Dr Test Doctor NutriPath. 16 Harker Street, Burwood VIC 3125

Lab ID 25028-0001
Patient ID P000002
Ext ID

Test Patient

Sex: Female • 45yrs • 01-Jan-1980
123 Home Street, Test Suburb Vic 3125

COLLECTED 25-Jan-2025
RECEIVED 28-Jan-2025

MICROBIOMIX

Specimen type - Stool, Spot

29-Jan-2025 03.33PM

MACROSCOPIC EXAMINATION AND OCCULT BLOOD

SERVICE	RESULT
Stool Colour	Brown
Stool Form	Unformed

MACROSCOPIC EXAMINATION AND OCCULT BLOOD

SERVICE	INTERPRETATION	H/L
Mucous	Absent	
Occult Blood	POSITIVE	H

GIT FUNCTIONAL MARKERS

SERVICE	RESULT	H/L	REF - RANGE	UNITS
Pancreatic Elastase 1	800		> 200	ug/g
b-Glucuronidase	7955	H	368 - 6266	U/g
Calprotectin	120.0	H	< 50.0	ug/g
Secretory IgA	440	L	510 - 2040	ng/mL
Transglutaminase IgA	110.0	H	0.0 - 100.0	ug/g
Zonulin	130	H	0 - 107	ng/mL
Steatocrit	19.0	H	0.0 - 10.0	%
pH	6.4		6.3 - 7.7	

SHORT CHAIN FATTY ACIDS, BENEFICIAL

SERVICE	RESULT	H/L	REF - RANGE	UNITS
Short Chain Fatty Acids, Beneficial	22.0		> 13.6	umol/g
Butyrate	10.00	L	10.80 - 33.50	%
Acetate	65.00		44.50 - 72.40	%
Propionate	20.00		0.00 - 32.00	%
Valerate	5.00		0.50 - 7.00	%

Parasites & Worms

Blastocystis hominis
Dientamoeba fragilis
Ascaris lumbricoides, Roundworm

Bacteria and Viruses

Rotavirus A
Aeromonas hydrophila
Salmonella species
Helicobacter pylori

Mycology

Candida glabrata
Candida parapsilosis

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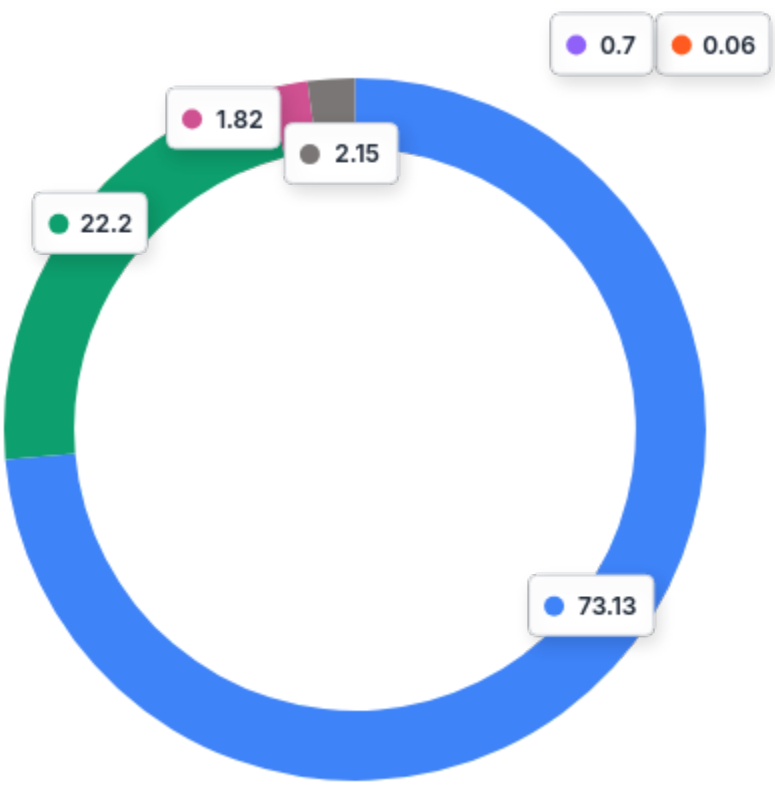
MICROBIOTA PHYLA

SERVICE	RESULT	H/L	REF - RANGE	UNITS
Actinobacteria Phylum	1.200	H	0.052 - 0.292	%
Bacteroidetes Phylum	39.500	L	55.200 - 91.130	%
Euryarchaeota Phylum	0.020	H	0.000 - 0.003	%
Firmicutes Phylum	53.280	H	6.630 - 42.300	%
Proteobacteria Phylum	5.000	H	0.357 - 2.210	%
Verrucomicrobia Phylum	1.000	H	0.000 - 0.285	%

Your Phyla

Healthy Phyla



GUT MICROBIAL DIVERSITY

SERVICE	RESULT	H/L	REF - RANGE	UNITS
Shannon Diversity Index	2.70		2.15 - 3.50	
Simpson Diversity Index	0.90		0.80 - 1.00	

