

P: +1.206.365.1256
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 1620 Linden Av N
 Shoreline WA, 98133
 Dr.- US BIOTEK

LAB ID : 4003094
 Collection Date : 08-Jul-2023
 Received Date: 08-Jul-2023

Accession #: 0000000000

GI ADVANCED

General Macroscopic Description

	Result	Markers
Stool Colour	Brown	Colour - Brown is the colour of normal stool. Other colours may indicate abnormal gut health.
Stool Form	Unformed	Form - Sample form is categorised using the Bristol stool chart. A comment on stool appearance can be found in the comments section.
Mucous	DETECTED	Mucous - Mucous production may indicate the presence of an infection and/or inflammation.
Occult Blood	POSITIVE	Blood (Macro) - The presence of blood in the stool may be the result of several causes besides colorectal bleeding, including hemorrhoids or gastrointestinal infection.

Short Chain Fatty Acids

Methodology: GC/MS

	Result	Range	Units	
Short Chain Fatty Acids, Beneficial	20.0	> 13.6	umol/g	
Butyrate	10.0 *L	10.8 - 33.5	%	
Acetate	65.0	44.5 - 72.4	%	
Propionate	20.0	0.0 - 32.0	%	
Valerate	5.0	0.5 - 7.0	%	

GIT Functional Markers

Methodology: FEIA, EIA, CLIA, pH electrode

	Result	Range	Units	
Calprotectin.	70.0 *H	0.0 - 50.0	ug/g	
Pancreatic Elastase	450.0	> 200.0	ug/g	
Secretory (slgA)	517.0	510.0 - 2040.0	ng/mL	
Zonulin	109.0 *H	0.0 - 107.0	ng/mL	
Beta glucuronidase	5411.0	368.0 - 6266.0	U/g	
Steatocrit	9.0	0.0 - 10.0	%	
a-Transglutaminase IgA	36.0	0.0 - 100.0	units/L	
pH	6.2 *L	6.3 - 7.7		

Microbiome Mapping Summary

Parasites & Worms

Blastocystis hominis.
 Dientamoeba fragilis.

Bacteria & Viruses

Bacillus species.
 Streptococcus agalactiae.
 Streptococcus anginosus.
 Methanobrevibacter smithii
 Citrobacter freundii.
 Candida parapsilosis.
 Candida albicans.
 Helicobacter pylori

Fungi and Yeasts

Key Phyla Microbiota

Firmicutes:Bacteroidetes Ratio

1.84 *H < 1.00

RATIO



Relative Commensal Abundance of the 6 Phyla groups can be found on page 5 of this report



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Parasites and Worms.

Parasitic Organisms

Result	Range	Units	
Cryptosporidium species	<dl < 1.0	x10 ⁵ org/g	
Entamoeba histolytica.	<dl < 1.0	x10 ⁵ org/g	
Giardia intestinalis	<dl < 1.0	x10 ⁵ org/g	
Blastocystis hominis.	66.0 *H < 1.0	x10 ⁵ org/g	
Dientamoeba fragilis.	12.0 *H < 1.0	x10 ⁵ org/g	
Endolimax nana	<dl < 1.0	x10 ⁵ org/g	
Entamoeba coli.	<dl < 5.0	x10 ⁵ org/g	
Pentatrichomonas hominis	<dl < 1.0	x10 ⁵ org/g	

Worms

Ancylostoma duodenale, Roundworm	Not Detected		
Ascaris lumbricoides, Roundworm	Not Detected	Necator americanus, Hookworm	Not Detected
Trichuris trichiura, Whipworm	Not Detected	Enterobius vermicularis, Pinworm	Not Detected
Enterocytozoon spp	Not Detected	Hymenolepis spp, Tapeworm	Not Detected
Strongyloides spp, Roundworm	Not Detected	Taenia species, Tapeworm	Not Detected

Comment: Not Detected results indicate the absence of detectable DNA in the sample for the worms reported.
 NOTE: Reflex testing is performed on clinically indicated samples

