US BioTek LABORATORIES · **PATIENT REPORT**
16020 Linden Av N Shoreline WA, 98133 • cservice@usbiotek.com • +1 206 365 1256

Clinical Laboratory Improvement Amendments

25281-0052

*** US BioTek** US BioTek. 16020 Linden Av N, Shoreline WA 98133

Lab ID
Patient ID PAT-100009
Ext ID 25281-0052

Test Patient
Sex: Female • 45yrs • 01-Jan-80

RECEIVED
08-Oct-25

GI-Standard
Specimen type - Stool

Collected
05-Oct-25

MACROSCOPIC EXAMINATION

TEST	RESULT
Stool Colour	Brown
Stool Form	Unformed
Mucous	PRESENT

OCCULT BLOOD

TEST	INTERPRETATION
Occult Blood	POSITIVE

GIT FUNCTIONAL MARKERS

TEST	RESULT	H/L	REFERENCE	UNITS
Calprotectin	93.0	H	(<50.0)	ug/g
b-Glucuronidase	4933		(368-6266)	U/g
Pancreatic Elastase 1	320		(>200)	ug/g
pH	6.6		(6.3-7.7)	
Secretory IgA	550		(510-2040)	ng/mL
Steatocrit	14.0	H	(0.0-10.0)	%
Transglutaminase IgA	10.0		(0.0-100.0)	ug/g
Zonulin	119	H	(0-107)	ng/mL

SHORT CHAIN FATTY ACIDS

TEST	RESULT	H/L	REFERENCE	UNITS
Short Chain Fatty Acids, Beneficial	19.3		(>13.6)	umol/g
Acetate	58.00		(44.50-72.40)	%
Butyrate	26.00		(10.80-33.50)	%
Propionate	11.00		(0.00-32.00)	%
Valerate	5.00		(0.50-7.00)	%

Parasites & Worms

Dientamoeba fragilis
Ascaris species, Roundworm

Bacteria and Viruses

Pseudomonas aeruginosa
Methanobrevibacter smithii
Desulfovibrio piger
Klebsiella pneumoniae complex
Fusobacterium species
Aeromonas species
Helicobacter pylori
Adenovirus 40/41

Mycology

Candida krusei
Candida albicans

TEST	RESULT	H/L	REFERENCE	UNITS
Firmicutes/Bacteroidetes Ratio	1.91	H	(<1.00)	ratio

Sample Report

Lab Director: Jillian Harrington, PhD, HCLD (ABB). CLIA#99D2282774

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PARASITES

TEST	RESULT	H/L	REFERENCE	UNITS
Blastocystis hominis	<DL		(<1.00)	x10^5 org/g
Cryptosporidium species	<DL		(<1.00)	x10^5 org/g
Dientamoeba fragilis	1.00	H	(<1.00)	x10^5 org/g
Cyclospora cayetanensis	<DL		(<1.00)	x10^5 org/g
Entamoeba histolytica	<DL		(<1.00)	x10^5 org/g
Giardia intestinalis	<DL		(<1.00)	x10^5 org/g
Enterocytozoon species	<DL		(<1.00)	x10^5 org/g

HELMINTHS

TEST	RESULT
Ancylostoma species Hookworm	Not Detected
Ascaris species, Roundworm	DETECTED
Enterobius vermicularis, Pinworm	Not Detected
Hymenolepis spp, Tapeworm	Not Detected
Necator americanus, Hookworm	Not Detected
Strongyloides spp, Roundworm	Not Detected
Taenia species, Tapeworm	Not Detected
Trichuris trichiura, Whipworm	Not Detected

VIRUSES

TEST	RESULT
Adenovirus 40/41	DETECTED
Astrovirus (hAstro)	Not Detected
Norovirus GI/II	Not Detected
Rotavirus A	Not Detected
Sapovirus (I,II,IV,V)	Not Detected

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BACTERIAL PATHOGENS

TEST	RESULT	H/L	REFERENCE	UNITS
Aeromonas species	1.06	H	(<1.00)	x10^3 CFU/g
Campylobacter species	<DL		(<1.00)	x10^5 CFU/g
C. difficile, Toxin A	<DL		(<1.00)	x10^4 CFU/g
C. difficile, Toxin B	<DL		(<1.00)	x10^4 CFU/g
Clostridium difficile, Hypervirulent	<DL		(<1.00)	x10^3 CFU/g
Enteroaggregative E. coli	<DL		(<1.00)	x10^3 CFU/g
Enteropathogenic E. coli	<DL		(<1.00)	x10^3 CFU/g
E. coli O157	<DL		(<1.00)	x10^2 CFU/g
Enteroinvasive E. coli/Shigella	<DL		(<1.00)	x10^3 CFU/g
Enterotoxigenic E. coli LT/ST	<DL		(<1.00)	x10^5 CFU/g
Salmonella species	<DL		(<1.00)	x10^5 CFU/g
Shiga toxigenic E. coli (stx1/2)	<DL		(<1.00)	x10^3 CFU/g
Vibrio species	<DL		(<1.00)	x10^4 CFU/g
Yersinia species	<DL		(<1.00)	x10^5 CFU/g
Helicobacter pylori	1.89	H	(<1.00)	x10^3 CFU/g

HELICOBACTER PROFILE

TEST	RESULT
H. pylori Antigen	POSITIVE

H. pylori Virulence Factors

TEST	RESULT
Virulence Factor, babA	DETECTED
Virulence Factor,oipA	Not Detected
Virulence Factor, virB	Not Detected
Virulence Factor, cagA	Not Detected
Virulence Factor, vacA	Not Detected
Virulence Factor, virD	Not Detected
Virulence Factor, dupA	Not Detected
Virulence Factor, iceA	Not Detected

