

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

Lab ID  
Patient ID PAT-100009  
Ext ID 25281-0053

### Test Patient

Sex: Female • 45yrs • 01-Jan-80

RECEIVED  
08-Oct-25

## GI-Advanced

Specimen type - Stool

Collected

05-Oct-25

MACROSCOPIC EXAMINATION		OCCULT BLOOD	
TEST	RESULT	TEST	INTERPRETATION
Stool Colour	Brown	Occult Blood	Negative
Stool Form	Semiformed		
Mucous	PRESENT		

GIT FUNCTIONAL MARKERS				
TEST	RESULT	H/L	REFERENCE	UNITS
Calprotectin	86.0	H	(<50.0)	ug/g
b-Glucuronidase	5830		(368-6266)	U/g
Pancreatic Elastase 1	330		(>200)	ug/g
pH	6.5		(6.3-7.7)	
Secretory IgA	602		(510-2040)	ng/mL
Steatocrit	17.0	H	(0.0-10.0)	%
Transglutaminase IgA	18.0		(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	28.00		(10.80-33.50)	%
Propionate	11.00		(0.00-32.00)	%
Valerate	5.00		(0.50-7.00)	%

Parasites & Worms
Ascaris species, Roundworm Dientamoeba fragilis

Bacteria & Viruses
Methanobrevibacter smithii Desulfovibrio piger Enterococcus faecium Fusobacterium species Helicobacter pylori Adenovirus 40/41 Aeromonas species

Mycology
Candida albicans Candida parapsilosis

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



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#### PARASITES

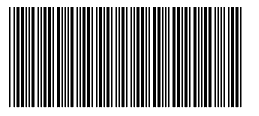
TEST	RESULT	H/L	REFERENCE	UNITS
Blastocystis hominis	<DL		(<1.00)	x10 <sup>5</sup> org/g
Cryptosporidium species	<DL		(<1.00)	x10 <sup>5</sup> org/g
Dientamoeba fragilis	1.67	H	(<1.00)	x10 <sup>5</sup> org/g
Entamoeba histolytica	<DL		(<1.00)	x10 <sup>5</sup> org/g
Giardia intestinalis	<DL		(<1.00)	x10 <sup>5</sup> org/g
Cyclospora cayetanensis	<DL		(<1.00)	x10 <sup>5</sup> org/g
Enterocytozoon species	<DL		(<1.00)	x10 <sup>5</sup> 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 <sup>3</sup> CFU/g
Campylobacter species	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
C. difficile, Toxin A	<DL		(<1.00)	x10 <sup>4</sup> CFU/g
C. difficile, Toxin B	<DL		(<1.00)	x10 <sup>4</sup> CFU/g
Clostridium difficile, Hypervirulent	<DL		(<1.00)	x10 <sup>3</sup> CFU/g
Enterogastric E. coli	<DL		(<1.00)	x10 <sup>3</sup> CFU/g
Enteropathogenic E. coli	<DL		(<1.00)	x10 <sup>3</sup> CFU/g
E. coli O157	<DL		(<1.00)	x10 <sup>2</sup> CFU/g
Enteroinvasive E. coli/Shigella	<DL		(<1.00)	x10 <sup>3</sup> CFU/g
Enterotoxigenic E. coli LT/ST	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
Salmonella species	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
Shiga toxinogenic E. coli (stx1/2)	<DL		(<1.00)	x10 <sup>3</sup> CFU/g
Vibrio species	<DL		(<1.00)	x10 <sup>4</sup> CFU/g
Yersinia species	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
Helicobacter pylori	2.10	H	(<1.00)	x10 <sup>3</sup> CFU/g

#### HELICOBACTER PYLORI PROFILE

TEST	RESULT
H. pylori Antigen	<b>POSITIVE</b>

#### H. pylori Virulence Factors

TEST	RESULT
Virulence Factor, babA	<b>DETECTED</b>
Virulence Factor, oipA	<b>Not Detected</b>
Virulence Factor, virB	<b>Not Detected</b>
Virulence Factor, cagA	<b>Not Detected</b>
Virulence Factor, vacA	<b>Not Detected</b>
Virulence Factor, virD	<b>Not Detected</b>