Opportunistic Bacteria/Overgrowth

Result	Range	Units	
Bacillus species.	1.70 *H < 1.00	x10 ⁴ CFU/g	
Enterococcus faecalis	0.30 < 1.00	x10 ⁵ CFU/g	
Enterococcus faecium	0.50 < 1.00	x10 ⁵ CFU/g	
Morganella species	<dl < 1.00	x10 ⁵ CFU/g	
Pseudomonas species	0.50 < 1.00	x10 ⁴ CFU/g	
Pseudomonas aeruginosa.	<dl < 3.00	x10 ⁴ CFU/g	
Staphylococcus species	<dl < 1.00	x10 ³ CFU/g	
Staphylococcus aureus	2.00 < 5.00	x10 ³ CFU/g	
Streptococcus agalactiae.	4.20 *H < 3.00	x10 ⁶ CFU/g	
Streptococcus anginosus.	6.70 *H < 3.00	x10 ⁶ CFU/g	
Streptococcus mutans.	<dl < 3.00	x10 ⁶ CFU/g	
Streptococcus oralis.	<dl < 3.00	x10 ⁶ CFU/g	
Streptococcus salivarius.	<dl < 3.00	x10 ⁶ CFU/g	
Methanobrevibacter smithii	6.60 *H < 3.50	x10 ⁵ CFU/g	
Desulfovibrio piger	<dl < 18.00	x10 ⁷ CFU/g	

Potential Autoimmune Triggers

Citrobacter species.	<dl < 5.00	x10 ⁴ CFU/g	
Citrobacter freundii.	55.00 *H < 5.00	x10 ⁴ CFU/g	
Klebsiella species	<dl < 5.00	x10 ³ CFU/g	
Klebsiella pneumoniae.	<dl < 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 < 1.00	x10 ⁴ CFU/g	
Fusobacterium species	1.70 < 10.00	x10 ⁴ CFU/g	

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Mycology	Result	Range	Units	
<i>Candida dubliniensis</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Candida glabrata</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Candida intermedia</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Candida krusei</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Candida lambica</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Candida lusitanae</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Candida parapsilosis</i> .	8.00 *H	< 1.00	x10 ⁵ CFU/g	●
<i>Candida albicans</i> .	15.00 *H	< 1.00	x10 ⁵ CFU/g	●
<i>Candida famata</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Candida kefyr</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Candida lipolytica</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Geotrichum species</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Rhodotorula species</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Saccharomyces cerevisiae</i> :	<dl	< 1.00	x10 ⁵ CFU/g	●

Bacterial Pathogens	Result	Range	Units	
<i>Aeromonas hydrophila</i> .	<dl	< 1.00	x10 ³ CFU/g	●
<i>Campylobacter species</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>C. difficile</i> , Toxin A	<dl	< 1.00	x10 ⁴ CFU/g	●
<i>C. difficile</i> , Toxin B	<dl	< 1.00	x10 ⁴ CFU/g	●
Enterohemorrhagic <i>E. coli</i>	<dl	< 1.00	x10 ⁵ CFU/g	●
Enteroinvasive <i>E. coli</i> /Shigella	<dl	< 1.00	x10 ³ CFU/g	●
Enterotoxigenic <i>E. coli</i> LT/ST	<dl	< 1.00	x10 ⁵ CFU/g	●
Shiga-like Toxin <i>E. coli</i> stx1	<dl	< 1.00	x10 ⁴ CFU/g	●
Shiga-like Toxin <i>E. coli</i> stx2	<dl	< 1.00	x10 ⁴ CFU/g	●
<i>Salmonella species</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Vibrio species</i> .	<dl	< 1.00	x10 ⁴ CFU/g	●
<i>Yersinia species</i> .	<dl	< 1.00	x10 ⁵ CFU/g	●
<i>Helicobacter pylori</i>	55.0 *H	< 1.0	x10 ³ CFU/g	●

Comment: Helico Pylori virulence factors will be listed below if detected POSITIVE

<i>H.pylori</i> Virulence Factor, babA	Not Detected	<i>H.pylori</i> Virulence Factor, cagA	Not Detected
<i>H.pylori</i> Virulence Factor, dupA	Not Detected	<i>H.pylori</i> Virulence Factor, iceA	Not Detected
<i>H.pylori</i> Virulence Factor, oipA	Not Detected	<i>H.pylori</i> Virulence Factor, vacA	Not Detected
<i>H.pylori</i> Virulence Factor, virB	Not Detected	<i>H.pylori</i> Virulence Factor, virD	Not Detected

Viral Pathogens	Result	Range	Units
Adenovirus 40/41	Not Detected		
Norovirus GI/II	Not Detected		
Rotavirus A	Not Detected		
Sapovirus (I,II,IV,V)	Not Detected		
Astrovirus (hAstro)	Not Detected		

GIT Functional markers performed by GCMS,EIA,FEIA.