MICROBIOTA RATIOS

SERVICE	RESULT	H/L	REF - RANGE	UNITS
Firmicutes/Bacteroidetes ratio	1.35	H	0.80 - 1.20	ratio
Fus. nucleatum/Faec. prausnitzii ratio	0.03		0.00 - 1.00	ratio
Gram-Positive/Gram-Negative ratio	0.60	H	0.40 - 0.50	ratio
Prevotella/Bacteroides ratio	0.14		0.00 - 0.15	ratio
Proteobacteria/Actinobacteria	4.00		0.00 - 6.00	ratio

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IMPORTANT BIOCHEMICAL FUNCTIONS

SERVICE	RESULT	H/L	REF - RANGE	UNITS
Ageing Factors (Oxidative Stress)	0.5000		< 1.0000	%
Ammonia/Urease Production	0.5000		< 1.0000	%
Branched Chain AA Production	0.0003		< 5.0000	%
Carbohydrate Metabolism	6.2000		3.0000 - 7.0000	%
Histamine Production	1.7000	H	< 1.0000	%
Iron/Other Ion Metabolism	1.4000		< 3.0000	%
Indolepropionic Acid (IPA) Production	0.7000	L	> 1.0000	%
Lipid Metabolism	9.4000	H	4.0000 - 8.0000	%
Lipopolysaccharides (LPS) Production	5.6000	H	< 4.0000	%
Protein/Other Energy Metabolism	10.2000		9.0000 - 18.0000	%
Sulphate Production	3.0000	H	< 3.0000	%
Trimethylamine (TMA) Production	2.0000	H	< 0.3000	%

DISEASE RISKS

SERVICE	RESULT	H/L
Colon Cancer Risk	Low Risk	
Crohns Disease Risk	Low Risk	
Fatty Liver Risk	Low Risk	
Type 2 Diabetes Risk	High Risk	
Ulcerative Colitis Risk	High Risk	

Disclaimer for Shotgun Microbiome Sequencing:

The results from this shotgun microbiome sequencing analysis are for informational and research purposes only. They do not diagnose, treat, or predict any disease or health condition. While certain bacterial compositions may be associated with an increased or decreased risk of specific health outcomes, having a higher risk does not mean you will develop the disease, nor does a lower risk guarantee protection.

The microbiome is a complex and dynamic ecosystem influenced by various factors, including diet, lifestyle, genetics, and environment. These results should be interpreted in conjunction with other clinical assessments and professional medical advice.

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BACTERIAL PATHOGENS

SERVICE	RESULT	H/L	REF - RANGE	UNITS
Aeromonas hydrophila	1.40	H	< 1.00	x10^3 CFU/g
Campylobacter species	<dL		< 1.00	x10^5 CFU/g
C. difficile, Toxin A	<dL		< 1.00	x10^3 CFU/g
C. difficile, Toxin B	<dL		< 1.00	x10^3 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	1.60	HH	< 1.00	x10^5 CFU/g
Shiga toxigenic E. coli	<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	5.20	H	< 1.00	x10^3 CFU/g

H.Pylori Virulence Factors

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

H. pylori Resistance Genes

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

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MYCOLOGY

SERVICE	RESULT	H/L	REF - RANGE	UNITS
Candida albicans	0.80		< 1.00	x10^5 CFU/g
Candida dubliniensis	0.80		< 1.00	x10^5 CFU/g
Candida famata	<dL		< 1.00	x10^5 CFU/g
Candida glabrata	2.00	H	< 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	<dL		< 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	1.30	H	< 1.00	x10^5 CFU/g
Candida tropicalis	<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

PATHOGENS/OPPORTUNISTIC PATHOGENS

SERVICE	RESULT	H/L	REF - RANGE	UNITS
Abiotrophia defectiva	<dL		< 0.010	%
Acinetobacter baumannii	<dL		< 0.010	%
Acinetobacter haemolyticus	<dL		< 0.010	%
Acinetobacter junii	<dL		< 0.010	%
Bacteroides caccae	0.800		< 3.000	%
Bacteroides fragilis	3.200	H	< 2.000	%
Bacteroides vulgatus	5.500		< 7.500	%
Bilophila wadsworthia	0.150	H	< 0.120	%
Citrobacter freundii	0.700	H	< 0.010	%
Citrobacter koseri	<dL		< 0.010	%
Citrobacter youngae	3.900	H	< 0.010	%
Corynebacterium urealyticum	<dL		< 0.010	%
Desulfovibrio piger	5.700	H	< 0.120	%
Enterobacter cloacae	<dL		< 0.010	%
Enterococcus casseliflavus	<dL		< 0.010	%