#### H. pylori Resistance Genes

TEST	RESULT
Resistance gene A2142C	<b>DETECTED</b>
Resistance gene A2142G	<b>Not Detected</b>
Resistance gene A2143G	<b>Not Detected</b>

● 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 <sup>4</sup> CFU/g
Bacteroides fragilis	<DL		(<250.00)	x10 <sup>5</sup> CFU/g
Bacteroides thetaiotaomicron	<DL		(<300.00)	x10 <sup>5</sup> CFU/g
Phocaeicola vulgatus	<DL		(<300.00)	x10 <sup>5</sup> CFU/g
Enterobacter cloacae complex	<DL		(<5.00)	x10 <sup>5</sup> CFU/g
Enterococcus faecalis	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
Enterococcus faecium	1.03	H	(<1.00)	x10 <sup>5</sup> CFU/g
Morganella species	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
Pseudomonas species	<DL		(<1.00)	x10 <sup>4</sup> CFU/g
Pseudomonas aeruginosa	1.74		(<3.00)	x10 <sup>4</sup> CFU/g
Staphylococcus species	<DL		(<1.00)	x10 <sup>3</sup> CFU/g
Staphylococcus aureus	<DL		(<5.00)	x10 <sup>3</sup> CFU/g
Streptococcus agalactiae	1.10		(<3.00)	x10 <sup>4</sup> CFU/g
Streptococcus anginosus	<DL		(<1.00)	x10 <sup>6</sup> CFU/g
Streptococcus mutans	<DL		(<1.00)	x10 <sup>4</sup> CFU/g
Streptococcus oralis	<DL		(<1.00)	x10 <sup>6</sup> CFU/g
Streptococcus salivarius	<DL		(<5.00)	x10 <sup>6</sup> CFU/g

#### HYDROGEN UTILISING MICROBES

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

#### POTENTIAL AUTOIMMUNE TRIGGERS

TEST	RESULT	H/L	REFERENCE	UNITS
Citrobacter species	<DL		(<5.00)	x10 <sup>4</sup> CFU/g
Citrobacter freundii complex	1.41		(<5.00)	x10 <sup>4</sup> CFU/g
Klebsiella species	<DL		(<5.00)	x10 <sup>3</sup> CFU/g
Klebsiella pneumoniae complex	1.62		(<5.00)	x10 <sup>5</sup> CFU/g
Prevotella copri	<DL		(<1.00)	x10 <sup>9</sup> CFU/g
Proteus species	<DL		(<5.00)	x10 <sup>5</sup> CFU/g
Proteus mirabilis	<DL		(<5.00)	x10 <sup>4</sup> CFU/g
Fusobacterium species	42.42	H	(<20.00)	x10 <sup>4</sup> CFU/g

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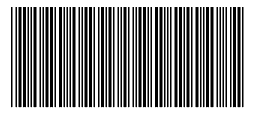
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#### MYCOLOGY

TEST	RESULT	H/L	REFERENCE	UNITS
● <b>Candida albicans</b>	<b>6.30</b>	<b>H</b>	(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida dubliniensis</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida famata</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida glabrata</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida guilliermondii</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida intermedia</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida kefyr</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida krusei</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida lambica</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida lipolytica</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida lusitanae</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida parapsilosis</b>	<b>2.70</b>	<b>H</b>	(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida tropicalis</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Candida species</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Geotrichum species</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Rhodotorula species</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g
● <b>Saccharomyces cerevisiae</b>	<DL		(<1.00)	x10 <sup>5</sup> CFU/g

Sample Report



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#### NORMAL BACTERIAL GUT FLORA

TEST	RESULT	H/L	REFERENCE	UNITS
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
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
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
Oxalobacter formigenes	5.69		(<50.00)	x10^6 CFU/g
Akkermansia muciniphila	118.00	H	(1.00-50.00)	x10^7 CFU/g
Faecalibacterium prausnitzii	890.00		(100.00-3500.00)	x10^6 CFU/g