Bacteriology,Virology,Fungi,Parasites & Worms performed by PCR,qPCR.

<dl = result below detectable limit. *H = Result greater than the reference range. *L = Result less than the reference range

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Normal Bacterial GUT Flora	Result	Range	Units	
Bacteroides fragilis	1.7	1.6 - 250.0	x10 ⁵ CFU/g	
Bifidobacterium adolescentis	<dl*L	4.6 - 1000.0	x10 ⁵ CFU/g	
Bifidobacterium bifidum.	27.0	4.6 - 1000.0	x10 ⁶ CFU/g	
Bifidobacterium breve.	<dl*L	4.6 - 1000.0	x10 ⁵ CFU/g	
Bifidobacterium longum	122.0	4.6 - 1000.0	x10 ⁵ CFU/g	
Enterococcus species	2.0	1.9 - 2000.0	x10 ³ CFU/g	
Escherichia species	1098.0	3.7 - 3800.0	x10 ⁴ CFU/g	
Lactobacillus acidophilus.	11.0	1.7 - 500.0	x10 ³ CFU/g	
Lactobacillus casei.	<dl*L	1.7 - 500.0	x10 ³ CFU/g	
Lactobacillus delbrueckii	<dl*L	1.7 - 500.0	x10 ³ CFU/g	
Lactobacillus plantarum.	<dl*L	1.7 - 500.0	x10 ³ CFU/g	
Lactobacillus rhamnosus	344.0	1.7 - 500.0	x10 ³ CFU/g	
Lactobacillus salivarius	<dl*L	1.7 - 500.0	x10 ³ CFU/g	
Clostridium species	66.0*H	5.0 - 50.0	x10 ⁷ CFU/g	
Oxalobacter formigenes	<dl*L	> 5.00	x10 ⁶ CFU/g	
Akkermansia muciniphila	71.00*H	1.00 - 50.00	x10 ⁷ CFU/g	
Faecalibacterium prausnitzii	187.0*L	200.0 - 3500.0	x10 ⁶ CFU/g	

Actions

	L. plantarum HEAL19	L. paracasei 8700-2	L. plantarum HEAL19	L. plantarum 6595	L. plantarum 299V	L. rhamnosus GG	L. acidophilus LA02	B. animalis subsp. lactis BS01	L. casei LC03	B. breve BR03	L. fermentum LF08	L. crispatus strains	B. animalis subsp. lactis BA05	L. plantarum LP01	L. rhamnosus LR06	B. longum 04	L. fermentum LF16	L. salivarius LS01	B. breve B632	L. fermentum LF10	L. salivarius LS03	L. helveticus Rosell-52	L. rhamnosus Rosell-11	B. longum Rosell-75	S. boulardii CNCM I-1079	S. thermophilus FP4
Intestinal epithelial barrier health																										
Mucous membrane health																										
Normalisation of bowel movements																										
Normalisation of bloating																										
Normalisation of peristalsis																										
Autoimmune immunomodulation																										
Inhibition of pathogenic overgrowth																										
Inactivate microbial toxins																										
Increase infection resistance																										
Th1/Th2 immune cell modulation																										
Staphylococci inhibition																										
Gut-brain axis support																										
GABA production																										
Bone resorption inhibition																										
E. coli inhibition																										
Oxalate degradation																										

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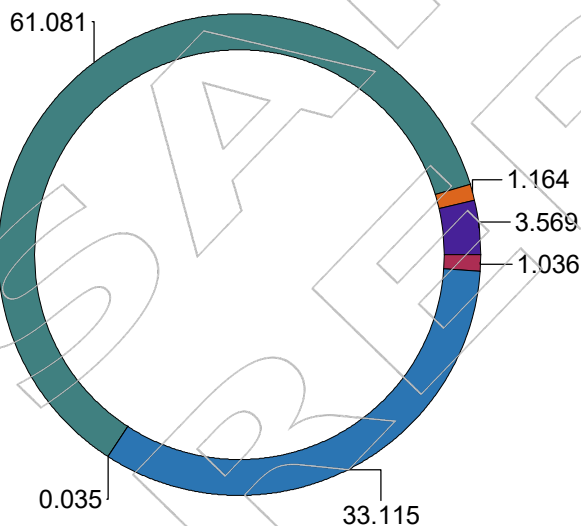
Accession #: 0000000000