H. pylori Resistance Genes

TEST	RESULT
Resistance gene A2142C	DETECTED
Resistance gene A2142G	Not Detected
Resistance gene A2143G	Not Detected

Actinobacteria Phylum Bacteroidetes Phylum Euryarchaeota Phylum Firmicutes Phylum Proteobacteria Phylum Verrucomicrobia Phylum

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OPPORTUNISTIC BACTERIA

TEST	RESULT	H/L	REFERENCE	UNITS
Bacillus species	<DL		(<1.00)	x10^4 CFU/g
Bacteroides fragilis	<DL		(<250.00)	x10^5 CFU/g
Bacteroides thetaiotaomicron	<DL		(<300.00)	x10^5 CFU/g
Phocaeicola vulgatus	<DL		(<300.00)	x10^5 CFU/g
Enterobacter cloacae complex	<DL		(<5.00)	x10^5 CFU/g
Enterococcus faecalis	<DL		(<1.00)	x10^5 CFU/g
Enterococcus faecium	<DL		(<1.00)	x10^5 CFU/g
Morganella species	<DL		(<1.00)	x10^5 CFU/g
Pseudomonas species	<DL		(<1.00)	x10^4 CFU/g
Pseudomonas aeruginosa	11.34	H	(<3.00)	x10^4 CFU/g
Staphylococcus species	<DL		(<1.00)	x10^3 CFU/g
Staphylococcus aureus	<DL		(<5.00)	x10^3 CFU/g
Streptococcus agalactiae	<DL		(<3.00)	x10^4 CFU/g
Streptococcus anginosus	<DL		(<1.00)	x10^6 CFU/g
Streptococcus mutans	<DL		(<1.00)	x10^4 CFU/g
Streptococcus oralis	2.36	H	(<1.00)	x10^6 CFU/g
Streptococcus salivarius	<DL		(<5.00)	x10^6 CFU/g

HYDROGEN UTILISING MICROBES

TEST	RESULT	H/L	REFERENCE	UNITS
Desulfovibrio piger	396.00	H	(<18.00)	x10^6 CFU/g
Methanobrevibacter smithii	5.54	H	(<1.00)	x10^5 CFU/g

POTENTIAL AUTOIMMUNE TRIGGERS

TEST	RESULT	H/L	REFERENCE	UNITS
Citrobacter species	<DL		(<5.00)	x10^4 CFU/g
Citrobacter freundii complex	0.55		(<5.00)	x10^4 CFU/g
Klebsiella species	1.37		(<5.00)	x10^3 CFU/g
Klebsiella pneumoniae complex	11.00	H	(<5.00)	x10^5 CFU/g
Prevotella copri	<DL		(<1.00)	x10^9 CFU/g
Proteus species	<DL		(<5.00)	x10^5 CFU/g
Proteus mirabilis	<DL		(<5.00)	x10^4 CFU/g
Fusobacterium species	42.42	H	(<20.00)	x10^4 CFU/g

Actinobacteria Phylum · Bacteroidetes Phylum · Euryarchaeota Phylum · Firmicutes Phylum · Proteobacteria Phylum · Verrucomicrobia Phylum

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MYCOLOGY

TEST	RESULT	H/L	REFERENCE	UNITS
Candida albicans	6.30	H	(<1.00)	x10^5 CFU/g
Candida dubliniensis	<DL		(<1.00)	x10^5 CFU/g
Candida famata	<DL		(<1.00)	x10^5 CFU/g
Candida glabrata	<DL		(<1.00)	x10^5 CFU/g
Candida guilliermondii	<DL		(<1.00)	x10^5 CFU/g
Candida intermedia	<DL		(<1.00)	x10^5 CFU/g
Candida kefyr	<DL		(<1.00)	x10^5 CFU/g
Candida krusei	1.90	H	(<1.00)	x10^5 CFU/g
Candida lambica	<DL		(<1.00)	x10^5 CFU/g
Candida lipolytica	<DL		(<1.00)	x10^5 CFU/g
Candida lusitaniae	<DL		(<1.00)	x10^5 CFU/g
Candida parapsilosis	<DL		(<1.00)	x10^5 CFU/g
Candida tropicalis	<DL		(<1.00)	x10^5 CFU/g
Candida species	<DL		(<1.00)	x10^5 CFU/g
Geotrichum species	<DL		(<1.00)	x10^5 CFU/g
Rhodotorula species	<DL		(<1.00)	x10^5 CFU/g
Saccharomyces cerevisiae	<DL		(<1.00)	x10^5 CFU/g

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NORMAL BACTERIAL GUT FLORA

TEST	RESULT	H/L	REFERENCE	UNITS
Akkermansia muciniphila	118.00	H	(1.00-50.00)	x10^7 CFU/g
TOTAL BIFIDOBACTERIA	10.00		(<2000.00)	x10^6 CFU/g
Bifidobacterium adolescentis	2.00		(<1000.00)	x10^6 CFU/g
Bifidobacterium bifidum	<DL		(<1000.00)	x10^6 CFU/g
Bifidobacterium breve	5.00		(<1000.00)	x10^6 CFU/g
Bifidobacterium longum	3.00		(<1000.00)	x10^6 CFU/g
Clostridium species	114.70	H	(5.00-50.00)	x10^7 CFU/g
Enterococcus species	56.50		(1.90-2000.00)	x10^3 CFU/g
Escherichia species	5385.00	H	(3.70-3800.00)	x10^4 CFU/g
Faecalibacterium prausnitzii	890.00		(100.00-3500.00)	x10^6 CFU/g
TOTAL LACTOBACILLI	4.90		(<3000.00)	x10^3 CFU/g
Lactobacillus acidophilus	3.00		(<500.00)	x10^3 CFU/g
Lactobacillus casei	<DL		(<500.00)	x10^3 CFU/g
Lactobacillus delbrueckii	<DL		(<500.00)	x10^3 CFU/g
Lactobacillus plantarum	<DL		(<500.00)	x10^3 CFU/g
Lactobacillus rhamnosus	1.90		(<500.00)	x10^3 CFU/g
Lactobacillus salivarius	<DL		(<500.00)	x10^3 CFU/g
Oxalobacter formigenes	5.69		(<50.00)	x10^6 CFU/g