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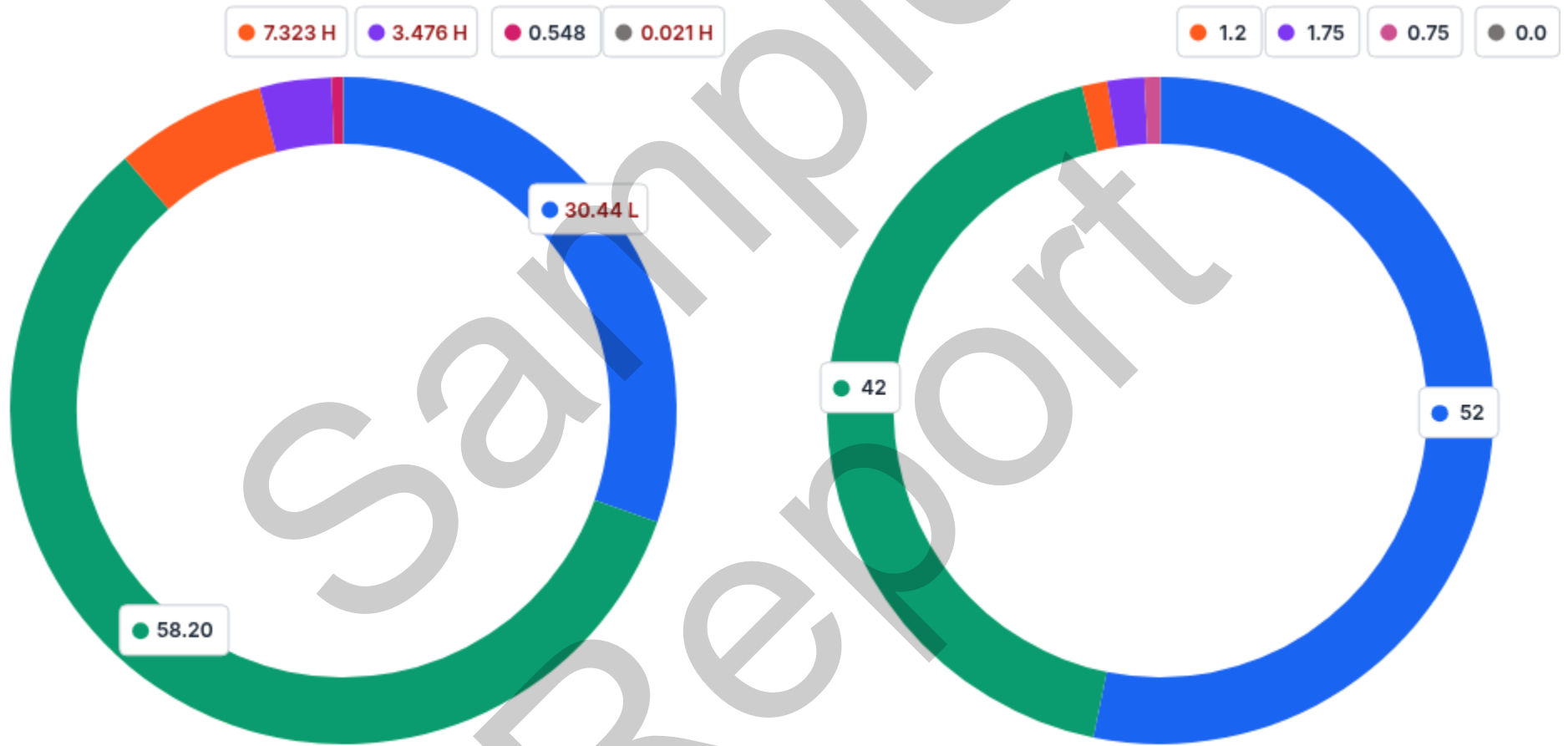
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#### COMMENSAL RELATIVE ABUNDANCE

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

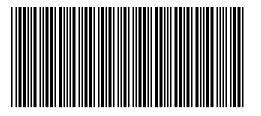
#### Healthy Phyla



#### MICROBIOTA RATIO

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

● Actinobacteria Phylum 
 ● Bacteroidetes Phylum 
 ● Euryarchaeota Phylum 
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#### BACTERIAL CULTURE