Introduction:

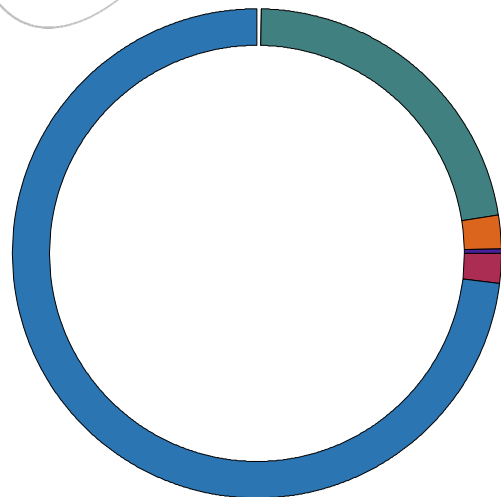
Your gut microbiome is a collective name for the 40 trillion cells and up to 1000 microbial species that include bacteria, viruses, fungi, parasites, and archaea and reside in our gut. The number of gut bacterial cells is approximately equal to the total number of human cells in our body, so if we consider only cell counts, we are only about half human. In terms of gene counts, the microbiome contains about 200 times more genes than the human genome, making bacterial genes responsible for over 99% of our body's gene content! Of all the microbial communities in the human body, the gut microbiome is by far the most dense, diverse, and physiologically important ecosystem to our overall health.

Relative Commensal Abundance	Result	Range	Units
 Firmicutes Phylum	61.081*H	3.500 - 40.000	%
 Bacteroidetes Phylum	33.115*L	50.000 - 95.000	%
 Verrucomicrobia Phylum	3.569*H	0.000 - 2.400	%
 Proteobacteria Phylum	1.164	0.500 - 12.500	%
 Actinobacteria Phylum	1.036	0.001 - 4.818	%
 Euryarchaeota Phylum	0.035*H	0.000 - 0.017	%

Your Phyla:



Healthy Phyla:



References:

NOTE: Relative abundance reference ranges have been based on a healthy population study.

King CH, et., al. (2019) Baseline human gut microbiota profile in healthy people and standard reporting template. PLoS One. 2019 Sep 11;14(9):e0206484.

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Microbiome (Culture) MALDI-TOF

Matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF) mass spectrometry (MS) has become a widely used technique for the rapid and accurate identification of pathogenic bacteria, opportunistic bacteria and fungi/yeast in clinical microbiology laboratory testing. The specimen received has been tested under various culture conditions and results are reported below.

Pathogenic Bacteriology

Organism	Growth	Range	Classification
----------	--------	-------	----------------

Pathogen: Organisms that fall under this category have a well-recognised mechanism of pathogenicity in clinical literature and are considered significant regardless of the quantity that appears in culture.

Opportunistic Bacteriology

Organism	Growth	Range	Classification
Streptococcus agalactiae.	4+ *H	< 4+	Possible Pathogen
Streptococcus anginosus.	4+ *H	< 4+	Possible Pathogen
Bacillus species.	4+ *H	< 4+	Possible Pathogen
Citrobacter freundii.	4+ *H	< 4+	Possible Pathogen

Non-Pathogen: Organisms that fall under this category are those that constitute normal, commensal flora, or have not been recognized as etiological agents of disease. Results in this category should be interpreted in context of clinical symptoms.

Possible Pathogen: Organisms that fall under this category are considered potential or opportunistic pathogens when present in heavy growth.

Mycology (Fungi & Yeast)

Organism	Growth	Range	Classification
Candida albicans	4+ *H	< 2+	Possible Pathogen
Candida parapsilosis.	3+ *H	< 2+	Possible Pathogen

Non-Pathogen: Organisms that fall under this category are those that constitute normal, commensal flora, or have not been recognized as etiological agents of disease. Results in this category should be interpreted in context of clinical symptoms.