Actinobacteria Phylum Bacteroidetes Phylum Euryarchaeota Phylum Firmicutes Phylum Proteobacteria Phylum Verrucomicrobia Phylum

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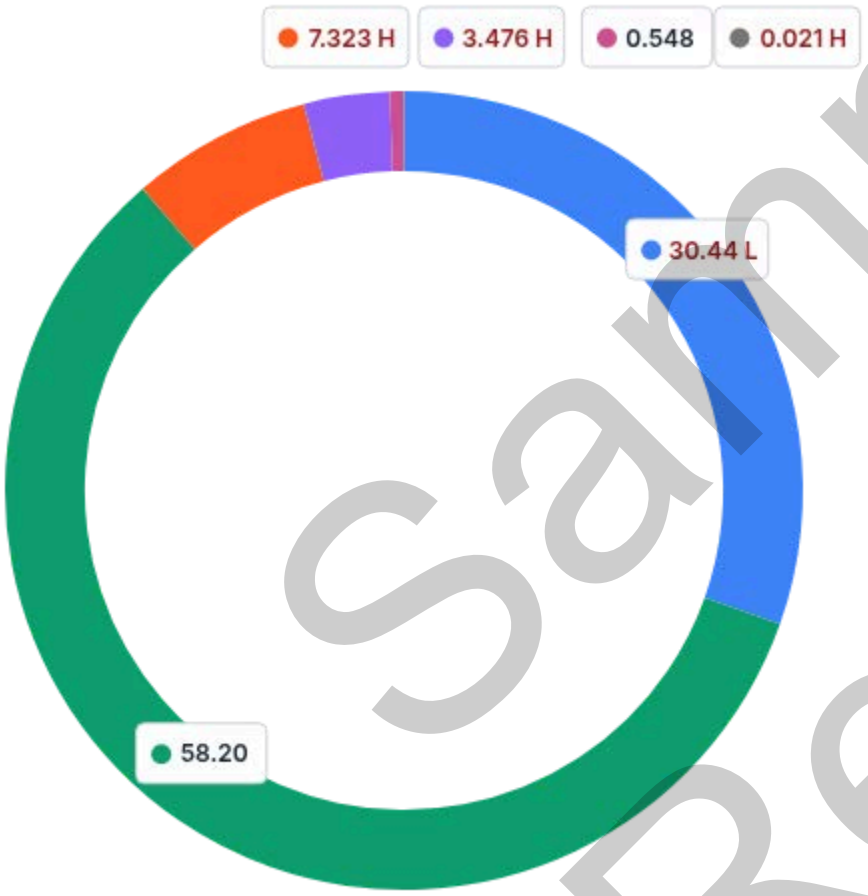
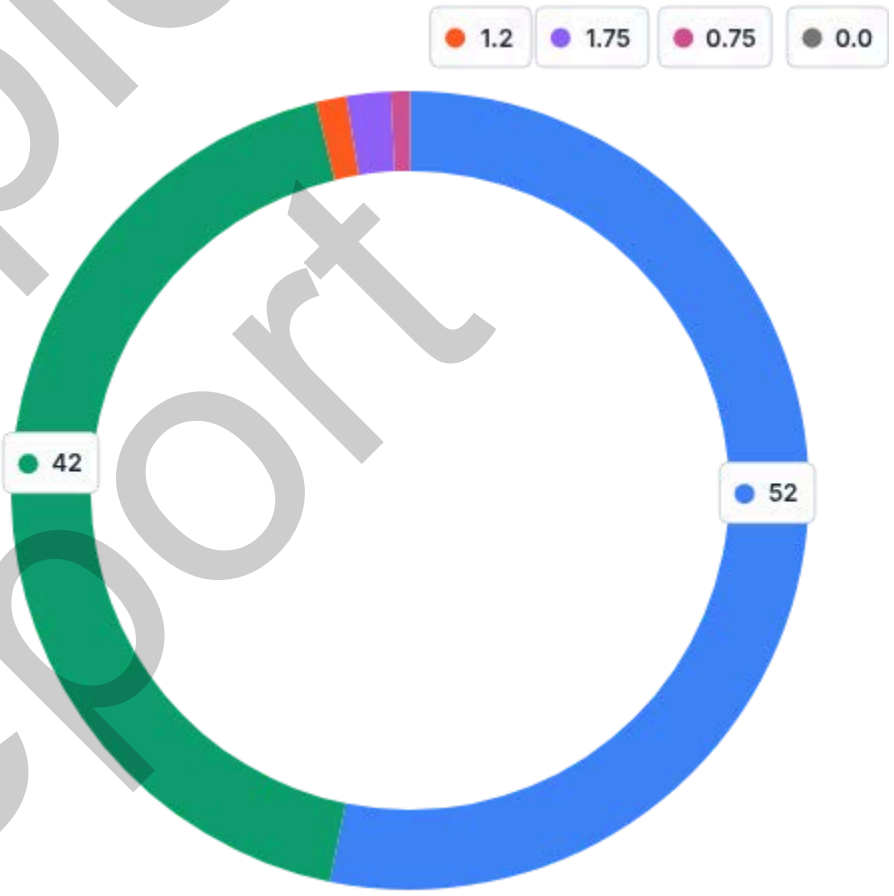
COMMENSAL RELATIVE ABUNDANCE