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SERVICE	RESULT	H/L	REF - RANGE	UNITS
Enterococcus faecalis	<dL		< 0.010	%
Enterococcus faecium	<dL		< 0.010	%
Enterococcus gallinarum	<dL		< 0.010	%
Escherichia coli	7.400	H	< 3.000	%
Fusobacterium nucleatum	0.090	H	< 0.010	%
Fusobacterium ulcerans	<dL		< 0.010	%
Klebsiella oxytoca	0.800	H	< 0.010	%
Klebsiella pneumoniae	0.600	H	< 0.010	%
Methanobrevibacter smithii	0.020	H	< 0.010	%
Morganella morganii	<dL		< 0.010	%
Mycoplasma hominis	<dL		< 0.010	%
Prevotella amnii	<dL		< 0.010	%
Prevotella bivia	0.050	H	< 0.010	%
Prevotella melaninogenica	<dL		< 0.010	%
Proteus mirabilis	<dL		< 0.010	%
Providencia rettgeri	<dL		< 0.010	%
Pseudoflavonifractor capillosus	<dL		< 0.010	%
Pseudomonas aeruginosa	0.900	H	< 0.010	%
Staphylococcus aureus	0.002		< 0.010	%
STREPTOCOCCUS TOTAL	0.020		< 0.030	%
Streptococcus agalactiae	0.020	H	< 0.010	%
Streptococcus anginosus	<dL		< 0.010	%
Streptococcus dysgalactiae	<dL		< 0.010	%
Streptococcus mutans	<dL		< 0.010	%
Streptococcus pyogenes	<dL		< 0.010	%
Streptococcus salivarius	<dL		< 0.030	%
Streptococcus suis	<dL		< 0.010	%
Veillonella parvula	0.020		< 0.030	%

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

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PROBIOTICS/BENEFICIAL BACTERIA

SERVICE	RESULT	H/L	REF - RANGE	UNITS
Akkermansia muciniphila	16.600	H	0.010 - 7.500	%
Bacteroides thetaiotaomicron	3.200		0.080 - 3.400	%
Bacteroides uniformis	14.200		0.500 - 16.000	%
BIFIDOBACTERIUM TOTAL	7.820	H	0.010 - 5.000	%
Bifidobacterium adolescentis	<dL	L	1.000 - 10.000	%
Bifidobacterium animalis	<dL	L	0.100 - 2.000	%
Bifidobacterium bifidum	4.500		0.500 - 5.000	%
Bifidobacterium breve	0.020	L	0.100 - 1.000	%
Bifidobacterium longum	3.300		2.000 - 15.000	%
Bifidobacterium pseudolongum	<dL	L	0.100 - 0.500	%
Clostridium butyricum	<dL		< 0.001	%
Faecalibacterium prausnitzii	3.470		0.860 - 14.350	%
LACTOBACILLUS TOTAL	0.090		0.010 - 1.000	%
Lactobacillus acidophilus	<dL	L	0.010 - 0.100	%
Lactobacillus casei paracasei	<dL	L	0.010 - 0.200	%
Lactobacillus crispatus	<dL	L	0.010 - 0.050	%
Lactobacillus delbrueckii	<dL	L	0.010 - 0.050	%
Lactobacillus fermentum	<dL	L	0.010 - 0.100	%
Lactobacillus gasseri	0.020		0.010 - 0.100	%
Lactobacillus helveticus	<dL	L	0.010 - 0.050	%
Lactobacillus johnsonii	<dL	L	0.010 - 0.050	%
Lactobacillus plantarum	<dL	L	0.010 - 0.200	%
Lactobacillus reuteri	<dL	L	0.010 - 0.200	%
Lactobacillus rhamnosus	0.070		0.010 - 0.100	%
Lactobacillus salivarius	<dL	L	0.010 - 0.050	%
Lactococcus lactis.	<dL		< 0.010	%
Oxalobacter formigenes	<dL		< 0.150	%
Pediococcus acidilactici	<dL		< 0.030	%
Pediococcus pentosaceus	<dL		< 0.020	%
Roseburia hominis	0.020		0.010 - 0.900	%
Roseburia intestinalis	0.010		< 3.730	%
Roseburia inulinivorans	0.020		0.010 - 3.560	%
Streptococcus thermophilus	<dL		< 0.300	%

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PARASITES

SERVICE	RESULT	H/L	REF - RANGE	UNITS
Blastocystis hominis	1.6	H	< 1.0	x10^5 org/g
Cryptosporidium species	<dL		< 1.0	x10^5 org/g
Dientamoeba fragilis	2.0	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
Entamoeba histolytica	<dL		< 1.0	x10^5 org/g
Giardia intestinalis	<dL		< 1.0	x10^5 org/g
Pentatrichomonas hominis	<dL		< 1.0	x10^5 org/g

Blastocystis Subtypes

SERVICE	RESULT
Subtype 1	Negative
Subtype 2	Negative
Subtype 3	POSITIVE
Subtype 4	Negative
Subtype 5	POSITIVE
Subtype 6	Negative
Subtype 7	Negative
Subtype 8	Negative
Subtype 9	Negative