Possible Pathogen: Organisms that fall under this category are considered potential or opportunistic pathogens when present in heavy growth.

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ANTIBIOTIC SENSITIVITIES and NATURAL INHIBITORS

Antibiotics

**Citrobacter
freundii**

Susceptible

Amoxicillin	N/A
Ampicillin	R
Augmentin	S
Ciprofloxacin	S
Norfloxacin	S
Meropenem	S
Cefazolin	N/A
Gentamycin.	S
Trimethoprim/Sulpha	S
Erythromycin	S
Penicillin.	N/A

LEGEND

S = Sensitive	R = Resistant	N/A = Not Tested
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Inhibitors

Inhibition %

Berberine	60%
Black Walnut	40%
Caprylic Acid	100%
Citrus Seed	60%
Coptis	40%
Garlic-	60%
Golden seal	20%
Oregano	20%

LEGEND

Low Inhibition

High Inhibition

0	20	40	60	80	100
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YEAST - SENSITIVITIES and NATURAL ANTIFUNGALS

**Candida
albicans**

Antifungals

Inhibition

Fluconazole

1.0=S

Voriconazole

<=0.12=S

Itraconazole

INHIBITION CATEGORY

R	Resistant	This category indicates that the organism is not inhibited by obtainable levels of the pharmaceutical agent
I	Intermediate	This category indicates where the minimum inhibition concentrations (MIC) approach obtainable pharmaceutical agent levels and for which response rates may be lower than for susceptible isolates
SDD	Susceptible, Dose Dependent	This category indicates that clinical efficacy is achieved when higher than normal dosage of a drug is used to achieve maximal concentrations
S	Susceptible	This category indicates that the organisms are inhibited by the usual achievable concentration of the agent
NI	No Interpretative Guidelines	This category indicates that there are no established guidelines for MIC interpretation for these organisms

Non-absorbed Antifungals

Inhibition %

Nystatin

60%

Natural Antifungals

Inhibition %

Berberine.

60%

Garlic

40%

Black Walnut.

40%

Citrus Seed.

40%

Coptis.

20%

Golden seal.

20%

Oregano.

20%

LEGEND

Low Inhibition

High Inhibition



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Pathogen Summary:

Macroscopy Comment

BROWN coloured stool is considered normal in appearance.

UNFORMED/LIQUID stools may indicate the presence of infection and/or inflammation.

Consider dysbiosis, food sensitivity, high dose vitamin C and magnesium, infection, intestinal permeability, laxative use, malabsorption, maldigestion, stress. Other causes: bacterial, fungal, viral and other parasitic infections.

Treatment:

- Investigate and treat possible underlying cause.
- Assess other gut markers (e.g pH, pancreatic elastase 1, etc).

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.

Metabolism Comment

In a healthy gut Short Chain Fatty Acids (SCFAs) exhibited in the following proportions; Butyrate, Acetate, Propionate (16%:60%:24%).

The primary SCFAs butyrate, propionate and acetate are produced by predominant commensal bacteria via fermentation of soluble dietary fibre and intestinal mucus glycans.

Key producers of SCFAs include Faecalibacterium prausnitzii, Akkermansia muciniphila, Bacteroides fragilis, Bifidobacterium, Clostridium and Lactobacillus Spp.

The SCFAs provide energy for intestinal cells and regulate the actions of specialised mucosal cells that produce anti-inflammatory and antimicrobial factors, mucins that constitute the mucus barriers, and gut active peptides that facilitate appetite regulation and euglycemia. Abnormal SCFAs may be associated with dysbiosis, intestinal barrier dysfunction and inflammatory conditions.

LOW BUTYRATE LEVEL:

Butyrate is a short chain fatty acid that is extremely important for gut health. It is the main fuel source for gut cells, which helps keep the gut cell barrier intact, can reduce inflammation, and helps control appetite. Low levels of butyrate production have been observed in individuals with inflammatory bowel diseases, insufficient fibre intake, slow transit time, recent antibiotic therapy. Low butyrate may also be associated with an increased risk of colon cancer & constipation.

Consuming foods high in resistant starch has been shown to increase butyrate levels.

LOW pH PRESENT: High Acidity stool.