Organism	Growth	H/L	Ref Range	Classification
<span style="color: red;">●</span> <i>Aeromonas hydrophila</i>	1+	H	(<1+)	<b>PATHOGEN</b>
<span style="color: red;">●</span> <i>Citrobacter freundii</i> complex	4+	H	(<4+)	<b>Possible Pathogen</b>
<span style="color: green;">●</span> <i>Enterococcus faecium</i>	1+		(<4+)	<b>Non-Pathogen</b>
<span style="color: red;">●</span> <i>Klebsiella pneumoniae</i> complex	2+		(<4+)	<b>Non-Pathogen</b>
<span style="color: red;">●</span> <i>Pseudomonas aeruginosa</i>	2+		(<4+)	<b>Non-Pathogen</b>
<span style="color: green;">●</span> <i>Streptococcus agalactiae</i>	2+		(<4+)	<b>Non-Pathogen</b>

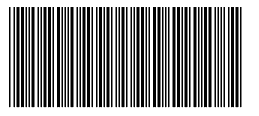
#### SUSCEPTIBILITY - BACTERIA

Antimicrobials	<i>Aeromonas hydrophila</i> Susceptible	<i>Citrobacter freundii</i> complex Susceptible	<i>Klebsiella pneumoniae</i> complex Susceptible	<i>Pseudomonas aeruginosa</i> Susceptible
Ampicillin	R	R	S	NT
Augmentin	S	R	S	NT
Ciprofloxacin	S	S	S	R
Gentamicin	S	S	S	NT
Meropenem	S	S	S	S
Norfloxacin	S	S	S	NT
Trimethoprim/Sulpha	S	S	S	NT

R Resistant   
 S Susceptible   
 I Intermediate   
 NT Not Tested

**Antibiotics:** Please note that the tested antibiotics for each organism are those specifically recommended by microbiological guidelines.

**Disclaimer:** The antibiotics listed have been reported as requested by the treating healthcare practitioner. Clinical necessity for antibiotic use may vary, and prescription should be based on the professional judgment of the healthcare practitioner and patient case. Information regarding natural inhibitors is provided for reference purposes only and is not intended to replace medical advice or treatment.



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#### NATURAL INHIBITORS - BACTERIA

Citrobacter freundii complex	Low Inhibition	High Inhibition
Berberine	<div style="width: 10%;"></div>	
Black Walnut	<div style="width: 10%;"></div>	
Caprylic Acid	<div style="width: 25%;"></div>	
Citrus Seed	<div style="width: 75%;"></div>	
Coptis	<div style="width: 20%;"></div>	
Garlic	<div style="width: 30%;"></div>	
Golden Seal	<div style="width: 15%;"></div>	
Oregano	<div style="width: 10%;"></div>	

#### NATURAL INHIBITORS - BACTERIA

Pseudomonas aeruginosa	Low Inhibition	High Inhibition
Berberine	<div style="width: 10%;"></div>	
Black Walnut	<div style="width: 10%;"></div>	
Caprylic Acid	<div style="width: 10%;"></div>	
Citrus Seed	<div style="width: 85%;"></div>	
Coptis	<div style="width: 10%;"></div>	
Garlic	<div style="width: 25%;"></div>	
Golden Seal	<div style="width: 10%;"></div>	
Oregano	<div style="width: 10%;"></div>	

Klebsiella pneumoniae complex	Low Inhibition	High Inhibition
Berberine	<div style="width: 10%;"></div>	
Black Walnut	<div style="width: 10%;"></div>	
Caprylic Acid	<div style="width: 35%;"></div>	
Citrus Seed	<div style="width: 80%;"></div>	
Coptis	<div style="width: 10%;"></div>	
Garlic	<div style="width: 10%;"></div>	
Golden Seal	<div style="width: 10%;"></div>	
Oregano	<div style="width: 10%;"></div>	