HELMINTHS

SERVICE	RESULT	H/L
Ancylostoma duodenale, Roundworm	Not Detected	
Ascaris lumbricoides, Roundworm	DETECTED	H
Enterobius vermicularis, Pinworm	Not Detected	
Enterocytozoon spp	Not Detected	
Hymenolepis spp, Tapeworm	Not Detected	

HELMINTHS

SERVICE	RESULT	H/L
Necator americanus, Hookworm	Not Detected	
Strongyloides spp, Roundworm	Not Detected	
Taenia species, Tapeworm	Not Detected	
Trichuris trichiura, Whipworm	Not Detected	

VIRUSES

SERVICE	RESULT
Adenovirus 40/41	Not Detected
Astrovirus (hAstro)	Not Detected
Norovirus GI/II	Not Detected

VIRUSES

SERVICE	RESULT
Rotavirus A	DETECTED
Sapovirus (I,II,IV,V)	Not Detected

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Macroscopy Comment

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:
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 immunosassay (CLIA).

beta GLUCURONIDASE ELEVATED:
Beta-glucuronidase is a bacterial enzyme that may limit the body's ability to excrete compounds such as drugs, hormones, and environmental toxins. Certain bacteria may also increase Beta-glucuronidase such as elevated levels of E.coli.

Treatment: Consider Calcium-D-glucarate which may assist with lowering B-glucuronidase levels. It is also suggested to introduce a low-calorie/vegetarian diet for 4 weeks which may also be beneficial with lowering faecal B-glucuronidase levels. Additionally, one human study has suggested that consuming glucomannan can reduce fecal beta-glucuronidase activity. Glucomannan is a type of prebiotic fiber found in konjac root which is commonly used to make low calorie pasta and noodles.

CALPROTECTIN SIGNIFICANTLY ELEVATED:
Values above 100 mcg/g indicate SIGNIFICANT inflammation in the gastrointestinal tract. Reference ranges are based on an adult population. Etiology could be associated with the following: IBD, infection, NSAID use, polyps, adenomas, or colorectal cancer. Calprotectin may also be elevated in children with chronic diarrhea secondary to cow's milk allergy or multiple food allergies. Further investigative procedures are necessary to determine the cause of inflammation. Whether inflammatory or neoplastic, the cause of elevated calprotectin MUST be ascertained by endoscopy or radiography. If these evaluations do not yield signs of overt disease, other tests may be considered to uncover causes of chronic bowel inflammation.

FAECAL SECRETORY IgA: Production of sIgA is important to the normal function of the gastrointestinal mucosa as an immune barrier. It represents the first line immune defense of the GIT. Elevated levels are associated with an upregulated immune response.

SECRETORY IGA ELEVATED:
The most abundant class of antibody found in the human intestinal lumen is secretory IgA (sIgA). sIgA is recognized as a first line of defence in protecting the intestinal epithelium from enteric pathogens and toxins. It is used to assess gastrointestinal barrier function. As part of the gut epithelial barrier, sIgA is important in the development of immune tolerance for normal, beneficial commensal gut organisms, as well as common molecular epitopes found in foods.

A common cause of an elevated sIgA may be due to:

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A defective epithelial barrier which may allow for bacterial and microbial penetration, which is the strongest stimulator of sIgA production.

Other common causes may include:

-Coeliac disease

-Colon cancer

-Infections

-IBS (especially the diarrhea subtype)

Review this level with other GIT markers such as Calprotectin and Zonulin. Other clinical tools that may be considered is food antibody testing.

FAECAL TRANSGLUTAMINASE IgA: POSITIVE

Tissue Transglutaminase is the most specific test for Coeliac Disease. Levels greater than 100 are deemed as POSITIVE.

Treatment: Avoid gluten containing foods. Also assess IgG/IgA Food sensitivity tests to identify specific food intolerances.

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.

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

FAECAL pH: Faecal pH appears to be an indicator of the health or status of colonic digestive processes and may be a marker for the development of colon cancer. Abnormally acidic or alkaline pH usually reflects an abnormality in acid production or absorpt

Short Chain Fatty Acids Comment

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

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associated with an increased risk of colon cancer & constipation. Consuming foods high in resistant starch has been shown to increase butyrate levels.

Dominant Phyla Comment

BACTEROIDETES PHYLUM LOW:

The phylum Bacteroidetes is composed of multiple Gram-negative, nonsporeforming, anaerobic or aerobic, and rod-shaped bacteria, that make up a large proportion of the gut Microbiota. Although some Bacteroides spp. can be opportunistic pathogens, many are symbiotic species highly adjusted to the gastrointestinal tract. Abundance of the Bacteroidetes and disturbance of gastrointestinal microbiome balance, particularly Firmicutes/Bacteroidetes ratio, may be associated with obesity, ulcerative colitis, Crohn's and inflammatory bowel disease.

EURYARCHAEOTA PHYLUM ELEVATED:

Euryarchaeota are a phylum of a diverse range of bacteria, including methanogens, halophiles and sulfatereducers. 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.