Consider bacterial overgrowth, lipid or carbohydrate malabsorption, rapid transit time, pancreatic insufficiency.

Treatment:

- Supplement digestive enzymes or other digestive aids
- Assess other CDSA markers such as fat globules, food remnants, transglutaminase IgA & microbiology markers.
- Investigate causes of malabsorption or diarrhoea.

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GIT Markers Comment

PANCREATIC ELASTASE: Normal exocrine pancreatic function.

Pancreatic Elastase reflects trypsin, chymotrypsin, amylase and lipase activity.

This test is not affected by supplements of pancreatic enzymes.

Healthy individuals should be producing >500 ug/g of PE-1 under normal/healthy conditions.

PE-1 levels between 200 - 500 ug/g may indicate suboptimal production.

PE-1 levels <200 ug/g indicate clear inadequate production.

The clinician should therefore consider digestive enzyme supplementation if one or more of the following conditions is present:

Loose watery stools, Undigested food in the stools, Post-prandial abdominal pain, Nausea or colicky abdominal pain, Gastroesophageal reflux symptoms, Bloating or food intolerance.

Testing performed by chemiluminescence immunoassay (CLIA).

ELEVATED CALPROTECTIN:

Elevated faecal calprotectin indicates a high probability of intestinal inflammation.

For patients with known inflammatory bowel disease in remission, faecal calprotectin above 50 ug/g is associated with an increased risk of relapse over the next 12 months. In patients with faecal calprotectin below 50ug/g with strong clinical indications of intestinal inflammation, repeat testing may be useful. In small bowel Crohn's disease, the faecal calprotectin may not be elevated. Elevated faecal calprotectin may occur with other conditions including colorectal cancer, NSAID ulceration, coeliac disease, diverticulitis and chronic inflammation.

Further investigative procedures are necessary to determine the cause of inflammation.

Test performed by Phadia ELIA Fluorescence enzyme immunoassay (FEIA).

SECRETORY IGA NORMAL:

Secretory IgA is within range.

Secretory IgA represents the first line of defence of the gastrointestinal mucosa and is central to the normal function of the gastrointestinal tract as an immune barrier. Review this level with other pathogenic bacteria and normal commensal flora. Lower levels within reference range should be interpreted clinically.

ELEVATED ZONULIN LEVELS:

Zonulin is a protein that modulates intestinal barrier function and can also be considered as a potential inflammatory marker. Review other markers in conjunction to this result such as faecal calprotectin.

Zonulin release facilitates the opening of tight junctions between the cells of the intestinal lining to allow for passage of nutrients and fluids into the body. However, Zonulin release can be "overstimulated" by certain external factors to cause excessive opening of tight junctions, leading to intestinal hyperpermeability or "leaky gut", inflammation, liver overload, nutrient deficiencies, rheumatoid arthritis and autoimmune disorders.

Identify the possible cause/s (Gut microorganism imbalance or the presence of dietary Gluten/gliadin) and remove to reduce further damage.

BETA-GLUCURONIDASE NORMAL:

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

Parasites/Worms Comment

ELEVATED BLASTOCYSTIS HOMINIS LEVEL:

Blastocystis hominis may be the cause of persistent, mild diarrhoea. Although considered endemic, it may also be associated with recent overseas travel. Detection suggests the ingestion of contaminated material or contact with farm animals. Continued symptoms may require further testing for the detection of bacterial, viral and/or parasitic co-pathogens.

TREATMENT SUGGESTIONS:

Mild symptoms are self-limiting.

If treatment is warranted, metronidazole 400 - 750mg (child 12-17mg/kg up to 750mg) three times daily for at least 10 days.

Lower dosages are usually associated with treatment failure.

Paromomycin has also shown to be effective as an alternative treatment option.

Rule out allergy to above medication before prescribing/taking. Consult ID specialist if patient is showing severe symptoms or immunocompromised.

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.

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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.

Opportunistic Bacteria Comment

BACILLUS SPECIES ELEVATED:

PHYLUM: Firmicutes

DESCRIPTION:

Bacillus species are spore forming, gram-positive rods belonging to the Bacillaceae family. The majority of Bacillus species have little or no pathogenicity. However, some species, particularly *Bacillus cereus* and *licheniformis*, have been implicated in food poisoning and opportunistic infections, which may be characterised by abdominal pain with diarrhea or nausea and vomiting and transmitted via ingestion of contaminated food.