Streptococcus agalactiae	Low Inhibition	High Inhibition
Berberine	<div style="width: 10%;"></div>	
Black Walnut	<div style="width: 10%;"></div>	
Caprylic Acid	<div style="width: 25%;"></div>	
Citrus Seed	<div style="width: 85%;"></div>	
Coptis	<div style="width: 20%;"></div>	
Garlic	<div style="width: 30%;"></div>	
Golden Seal	<div style="width: 15%;"></div>	
Oregano	<div style="width: 10%;"></div>	

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Organism	Growth	H/L	Ref Range	Classification
Candida albicans	2+	H	(<2+)	Possible Pathogen
Candida parapsilosis	1+		(<2+)	Non-Pathogen

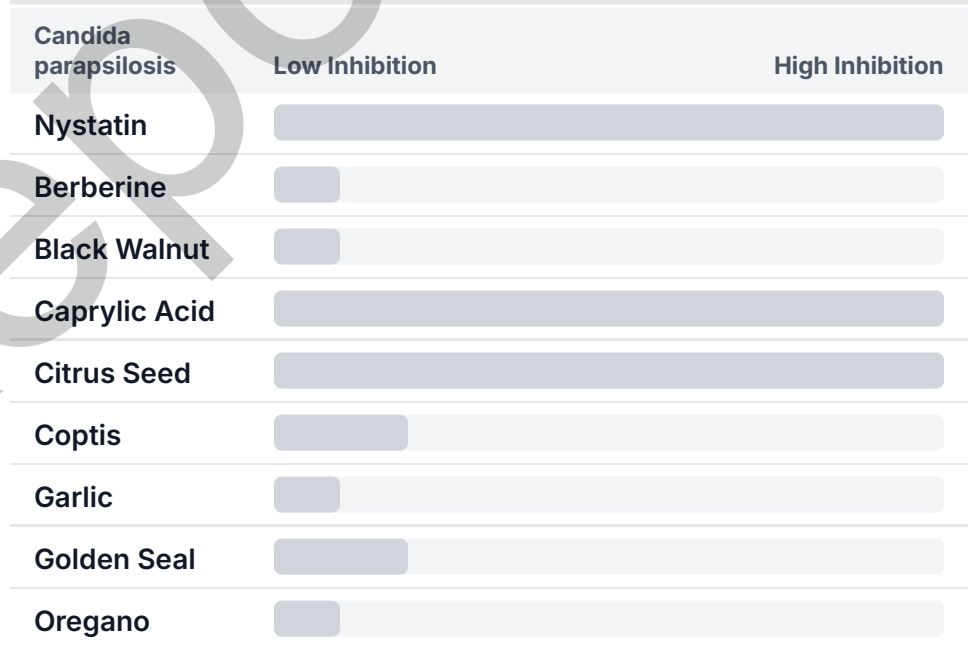
#### SUSCEPTIBILITY - MYCOLOGY



#### NATURAL INHIBITORS - MYCOLOGY



#### NATURAL INHIBITORS - MYCOLOGY





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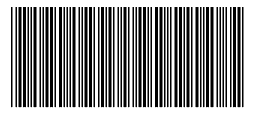
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# The Four “R” Treatment Protocol

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

#### SEMI-FORMED STOOL:

A SEMI-FORMED stool specimen classified as Type 4 on the Bristol Stool Chart is generally considered optimal, indicating balanced gut motility, adequate hydration, and sufficient dietary fibre intake. This stool consistency is often associated with efficient digestion, proper colonic function, and microbial stability. However, while Type 4 stools typically suggest gastrointestinal homeostasis, they do not always correlate with a healthy gut microbiome. Pathogenic bacteria, viral infections, parasitic infestations, or gut dysbiosis may still be present, even in well-formed stools. Clinical recommendations include maintaining a fiber-rich diet with prebiotic and probiotic sources, ensuring consistent hydration, and promoting gut microbial diversity through fermented foods or supplementation.

#### 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 NEGATIVE:

Faecal occult blood has not been detected in this specimen. If the test result is negative and clinical symptoms persist, additional follow-up testing using other clinical methods is recommended.

### 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.

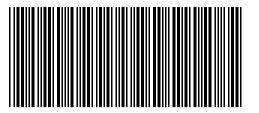
This result may warrant further monitoring.