TEST	RESULT	H/L	REFERENCE	UNITS
Actinobacteria Phylum	0.548		(0.001-1.500)	%
Bacteroidetes Phylum	30.44	L	(40.00-87.00)	%
Euryarchaeota Phylum	0.021	H	(0.000-0.010)	%
Firmicutes Phylum	58.20		(10.00-60.00)	%
Proteobacteria Phylum	7.323	H	(0.500-5.000)	%
Verrucomicrobia Phylum	3.476	H	(0.000-2.400)	%

Your Phyla



Healthy Phyla



MICROBIOTA RATIO

TEST	RESULT	H/L	REFERENCE	UNITS
Firmicutes/Bacteroidetes Ratio	1.91	H	(<1.00)	ratio

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The Four "R" Treatment Protocol

REMOVE	Using a course of antimicrobial, antibacterial, antiviral or anti parasitic therapies in cases where organisms are present. It may also be necessary to remove offending foods, gluten, or medication that may be acting as antagonists. Consider testing IgG96 foods as a tool for removing offending foods.	ANTIMICROBIAL	Oil of oregano, berberine, caprylic acid
		ANTIBACTERIAL	Liquorice, zinc carnosine, mastic gum, tribulus, berberine, black walnut, caprylic acid, oil of oregano
		ANTIFUNGAL	Oil of oregano, caprylic acid, berberine, black walnut
		ANTIPARASITIC	Artemesia, black walnut, berberine, oil of oregano
		ANTIVIRAL	Cat's claw, berberine, echinacea, vitamin C, vitamin D3, zinc, reishi mushrooms
		BIOFILM	Oil of oregano, protease
REPLACE	In cases of maldigestion or malabsorption, it may be necessary to restore proper digestion by supplementing with digestive enzymes.	DIGESTIVE SUPPORT	Betaine hydrochloride, tilactase, amylase, lipase, protease, apple cider vinegar, herbal bitters
REINOCULATE	Recolonisation with healthy, beneficial bacteria. Supplementation with probiotics, along with the use of prebiotics helps re-establish the proper microbial balance.	PREBIOTICS	Slippery elm, pectin, larch arabinogalactans
		PROBIOTICS	Bifidobacterium animalis sup lactose, lactobacillus acidophilus, lactobacillus plantarum, lactobacillus casei, bifidobacterium breve, bifidobacterium bifidum, bifidobacterium longum, lactobacillus salivarius sup salivarius, lactobacillus paracasei, lactobacillus rhamnosus, Saccaromyces boulardii
REPAIR & REBALANCE	Restore the integrity of the gut mucosa by giving support to healthy mucosal cells, as well as immune support. Address whole body health and lifestyle factors so as to prevent future GI dysfunction.	INTESTINAL MUCOSA IMMUNE SUPPORT	Saccaromyces boulardii, lauric acid
		INTESTINAL BARRIER REPAIR	L-Glutamine, aloe vera, liquorice, marshmallow root, okra, quercetin, slippery elm, zinc carnosine, Saccaromyces boulardii, omega 3 essential fatty acids, B vitamins
		SUPPORT CONSIDERATION	Sleep, diet, exercise, and stress management

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Macroscopy Comment

UNFORMED STOOL:

An UNFORMED stool specimen classified as Type 5 or 6 on the Bristol Stool Chart suggests rapid colonic transit, leading to inadequate water reabsorption and a looser stool consistency. This may result from mild digestive disturbances, dietary changes (such as high fibre or fat intake), stress, or gut microbiota imbalances (dysbiosis). Type 6, in particular, may indicate early-stage diarrhea, commonly linked to irritable bowel syndrome with Diarrhea (IBS-D), food intolerances (e.g., lactose, gluten, FODMAPs), gastrointestinal infections, or inflammatory responses. Clinical recommendations include identifying dietary triggers, ensuring adequate but not excessive fibre intake, and considering probiotic therapy (especially strains like Lactobacillus and Bifidobacterium) to help restore microbial balance. Persistent symptoms may warrant further evaluation for malabsorption syndromes (e.g., celiac disease, pancreatic insufficiency), small intestinal bacterial overgrowth (SIBO), or inflammatory markers to assess for underlying pathology.

MUCOUS HAS BEEN DETECTED IN THIS SPECIMEN:

The presence of mucous in the stool may be due to prolonged irritation of the intestinal mucosa. An increase of visible mucous may also be reflective of an inflammatory gastrointestinal condition such as: Crohns, Ulcerative colitis, irritable bowel syndrome (IBS) and infection.
Treatment:

- Investigate and treat possible underlying cause.
- Assess other Gut markers (e.g. calprotectin, M2PK, etc).

FAECAL OCCULT BLOOD POSITIVE:

Faecal occult blood has been detected in this specimen. The presence of blood in the stool may be the result of several causes besides colorectal bleeding, including hemorrhoids or gastrointestinal infection. Results should be considered with other clinical information available to the physician. Please note: A positive result indicates that the sample likely contains a human haemoglobin concentration >20ng/ml (Limit of detection). Review this result with other inflammation markers such as calprotectin.

GIT Markers Comment

PANCREATIC ELASTASE NORMAL (>200 ug/g):

A faecal pancreatic elastase level >200 ug/g indicates normal exocrine pancreatic function.

beta-GLUCORONIDASE NORMAL:

B-Glucuronidase is considered normal and is within reference range.