FIRMICUTES PHYLUM ELEVATED:

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 or decreased 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.

PROTEOBACTERIA PHYLUM ELEVATED:

Proteobacteria are a diverse phylum, comprised with a number of subclasses: Alphaproteobacteria, Betaproteobacteria, Gammaproteobacteria, Deltaproteobacteria, Epsilonproteobacteria, and Zetaproteobacteria. The Proteobacteria are commonly occurring in healthy mammalian gastrointestinal microbiomes and also include common human pathogens. Proteobacteria contribute to homeostasis of the anaerobic environment of the gastrointestinal tract. It has a role in protein and sugar degradation and maintaining oxygen homeostasis within the gut. Increased levels of Proteobacteria may be associated intestinal inflammation, colitis, inflammatory bowel disease and may also be due to high sugar intake.

VERRUCOMICROBIA PHYLUM ELEVATED:

Verrucomicrobiota is a phylum of Gram-negative bacteria that contains only a few described species, found in the environment and gastrointestinal tract. Verrucomicrobia aid in glucose homeostasis of the human gut and have anti-inflammatory properties that further aid in intestinal health. Elevated colonisation of Verrucomicrobia phylum may be seen following broad-spectrum antibiotic regimen or with pathogenic infection.

Important Biochemical Functions Comment

HISTAMINE ELEVATED:

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Histamine is a biogenic amine that plays a crucial role in immune regulation, gut function, and the nervous system. It is involved in mediating immune responses, such as inflammation and allergic reactions, as well as contributing to gut motility and neurotransmission. Gut microbiota that produce histamine, primarily through the decarboxylation of histidine, are often found at higher levels in individuals with asthma, food allergies, or conditions like irritable bowel syndrome (IBS). Elevated histamine production in the gut can exacerbate symptoms in these conditions, as histamine can increase gut permeability, contribute to inflammation, and affect the gut-brain axis, leading to symptoms such as bloating, diarrhea, and abdominal discomfort. Furthermore, individuals with histamine intolerance may experience heightened sensitivity to dietary histamine, resulting in adverse effects like headaches, skin rashes, and gastrointestinal distress. It is important to interpret histamine levels in the gut within the context of the patient's clinical presentation.

3-INDOLEPROPIONIC ADID (IPA) LOW:

3-Indolepropionic acid (IPA) is a potent antioxidant produced by specific gut bacteria, playing a critical role in protecting the nervous system, reducing inflammation, and supporting the gut barrier function. IPA is derived from the metabolism of the amino acid tryptophan by certain gut microbiota, and its antioxidant properties help combat oxidative stress, which is implicated in the pathogenesis of numerous chronic diseases. IPA has also been associated with a reduction in the risk of type 2 diabetes by improving insulin sensitivity and modulating gut inflammation. Additionally, IPA has neuroprotective effects, which may help mitigate neurodegenerative conditions by reducing neuronal damage caused by oxidative stress. The production of IPA can be influenced by dietary factors, with research suggesting that foods rich in ellagic acid, such as chestnuts and ellagic acid-enriched pomegranate juice, may promote its synthesis. Moreover, whole grains like wheat and rye have been shown to support the gut bacteria responsible for IPA production.

LIPID METABOLISM ELEVATED:

Fatty acid biosynthesis in the gut is a crucial metabolic pathway involved in lipid metabolism, wherein gut microbiota convert dietary fats into free fatty acids (FFAs) and other bioactive metabolites. This process is essential for maintaining energy homeostasis, regulating cellular functions, and supporting the synthesis of important lipids. Elevated levels of fatty acid biosynthesis may indicate dysregulation of the gut microbiome's metabolic processes. This dysregulation has been associated with an increased risk of several complex diseases, including obesity, cardiovascular disease, and metabolic syndrome. Excessive production of FFAs and associated metabolites may lead to chronic low-grade inflammation, insulin resistance, and disruption of gut barrier function, thereby contributing to the development of these conditions. The imbalance in microbial activity underlying excessive fatty acid biosynthesis highlights the critical role of gut health in overall metabolic regulation.

LIPOPOLYSACCHARIDES (LPS) ELEVATED:

Lipopolysaccharides (LPS), also known as endotoxins, are large molecules found in the outer membrane of Gram-negative bacteria. These endotoxins are released by harmful bacteria within the gut and have the ability to trigger strong immune responses. While LPS plays a key role in initiating acute inflammation, particularly in conditions like sepsis, chronic overproduction of LPS can contribute to ongoing inflammation in the intestines. Elevated LPS levels, often resulting from gut dysbiosis or an imbalance in microbial populations, are linked to the development of systemic inflammation, which can disrupt gut barrier integrity and lead to increased intestinal permeability, commonly referred to as "leaky gut." The release of LPS into the bloodstream can activate inflammatory pathways, contributing to the pathogenesis of various chronic diseases, including obesity, type 2 diabetes, and colorectal cancer. Excessive LPS production can also exacerbate metabolic disorders by promoting insulin resistance, adiposity, and colorectal tumorigenesis. The persistent low-grade inflammation associated with elevated LPS levels highlights the crucial role of maintaining gut microbial balance for reducing the risk of these chronic conditions and promoting overall health.