#### FAECAL TRANSGLUTAMINASE IgA: Negative

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

#### Treatment:

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.



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### 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 DIENTAMOEBIA 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.

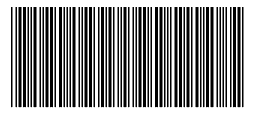
TREATMENT SUGGESTIONS: Mild symptoms are self-limiting. If treatment is warranted, metronidazole for 10 days or a single 2g dose of Tinidazole may be used. Tetracycline has also proven effective in adults. Rule out allergy to above medication before prescribing/taking. Consult ID specialist if patient 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 cycle is recommended to prevent recurrence. A repeat test should be suggested post therapy.



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### Opportunistic Bacteria Comment

ENTEROCOCCUS FAECIUM ELEVATED: PHYLUM: Firmicutes

DESCRIPTION: Enterococcus faecium is a gram-positive bacterium commensal bacterium inhabiting the gastrointestinal tracts of humans. It can however, be implicated in a variety of infections of which urinary tract infections are the most common. Enterococci have recently emerged as a prevalent multidrug-resistant nosocomial pathogen. Resistant Enterococci densely colonize the gut particularly following antibiotic treatment, which can deplete the GI tract of protective commensals.

TREATMENT SUGGESTIONS: Treatment of Enterococcus species in gut flora may not be necessary or recommended. However, if there is overgrowth of this genus with implicated infection, treatment may be warranted. Enterococci are challenging to treat due their drug-resistant mechanisms. Ampicillin is the preferred antibiotic used to treat enterococci infections if required. Rule out allergy to above medication before prescribing/taking.

STREPTOCOCCUS AGALACTIAE (GROUP B) ELEVATED: PHYLUM: Firmicutes

DESCRIPTION: S. agalactiae, a Gram-positive coccus found in the gut microbiome, is a significant pathogen causing invasive infections in adults, particularly the elderly and those with underlying health conditions.

TREATMENT SUGGESTIONS: Consuming probiotics, such as Lactobacillus and Bifidobacterium species, can help maintain a healthy balance in the gut microbiome and inhibit the overgrowth of S. agalactiae. Fermented foods such as yogurt, kefir, sauerkraut, and kimchi have also shown to be beneficial. Guided antibiotic therapy may be considered.

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 Desulfovibrio piger levels may be associated with diarrhea or inflammatory bowel disease.

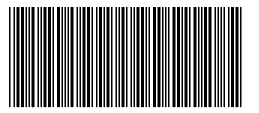
TREATMENT SUGGESTIONS: Treatment options include lowering the intake of sulfate rich foods such as some breads, dried fruits, beers, ciders and wines. It is also suggested to avoid foods high in fat.

### 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 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/Septin 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



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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 PARAPSILOSIS ELEVATED: PHYLUM: Ascomycota

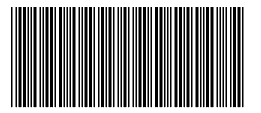
Candida parapsilosis is a yeast species that is part of the normal human microbiota but can become opportunistic under certain conditions. Overgrowth of C. parapsilosis in the gut can disrupt the microbial balance and lead to symptoms such as bloating, gas, and diarrhea. In immunocompromised individuals, C. parapsilosis is a potential pathogen and has been linked to invasive infections, though gastrointestinal symptoms are more common in cases of mild dysbiosis. When elevated guided susceptibility testing should be considered.

## Normal Bacterial Flora Comment

BIFIDOBACTERIUM ADOLESCENTIS LOW: PHYLUM: Actinobacteria

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



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#### 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.

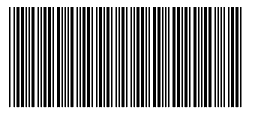
#### LACTOBACILLUS DELBRUECKII LOW: PHYLUM: Firmicutes

##### 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 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



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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

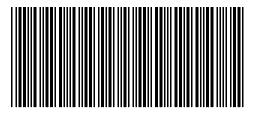
### EURYARCHAEOTA (PHYLUM) ELEVATED:

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.

### 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.



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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), MALDI-TOF (Matrix-Assisted Laser Desorption/Ionization Time of Flight)

Sample Report