ACCREDITATION SCOPE: Please note that the above test is currently not under the laboratory's scope of accreditation.

CALPROTECTIN BORDERLINE (51-100 ug/g):

A borderline faecal calprotectin level (51–100 ug/g) may reflect mild inflammation or a non-specific increase and is not diagnostic of IBD.

Borderline elevations may be seen in a range of conditions including early or quiescent IBD, gastrointestinal infections, colorectal neoplasia, or as a pharmacological effect of medications such as NSAIDs, aspirin, and proton pump inhibitors (PPIs).

Repeat testing in 4–6 weeks is recommended if clinical suspicion of IBD remains or if symptoms persist. Correlation with history, medication use, and other diagnostic investigations (e.g., colonoscopy, imaging) is essential.

This result may warrant further monitoring.

FAECAL TRANSGLUTAMINASE IgA: Negative

Tissue Transglutaminase is the most specific test for Coeliac Disease. Levels less than 100 are considered NEGATIVE.

Treatment:

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No treatment required. However, If there is clinical suspicion of Coeliac disease consider testing serum Coeliac markers. Also assess IgG/IgA Food sensitivity tests to identify specific food intolerances.

ACCREDITATION SCOPE: Please note that the above test is currently not under the laboratory's scope of accreditation.

ELEVATED ZONULIN:

Zonulin is a regulatory protein that modulates the permeability of the intestinal barrier by controlling the opening and closing of tight junctions between intestinal epithelial cells. While physiologically important for nutrient and fluid absorption, excessive zonulin release can lead to increased intestinal permeability, often referred to as “leaky gut.” This condition may contribute to systemic inflammation, liver stress, nutrient malabsorption, and has been associated with autoimmune diseases such as rheumatoid arthritis.

Elevated zonulin levels may indicate disruption of gut barrier integrity and should be interpreted alongside other inflammatory markers, such as faecal calprotectin, to assess intestinal inflammation. Potential triggers for increased zonulin release include imbalances in gut microbiota and exposure to dietary factors like gluten or gliadin.

ACCREDITATION SCOPE: Please note that the above test is currently not under the laboratory's scope of accreditation.

ELEVATED STEATOCRIT:

The presence of steatorrhea is an indirect indicator of incomplete fat digestion. Consider high dietary fat intake, cholestasis, malabsorption and digestion (diarrhoea, pancreatic or bile salt insufficiency), intestinal dysbiosis, parasites, NSAIDs use, short bowel syndrome, whipple disease, crohn's disease, food allergies & sensitivities.

Treatment:

o Prebiotic and probiotic supplementation

o Supplement hydrochloride, digestive enzymes or other digestive aids

o Investigate underlying causes

o Investigate food sensitivities and allergies

o Remove potential irritants

o Review markers such as pancreatic elastase 1 and calprotectin

Parasites/Worms Comment

ELEVATED DIENTAMOEBA FRAGILIS LEVEL:

Dientamoeba fragilis appears to be extremely common and may have a cosmopolitan distribution, although there are large variations in prevalence. Dientamoeba fragilis has been linked to intestinal symptoms, especially in children. The most common symptoms associated with this organism are abdominal pain, intermittent diarrhoea, bloating and anorexia.

TREATMENT SUGGESTIONS: Mild symptoms are self-limiting. If treatment is warranted, metronidazole for 10 days or a single 2g dose of Tinidazole may be used. Tetracycline has also proven effective in adults. Rule out allergy to above medication before prescribing/taking. Consult ID specialist if patient is showing severe symptoms or immunocompromised.

ASCARIS SPECIES (Roundworm) DETECTED:

Ascaris species (including A. lumbricoides and A. suum) are the most common parasitic roundworm in humans. Hosts may be asymptomatic, causing only malnutrition and growth retardation or present with severe gastrointestinal (abdominal pain, nausea, vomiting, bloating or diarrhoea) or lung symptoms (fever, cough or wheezing). Adult worms can also migrate causing cholecystitis, cholangitis, pancreatitis, small bowel obstruction or appendicitis. Infection occurs via ingestion of eggs, usually found in stool-contaminated soil.

TREATMENT SUGGESTIONS:

Effective treatments include Albendazole or Mebendazole single oral dose. Rule out allergy to above medication before prescribing/taking. Can repeat dose after 4-6 weeks. Whole family to be treated simultaneously. Hand hygiene and washing bedding /clothes in hot water

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cycle is recommended to prevent recurrence. A repeat test should be suggested post therapy.

Opportunistic Bacteria Comment

PSEUDOMONAS AERUGINOSA ELEVATED: PHYLUM: Proteobacteria

DESCRIPTION: Pseudomonas aeruginosa is a gram-negative, aerobic, non-spore forming bacteria that can cause a variety of infections in both immunocompetent and immunocompromised hosts. It is commonly found in the environment, particularly in freshwater, hot tubs, and swimming pools. Chronic gastrointestinal colonization is acknowledged to be an important component of P. aeruginosa diarrheal disease and systemic infections. Since disruption of the normal flora by antibiotics can reduce colonization resistance and promote pathologic colonization with P. aeruginosa, enterocolitis due to P. aeruginosa may also be considered to be an antibiotic-associated gastroenteritis. Pseudomonas aeruginosa in the gastrointestinal tract can cause inflammation, epithelial barrier dysfunction, tight cell junction interruption, and intestinal permeability.