TRIMETHYLAMINE (TMA) ELEVATED:

Trimethylamine (TMA) is a compound produced by gut microbiota during the digestion of certain dietary components, particularly choline, carnitine, and lecithin, which are abundant in foods such as red meat, eggs, and certain dairy products. TMA can be absorbed into the bloodstream and converted by the liver into trimethylamine N-oxide (TMAO). Elevated levels of TMAO have been identified as significant risk factors for cardiovascular disease, cancer, and Type 2 Diabetes, as they are associated with promoting atherosclerosis, enhancing clot formation, and contributing to metabolic dysfunction. The ability of gut microbiota to produce TMA can vary depending on individual

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microbiome composition, and in some cases, the potential for high TMA production may be linked to an imbalance in the gut flora or an overgrowth of TMA-producing bacteria.

Disease Risks Comment

TYPE 2 DIABETES RISK SCORE ELEVATED:

A balanced gut microbiota is essential for metabolic regulation, including insulin sensitivity and glucose metabolism. In individuals with or at high risk of Type 2 Diabetes (T2D), the gut microbiota is often dysregulated, with a reduction in beneficial bacteria that support metabolic health, such as Akkermansia muciniphila, Faecalibacterium prausnitzii, and Bifidobacterium longum. Low levels of these bacteria can compromise gut barrier integrity, increase systemic inflammation, and contribute to insulin resistance.

The microbiome's role in T2D is complex, impacting inflammatory pathways, lipid metabolism, and energy balance. A decrease in microbial diversity or the depletion of specific strains can exacerbate metabolic dysfunction, leading to glucose intolerance and the onset of Type 2 Diabetes. Furthermore, an overabundance of dysbiotic bacteria such as Bacteroides thetaiotaomicron and Prevotella species can worsen insulin resistance and inflammation. While some strains of Lactobacillus, like Lactobacillus rhamnosus, are beneficial for gut health, others may play a role in metabolic disruption. Additionally, opportunistic bacteria like Enterococcus faecalis can promote inflammation and insulin resistance.

Dietary interventions that promote microbial diversity, such as increasing prebiotic fiber (e.g., inulin) and polyphenol-rich foods (e.g., berries, green tea), can support gut health. Supplementation with beneficial strains like Lactobacillus rhamnosus and Bifidobacterium longum may help restore a balanced microbiome and improve insulin sensitivity. A fiber-rich diet, low in processed sugars and refined carbohydrates, can help reduce inflammation and promote gut health.

It is also recommended to assess metabolic status through biochemical markers like Insulin, Glucose, Lipids, and HbA1c.

ULCERATIVE COLITIS (UC) RISK SCORE ELEVATED:

Ulcerative colitis (UC), a chronic inflammatory bowel disease (IBD), is linked to an imbalance in the gut microbiota. Reduced levels of beneficial bacteria like Faecalibacterium prausnitzii and Roseburia species are often observed in individuals with UC. These bacteria help maintain gut health by producing anti-inflammatory short-chain fatty acids (SCFAs) and supporting the gut barrier function. Low levels of these microbes may impair the gut's ability to control inflammation, leading to the chronic gut inflammation characteristic of UC. Additionally, gut dysbiosis in UC patients is associated with increased intestinal permeability, further exacerbating inflammation and contributing to disease flare-ups. Review Calprotectin levels and if required referral to a gastroenterologist may be recommended.

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/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.

SALMONELLA SPECIES ELEVATED: PHYLUM: Proteobacteria

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DESCRIPTION: Salmonella is a genus of rod-shaped (bacillus) Gram-negative, non-spore-forming bacteria. Salmonella enteritis is an acute bacterial disease (commonly presenting as an acute enterocolitis) transmitted by either animal contact, person to person contact or contaminated food. Salmonella serotypes can be divided into two main groups: typhoidal and nontyphoidal. Salmonella typhi and paratyphoid are common in travellers and may invade tissues, causing systemic manifestation like severe entero-invasive colitis, bacteraemia, septic arthritis, endocarditis, pericarditis or pneumonia. Infections are serious and require intensive care including antibiotics. Nontyphoidal serotypes usually invade only the gastrointestinal tract and cause salmonellosis, the symptoms of which can usually be resolved without antibiotics. Symptoms may be asymptomatic or mild/severe, as nausea, vomiting, fever, diarrhoea and/or abdominal cramping.

