INFLAMMATORY MARKERS

- sIgA
  - If high, frank infection, recent infection. Signals active immune activity.
  - If low, possible immune system is tired or the body has gone on too long or is under resourced. Chronic infection, chronic exposures to chemicals/toxicants, chronic low protein intake.
- anti-gliadin sIgA
  - Different from serum gliadin IgA. Not diagnostic for celiac, order blood testing to confirm.
  - Suggestive of immune activity in the gut against gliadin.
  - When high, trial of gluten elimination & challenge (that would begin AFTER a blood test, if you're doing it) and assess zonulin for permeability issues.

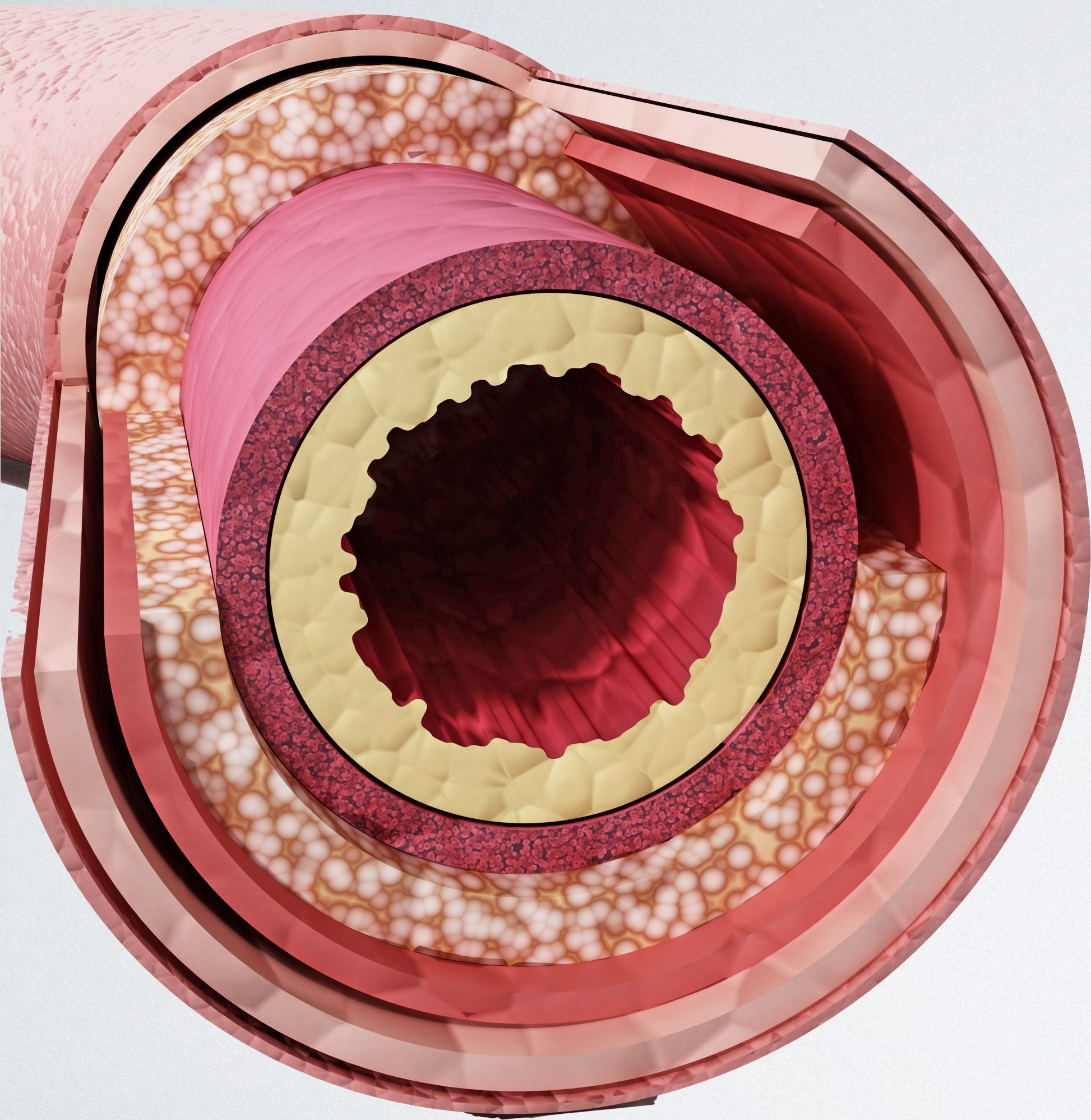


# STOOL TESTS: IMMUNE AND INFLAMMATORY MARKERS, CONT.

- Calprotectin
  - Protein complex released by neutrophils; most studied marker of intestinal inflammation, gold standard for monitoring IBD tx.
  - High levels can also be caused by H. pylori infection (or organisms that increase intestinal inflammation), NSAID use, polyps, diverticulitis & cancer.
- In the presence of overgrowth or infection, these markers should be examined.



# STOOL TESTS: ZONULIN



- Assesses level of intestinal permeability.
- If high, do 4+ week elimination/challenge of gluten & support gut restoration.
- Important marker for autoimmune function via the zonulin/gluten connection.
- Increased permeability can be caused by infection, binge drinking, lots of cardiovascular exercise, food sensitivities.
- Some diagnoses like IBD, microscopic colitis and celiac are more prone to increased intestinal permeability.



# STOOL TESTING: ANTIBIOTIC RESISTANCE

- PCR stool testing will look at generalized antibiotic resistance of the microbiome, and specific resistance of *H. pylori* to antibiotics.
- Testing is for macrolides (those abx ending in -mycin), fluoroquinolones (those ending in -oxacin), b-lactams (penicillin & its derivatives), vancomycin (used for *C. diff*, cellulitis).



# BLOOD TESTING

- Basic blood tests confer a lot of information into certain aspects of digestive health.
- Gallbladder function - gallstones, sludgy bile, biliary dyskinesia all common & can be evaluated with bilirubin.
- Liver function tests - comprehensive liver evaluation for fatty liver, elevated liver enzymes.
- Diagnostic tests for celiac disease, IBS, systemic inflammation that is found in IBD & can correlate with calprotectin.
- Assessing for anemia & nutritional nutrient deficiencies caused by digestive distress.





# THANKYOU!

## ANY QUESTIONS?

IF YOU LIKE INSTAGRAM, LET'S CONNECT @JILLIANTETA



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