TREATMENT SUGGESTIONS: If treatment is warranted, Pseudomonas is usually susceptible to antipseudomonal penicillins, aminoglycosides, carbapenems, 3rd generation cephalosporins and gentamycin. Plant-derived anti-biofilm products identified against P. aeruginosa include alkaloids, organosulfur compounds, flavonoids, phenolic compounds and terpenoids. Rule out allergy to above medication before prescribing/taking.

STREPTOCOCCUS ORALIS ELEVATED: PHYLUM: Firmicutes

DESCRIPTION: Streptococcus oralis is a Gram-positive bacterium in the gut and oral microbiome, part of the Streptococcus mitis group. In the gut, S. oralis is part of the complex microbial community that supports digestive health. However, in immunocompromised individuals or those with disrupted microbiomes, S. oralis can become an opportunistic pathogen.

METHANOBREVIBACTER SMITHII ELEVATED: PHYLUM: Euryarchaeota

DESCRIPTION: Methanobrevibacter smithii is a methane-producing microbe that plays an important role in the gut ecosystem by facilitating carbohydrate fermentation and production of short-chain fatty acids by commensal bacteria. Elevated levels may be associated with abdominal bloating, constipation, flatulence, inflammatory bowel disease (IBD), irritable bowel syndrome (IBS), colorectal cancer, diverticulosis or obesity and often correlate with a positive SIBO test. Methanobrevibacter smithii has also been closely correlated with the presence of Blastocystis hominis.

TREATMENT SUGGESTIONS: Elimination of methanogenic flora using antibiotic treatment may contribute to therapeutic benefits and include neomycin or rifaximin. Antimicrobial herbs may also be beneficial in treatment (including garlic and oregano). Rule out allergy to above medication before prescribing/taking.

DESULFOVIBRIO PIGER ELEVATED: PHYLUM: Proteobacterium

DESCRIPTION: Desulfovibrio piger is part of a group called sulfate-reducing bacteria (SRB) and are normal inhabitants of the intestine. Sulfate is present in different concentrations in the intestine dependent on diet. Remnants not absorbed, alongside the presence of lactate, promote the growth of SRB. Desulfovibrio Piger has been implicated in gastrointestinal disorders such as ulcerative colitis via the reduction of sulfate to hydrogen sulfide in the gut. High Delsulfovibrio piger levels may be associated with diarrhea or inflammatory bowel disease.

TREATMENT SUGGESTIONS: Treatment options include lowering the intake of sulfate rich foods such as some breads, dried fruits, beers, ciders and wines. It is also suggested to avoid foods high in fat.

Bacterial Pathogens Comment

AEROMONAS SPECIES ELEVATED: PHYLUM: Proteobacterium

DESCRIPTION: Aeromonas is a gram-negative rod and there are at least four species, with A. hydrophilia being the most common. Aeromonas are ubiquitous in freshwater environments. The number present is dependent on the extent of sewage pollution and the temperature. Recent studies have directly attributed Aeromonas as the cause of food-borne infections. The following foods may harbor the organism: raw meat, freshwater fish, shellfish and other seafood. Raw milk can also be a source of infection. Aeromonas gastroenteritis may affect both children and adults with the highest seasonal incidence occurring in the summer months. Symptoms tend to be generally

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mild, self-limiting diseases with watery diarrhea. Bloody stools have been reported. Aeromonas infections tend to be more acute in children and more chronic in adults.

TREATMENT SUGGESTIONS: Mild enterocolitis can be self-limiting. Trimethoprim/Sulphamethoxazole (Bactrim DS/Septrin DS): 160+800 mg orally, 12-hourly for 5 days. (Child: 4+20 mg/kg) Or Ciprofloxacin (adults) 500mg orally, 12 hourly for 5 days A reactive arthritis may follow infection from this organism. Rule out allergy to above medication before prescribing/taking. Consult ID specialist if patient is showing severe symptoms or immunocompromised.

HELICOBACTER PYLORI ELEVATED: PHYLUM: Proteobacteria

DESCRIPTION: Helicobacter pylori is a gram-negative bacterium found on the luminal surface of the gastric epithelium. An elevated result indicates a current infection and is not affected by the presence of other organisms, antacids, barium sulphate, blood or fat. Please correlate infection clinically with signs and symptoms.

TREATMENT: Triple therapy: PPI, clarithromycin and amoxicillin or metronidazole, 7-14 days. If penicillin allergic: PPI, clarithromycin and clindamycin or metronidazole, 7-14 days. If the patient is asymptomatic consider other alternative therapies including:

o Black currant seed oil and fish oil

o Lactobacillus Probiotics

o Vitamin C

o Mastic gum.

H. Pylori Virulence Factor,babA DETECTED:

Blood Group Antigen Binding Adhesion (BabA) promotes DNA breakage in host cell, Improves H. pylori adherence ("stickiness") to epithelial cells and can promote other virulence factors, especially CagA.

Treatment: More aggressive treatment may be warranted; consider the use of adhesion inhibitions.

Mycology Comment

CANDIDA ALBICANS ELEVATED: PHYLUM: Ascomycota

DESCRIPTION: Candida albicans is a genus of yeasts found in the environment and present in healthy persons colonizing the oropharyngeal, oesophageal, and gastrointestinal mucosa. Considered an opportunistic pathogen, C. albicans can cause superficial but also more severe systemic infections. Candidiasis is an opportunistic infection due to Candida, which can affect the oral cavity, vagina, penis, or gastrointestinal tract. Elevated Candida gastrointestinal colonization is associated with several diseases including Crohn's and inflammatory bowel disease as well as with antibiotic usage. Other common symptoms include: Gas, bloating, constipation, nausea and skin conditions such as Eczema.