TREATMENT SUGGESTIONS: Antibiotic therapy is usually not indicated for mild-uncomplicated Salmonella enterocolitis, as no benefits of shortening illness duration and may prolong faecal excretion. High risk cases and systemic manifestations need treatments: Newborn, infant's immunocompromised patients, severe or non-responding enteritis. Azithromycin 1g orally, on the first day, then 500mg orally daily for a further 6 days. (Child: First day 20 mg/kg up to 1g, then 10 mg/kg up to 500mg for 6 days) Or Ciprofloxacin 500mg orally, 12 hourly for 5 to 7 days. (Child: 12.5 mg/kg up to 500mg) Rule out allergy to above medication before prescribing/taking. Consult ID specialist if patient is showing severe symptoms or immunocompromised.

PLEASE NOTE: Salmonella is a Notifiable Disease. This result has been notified to the Department of Health.

NOTIFICATION BY THE REFERRING PRACTITIONER may also be required under the Public Health and Wellbeing Act 2009.

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.

H. Pylori Virulence Factor,vacA DETECTED:

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Vacuolating Toxin A (VacA) enters the host cell by endocytosis, affects mitochondrial function, disrupts tight junctions, causes a programmed necrosis by inducing the production of large vacuoles inside the host cells; inducing cellular swelling; disrupting cell barrier thus causing nutrient leakage, facilitates nutrient acquisition (iron, minerals, amino acids, etc.). Consider other investigations to rule our deficiencies.

Mycology Comment

CANDIDA GLABRATA ELEVATED:

Candida glabrata is a species commonly present in the gut but is less pathogenic compared to C. albicans. Overgrowth of C. glabrata can lead to symptoms such as gas, bloating, and changes in bowel habits. Due to its high resistance to common antifungal agents, it can be challenging to treat when present in elevated levels. It has been associated with mucosal infections and is an emerging concern in clinical settings.

CANDIDA PARAPSILOSIS ELEVATED:

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.

Pathogens/Opportunistic Pathogens Comment

BILIPHILA WADSWORTHIA ELEVATED: PHYLUM: Proteobacteria

DESCRIPTION: Bilophila wadsworthia is a Gram-negative, sulfate-reducing bacterium associated with the production of hydrogen sulfide. While present in small amounts in the gut, its elevation is often linked to diets high in animal fats and low in fiber. Elevated levels have been associated with inflammatory conditions such as IBD and may contribute to gut barrier dysfunction. Hydrogen sulfide produced by B. wadsworthia can impair epithelial integrity and exacerbate inflammation.

Suggested Treatment:

Natural support: Increase intake of prebiotic-rich foods like asparagus, bananas, and Jerusalem artichokes to support beneficial bacteria.

Probiotics: Consider strains like *Lactobacillus casei

BACTEROIDES FRAGILIS ELEVATED: PHYLUM: Bacteroidetes

DESCRIPTION: Bacteroides fragilis is a Gram-negative anaerobic bacterium that is a normal component of the gut microbiota. However, elevated levels may be associated with gut dysbiosis, chronic inflammation, or an impaired immune response. B. fragilis is known for producing polysaccharide A, which has both immunomodulatory and inflammatory properties. Overgrowth may also increase the risk of gut barrier dysfunction and systemic inflammation, contributing to conditions like IBD and metabolic syndrome.

Suggested Treatment:

Natural support: Include anti-inflammatory foods such as turmeric, ginger, and omega-3 fatty acids.

Probiotics: Use specific strains like Bifidobacterium lactis and Lactobacillus reuteri to support balance.

Dietary improvements: Increase intake of fermented foods and high-fiber vegetables to regulate bacterial populations.

CITROBACTER FREUNDII ELEVATED: PHYLUM: Proteobacteria

DESCRIPTION: Citrobacter freundii is a Gram-negative bacterium that is part of the normal flora of the human gastrointestinal tract. It is generally considered a commensal organism, but it can become pathogenic under certain conditions. Elevated levels of C. freundii are often linked to infections, including urinary tract infections (UTIs), sepsis, and gastrointestinal infections. This bacterium is known for its ability to produce extended-spectrum beta-lactamases (ESBL), which contribute to its resistance to many antibiotics. Elevated C. freundii

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levels may indicate gut dysbiosis, often triggered by antibiotic use, chronic diseases, or an imbalanced diet. Dysbiosis can lead to an overgrowth of opportunistic pathogens like C. freundii, contributing to gastrointestinal symptoms and other systemic issues.

Suggested Treatment:

Natural support: Use antimicrobial agents such as oregano oil, berberine, and garlic to help manage overgrowth and reduce the risk of infection.

Probiotics: Supplement with Lactobacillus rhamnosus, Saccharomyces boulardii, and Bifidobacterium longum to help restore healthy microbial balance and support immune function.

Dietary changes: Focus on a high-fiber, nutrient-dense diet to support a diverse microbiome. Incorporate fermented foods like kimchi, sauerkraut, and kefir to promote the growth of beneficial bacteria and reduce the overgrowth of pathogenic organisms.

Lifestyle: Maintain regular physical activity, manage stress, and stay hydrated to enhance digestive and immune health.