TREATMENT SUGGESTIONS:

Infection is usually self-limited and does not require any targeted therapy. In severe cases or immunocompromised, treatment with vancomycin, gentamicin, chloramphenicol, or carbapenems should be considered. Rule out allergy to above medication before prescribing/taking.

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.

Potential Autoimmune Comments

CITROBACTER FREUNDII ELEVATED:

PHYLUM: Proteobacteria

DESCRIPTION:

Citrobacter freundii is a species of facultative anaerobic Gram-negative predominantly soil-dwelling bacteria, but can also be found in water, sewage, food, and the intestinal tract. Citrobacter freundii is an emerging opportunistic pathogen and elevation may be a cause of nosocomial infections, diarrheal infections and has increasingly become multidrug resistant (MDR).

TREATMENT SUGGESTIONS:

A practitioner may take into consideration a range of patient factors and symptoms to determine if treatment is necessary. Citrobacter freundii infection is usually treated with antibiotics like fluoroquinolones, carbapenems and cephalosporins. The treatment plan depends up on the vulnerability of the microbe to the antibiotics and the degree of infection. Treatments may also include herbal antimicrobials and/or probiotics. Rule out allergy to above medication before prescribing/taking.

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Fungi/Yeasts Comment

CANDIDA ELEVATED:

PHYLUM: Ascomycota

DESCRIPTION:

Candida 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.

Bacterial Pathogens Comment

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.

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Phyla Microbiota Comment

FIRMICUTES (PHYLUM) ELEVATED:

DESCRIPTION:

Firmicutes are a phylum of diverse bacteria which are primarily grouped into classes, Bacilli, Clostridia, Erysipelotrichia and Negativicutes. They are found in various environments, including the intestinal tract, and the group includes some notable pathogens. Firmicutes are involved in energy resorption in the gut microbiome and levels may be affected by diet. Elevated levels and disturbance of gastrointestinal microbiome balance, particularly Firmicutes/Bacteroidetes ratio, have been associated with inflammation, obesity, diabetes and with a high sugar/ fat diet.

TREATMENT SUGGESTIONS: Consider using Bifidobacterium or Saccharomyces containing probiotics. It may also be suggested to optimise the patient diet. A lower fat diet may help to normalize Firmicutes levels.

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:

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.

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.

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 Methanospaera 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.

Normal Bacterial Flora Comment

CLOSTRIDIUM SPECIES ELEVATED:

PHYLUM: Firmicutes

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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).

OXOLOBACTER FORMIGENES LOW:

PHYLUM: Proteobacterium

DESCRIPTION:

Oxalobacter formigenes is a Gram negative oxalate-degrading anaerobic bacterium. Oxalate is formed in the liver by amino acid catabolism as well as present in a wide range of foods including tea, coffee, chocolate and certain fruits and vegetables. High concentration of oxalate in the urine is related to the potential formation of calcium oxalate kidney stones. Oxalobacter Formigenes is the main known bacterial species involved in oxalate degradation in the gut and maintains oxalate homeostasis. Levels of O. Formigenes tends to decrease with age as well as with the use of antibiotics or other drugs. Low levels may be associated with calcium oxide stone formation, inflammatory bowel disease or Crohn's.

TREATMENT SUGGESTIONS:

Treatment options include probiotic treatment and low oxalate diet modification. Urinary oxalate levels may also need to be investigated.

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.

FAECALIBACTERIUM PRAUSNITZII LOW:

PHYLUM: Firmicutes

DESCRIPTION:

Faecalibacterium prausnitzii is gram-positive, rod-shaped, anaerobic and is one of the most abundant and important commensal bacteria of the human gut microbiota. It is a key producer of Short Chain Fatty acids, has anti-inflammatory properties and may improve the imbalance in intestinal bacteria that leads to dysbiosis. Decreased colonisation of F. prausnitzii in the intestines have been associated with Crohn's disease, obesity, asthma, and major depressive disorders.

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

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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 lactise, lactobacillus acidophilus, lactobacillus plantarum, lactobacillus casei, bifidobacterium breve, bifidobacterium bifidum, bifidobacterium longum, lactobacillus salivarius ssp 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