TREATMENT SUGGESTIONS: Dietary: Reduce intake of sugars, starches, and fungi. Candida infections may be treated if warranted with antifungal medications such as nystatin, clotrimazole, amphotericin B or miconazole. Probiotic Lactobacillus treatment may also be effective. Rule out allergy to above medication before prescribing/taking.

CANDIDA KRUSEI ELEVATED: PHYLUM: Ascomycota

Candida krusei is a species of yeast commonly found in the human gut as part of the normal microbiome. Although typically present in low levels, overgrowth of C. krusei can disrupt gut homeostasis and contribute to dysbiosis. It is considered an opportunistic pathogen, particularly in immunocompromised individuals, where it may lead to systemic infections such as candidemia. Unlike other Candida species, C. krusei exhibits natural resistance to certain antifungal agents, such as fluconazole, complicating treatment strategies when pathogenic overgrowth occurs. Monitoring levels of C. krusei is therefore important in the context of gut health and overall microbiome balance.

Normal Bacterial Flora Comment

BIFIDOBACTERIUM ADOLESCENTIS LOW: PHYLUM: Actinobacteria

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DESCRIPTION: Bifidobacterium adolescentis is an anaerobic species of bacteria found in the gastrointestinal tracts of humans. It is one of the most abundant and prevalent Bifidobacterium species commonly found in adults. It contributes to the production of GABA, a neurotransmitter that plays a role in reducing stress and anxiety. Some strains can synthesise B vitamins, such as folic acid. B. adolescentis enhances the growth of all bifidobacteria.

TREATMENT SUGGESTIONS: Consider a probiotic supplement containing B. adolescentis and consuming prebiotic-rich foods like garlic, onions, and whole grains. Increase dietary fibre from fruits, vegetables, and legumes, and incorporate fermented foods such as yogurt and kefir.

BIFIDOBACTERIUM BIFIDUM LOW: PHYLUM: Actinobacteria

DESCRIPTION: Bifidobacterium bifidum is a Gram-positive, anaerobic bacterium integral to the human gut microbiota, especially in infants. It ferments a variety of carbohydrates, including human milk oligosaccharides, aiding in digestion, and promoting a healthy gut flora. B. bifidum produces short-chain fatty acids that lower gut pH and inhibit pathogenic bacteria while supporting intestinal cells. It also modulates the immune system, enhancing immune responses and reducing inflammation, and strengthens the intestinal barrier. Clinically, B. bifidum has shown promise in alleviating gastrointestinal disorders.

BIFIDOBACTERIUM LONGUM LOW: PHYLUM: Actinobacteria

DESCRIPTION: Bifidobacterium longum is a Gram-positive, catalase-negative, rod-shaped bacterium present in the human gastrointestinal tract and one of the Bifidobacterium species. It can induce and regulate immune responses, reduce the expression of inflammatory cytokines, and maintain the normal intestinal barrier function. Bifidobacterium longum is a clinically effective, well-established, multifunctional probiotic that has a long history of human use in alleviating gastrointestinal, immunological, and infectious diseases such as constipation, antibiotic associated diarrhoea, irritable bowel syndrome and ulcerative colitis. Low levels may be associated with irritable bowel syndrome, asthma, autism, depressive disorder and with pathogenic bacteria infection.

TREATMENT SUGGESTIONS: Treatment may involve the use of Bifidobacterium longum containing probiotics and treatment of any intestinal infections.

ESCHERICHIA SPECIES ELEVATED: PHYLUM: Proteobacteria

DESCRIPTION: Escherichia is a genus of Gram-negative, non-spore-forming, facultatively anaerobic, rod-shaped bacteria and normal inhabitants of the gastrointestinal tract. Species include E. albertii, E. fergusonii, E. hermannii, E. marmotae and most notably E. coli. High levels may be indicative of increased intestinal inflammatory activity and be associated with irritable bowel syndrome, Crohn's, ulcerative colitis and diarrhea. Studies have also revealed that chronic psychological stress may be associated with an increase in E.Coli colonisation.

TREATMENT SUGGESTIONS: Commensal probiotic cocktails are suggested to prevent and reverse gut elevated colonization.

LACTOBACILLUS CASEI LOW: PHYLUM: Firmicutes

DESCRIPTION: Lactobacillus casei is a Gram-positive, rod-shaped, non-spore-forming, anaerobic probiotic bacterium involved in the fermentation of foods like cheese and yogurt. It produces antimicrobial substances, enhances gut barrier function, reduces pathogenic bacteria, and modulates the immune system. This bacterium is used to prevent and may assist various forms of diarrhea, including infectious diarrhea, traveller's diarrhea, and antibiotic-associated diarrhea.

TREATMENT SUGGESTIONS: Consider probiotic supplementation containing L. casei and consuming fermented foods such as cheese and yogurt.

LACTOBACILLUS DELBRUECKII LOW: PHYLUM: Firmicutes

DESCRIPTION:

Lactobacillus delbrueckii is a beneficial Gram-positive bacterium commonly found in the gut microbiome and known for its role in maintaining gastrointestinal health. It produces lactic acid through the fermentation of carbohydrates, contributing to a lower gut pH, which inhibits the growth of pathogenic microorganisms such as Clostridium and Candida species. Additionally, L. delbrueckii can enhance the intestinal barrier function and modulate the host immune response by promoting the production of anti-inflammatory cytokines. Its

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presence in the gut is associated with improved digestion and nutrient absorption, making it an important component in supporting overall gut health and microbial balance.

LACTOBACILLUS PLANTARUM LOW: PHYLUM: Firmicutes

DESCRIPTION: Lactobacillus plantarum is a Gram-positive, non-spore-forming, rod-shaped bacterium. L. plantarum plays a crucial role in gut health by enhancing intestinal barrier function, modulating the immune system, and inhibiting pathogenic bacteria. Additionally, it is beneficial for conditions such as irritable bowel syndrome, ulcerative colitis, and high cholesterol.

TREATMENT SUGGESTIONS: Consider probiotic supplementation containing L. plantarum.

LACTOBACILLUS SALIVARIUS LOW: PHYLUM: Firmicutes

DESCRIPTION: Lactobacillus salivarius is a Gram-positive, rod-shaped, non-spore-forming bacterium predominantly found in the human oral cavity, gastrointestinal tract, and vagina. It plays a significant role in maintaining oral and gut health by producing lactic acid and bacteriocins, which inhibit the growth of pathogenic bacteria. L. salivarius enhances gut barrier function, modulates the immune system, and helps in the digestion of proteins and complex carbohydrates. It has been studied for its potential benefits in managing conditions such as irritable bowel syndrome (IBS), periodontal disease, and atopic dermatitis, highlighting its importance in promoting overall health and preventing infections.

TREATMENT SUGGESTIONS: Consider L. salivarius as a probiotic strain which may improve intestinal permeability and immune response.

CLOSTRIDIUM SPECIES ELEVATED: PHYLUM: Firmicutes

DESCRIPTION: Clostridium is a genus of anaerobic, Gram-positive bacteria found in the environment and the intestinal tract. This genus includes several species and can utilize large amounts of nutrients that cannot be digested by host and produce short-chain fatty acids (SCFAs), which play a noticeable role in intestinal homeostasis. Colonisation of Clostridium species may be affected by diet (carbohydrate and protein in diet) and general health and may be protective against inflammation and infection. However, some species may act as potential pathogens. Elevated Clostridium species may indirectly damage the intestinal epithelial cells. Another symptom may include constipation.

TREATMENT SUGGESTIONS: Treatment may involve the use of probiotics, treatment of any intestinal infections and dietary modification (reduce consumption of different fibres, such as inulin, oligofructose, arabinoxylan, guar gum and starch).

AKKERMANSIA MUCINIPHILA ELEVATED: PHYLUM: Verrucomicrobia

DESCRIPTION: Akkermansia muciniphila is a Gram-negative, strictly anaerobic, non-motile bacterium, often considered a human intestinal symbiont. There is growing evidence to suggest that the prevalence of this bacteria is associated with intestinal homeostasis, immunity, and a healthy gut. However, elevated colonisation may be associated with intestinal inflammation.

TREATMENT SUGGESTIONS: Treatment may involve the use of probiotics, treatment of any intestinal infections and dietary modification.

Key Phyla Comment

EURYARCHAEOTA (PHYLUM) ELEVATED:

DESCRIPTION: Euryarchaeota are a phylum of a diverse range of bacteria, including methanogens, halophiles and sulfate-reducers. Three distinct species within the group of Euryarchaeota have been regularly detected within the human body. Among these is the primary colonizer of the human gut system Methanobrevibacter smithii and the less frequently found species Methanosphaera stadtmanae, while in the oral cavity M. oralis is the predominating methanogenic species. Methanogens support the growth of fermenting bacteria, which themselves could be either true pathogens or at least opportunistic pathogens but also members of the commensal flora. They may also transform heavy metals or metalloids into volatile methylated derivatives which are known to be more toxic than the original compounds. Elevated Euryarchaeota may be associated with inflammatory bowel disease, Crohn's, irritable bowel syndrome, colorectal cancer, diverticulosis, and obesity. It may also affect short chain fatty acid production and absorption.

TREATMENT SUGGESTIONS: If treatment is warranted, Statins may be used to inhibit methanogenic archaea growth without affecting bacterial numbers. Symptoms may also be treated with dietary modification (low FODMAP) and probiotics. A lactulose SIBO test may be considered to assess Methanogen levels.

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VERRUCOMICROBIA (PHYLUM) ELEVATED:

DESCRIPTION: Verrucomicrobia is a phylum of Gram-negative bacteria that contains only a few described species, found in the environment and gastrointestinal tract. Akkermansia spp. is involved in gut membrane integrity and may be increased with polyphenols and prebiotics. Verrucomicrobia aid in glucose homeostasis of the human gut and have anti-inflammatory properties that further aid in intestinal health.

TREATMENT SUGGESTIONS: Probiotic use and dietary modification use may assist in the rebalancing of microbial flora.

FIRMICUTES/BACTEROIDETES RATIO ELEVATED:

Elevated Firmicutes/Bacteroidetes ratio is frequently cited in the scientific literature as a hallmark of obesity, metabolic syndrome, irritable bowel syndrome or diabetes risk. The ratio may also be used to evaluate commensal microbial balance. The calculation provided in this report is made by the sum of abundance of Firmicutes tested divided by the sum of abundance Bacteroidetes. Reference ranges are based off internal cohort studies.

TREATMENT SUGGESTIONS: Balance commensal bacteria using the 4R Protocol which is located at the end of this test report. When firmicutes are high, consider using Bifidobacterium probiotics and Saccharomyces boulardii primarily. Lactobacillus spp. and Bacillus spp. (found in probiotics) can elevate firmicutes. It is further suggested to optimize the patient diet. A lower fat diet may assist to normalize the F/B ratio.

Methodology

Automated Chemistry/Immunochemistry, Chemiluminescence Immunoassay (CLIA), Enzyme-Linked Immunosorbent Assay (ELISA), Microscopy, Fluorescence Enzyme Immunoassay (FEIA), pH Electrode, Gas Chromatography-MS (GC/MS), Quantitative PCR (qPCR), Polymerase Chain Reaction (PCR)

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