ESCHERICHIA COLI ELEVATED: PHYLUM: Proteobacteria

DESCRIPTION: Escherichia coli is a Gram-negative facultative anaerobe that is a normal resident of the gut microbiome. While most strains are harmless and contribute to gut health, elevated levels of pathogenic strains can cause infections, including diarrhea, urinary tract infections, and sepsis. Overgrowth of even non-pathogenic E. coli strains can indicate gut dysbiosis and may result from antibiotic use, high-fat diets, or chronic stress.

Suggested Treatment:

Natural support: Include antimicrobial agents such as garlic, oregano oil, and berberine to control overgrowth.

Probiotics: Supplement with Saccharomyces boulardii and Lactobacillus rhamnosus to restore gut flora.

Dietary changes: Focus on high-fiber foods and fermented products like kimchi and yogurt to support microbial diversity.

Lifestyle: Engage in regular physical activity and maintain proper hydration to support gut health.

FUSOBACTERIUM NUCLEATUM ELEVATED:: PHYLUM: Fusobacteria

DESCRIPTION: Fusobacterium nucleatum is a Gram-negative, anaerobic bacterium commonly found in the oral and gastrointestinal microbiota. While it can be part of a healthy microbiome, elevated levels of F. nucleatum are linked to periodontal disease, gastrointestinal inflammation, and an increased risk of colorectal cancer. Overgrowth may signal dysbiosis due to poor oral hygiene, high-sugar diets, or an imbalance in gut flora.

Suggested Treatment:

Natural support: Include antimicrobial agents such as turmeric, garlic, and berberine to reduce inflammation and control overgrowth.

Probiotics: Supplement with Lactobacillus rhamnosus and Bifidobacterium strains to restore gut health and support oral microbiota.

Dietary changes: Focus on a fiber-rich diet, limit sugar, and include fermented foods like kimchi and yogurt to improve gut microbial balance.

Lifestyle: Maintain good oral hygiene, manage stress, and stay hydrated to support overall health.

KLEBSIELLA OXYTOCA ELEVATED: PHYLUM: Proteobacteria

DESCRIPTION: Klebsiella oxytoca is a Gram-negative bacterium commonly found in the human gastrointestinal tract, where it typically does not cause harm. However, when it overgrows or translocates to other parts of the body, K. oxytoca can become pathogenic and is known to cause infections such as urinary tract infections (UTIs), bloodstream infections, and even severe gastrointestinal conditions like antibiotic-associated colitis. Elevated levels of K. oxytoca in the gut can be a sign of dysbiosis, often triggered by factors such as antibiotic use, high-fat diets, or a compromised immune system. This bacterium is also associated with the production of toxins, which can contribute to gut inflammation and other health problems.

Suggested Treatment:

Natural support: Include antimicrobial herbs like garlic, oregano oil, and berberine to help control overgrowth and manage inflammation.

Probiotics: Supplement with Lactobacillus rhamnosus, Saccharomyces boulardii, and Bifidobacterium longum to restore healthy gut flora.

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Dietary changes: Focus on a fiber-rich, anti-inflammatory diet with fermented foods like kimchi and sauerkraut to promote microbial diversity and gut health.

Lifestyle: Engage in regular physical activity, manage stress effectively, and stay hydrated to support immune function and overall digestive health.

KLEBSIELLA PNEUMONIAE ELEVATED: PHYLUM: Proteobacteria

DESCRIPTION: Klebsiella pneumoniae is a Gram-negative bacterium that is part of the normal flora in the gastrointestinal tract and respiratory system. However, it is also an opportunistic pathogen and is known to cause serious infections such as pneumonia, urinary tract infections (UTIs), and bloodstream infections, especially in immunocompromised individuals or those with chronic conditions such as diabetes. Elevated levels of K. pneumoniae in the gut can indicate dysbiosis, often caused by factors such as antibiotic overuse, poor diet, or an impaired immune system. This bacterium is particularly concerning due to its ability to produce extended-spectrum beta-lactamase (ESBL), which confers resistance to many antibiotics.

Suggested Treatment:

Natural support: Use antimicrobial agents such as garlic, oregano oil, and berberine to reduce overgrowth.

Probiotics: Supplement with Lactobacillus acidophilus, Lactobacillus rhamnosus, and Saccharomyces boulardii to restore a healthy microbial balance in the gut.

Dietary changes: Focus on anti-inflammatory, high-fiber foods and fermented products like kefir, kimchi, and sauerkraut to support a healthy gut microbiota and reduce inflammation.

Lifestyle: Engage in regular exercise, stay hydrated, and manage stress to support immune function and gut health.

METHANOBREVIBACTER SMITHII ELEVATED: PHYLUM: Euryarchaeota

DESCRIPTION: Methanobrevibacter smithii is a methane-producing archaea commonly found in the human gastrointestinal tract, particularly in the colon. It plays a significant role in the gut microbiome by helping to digest complex carbohydrates and fiber, producing methane as a byproduct. While M. smithii is typically considered beneficial in small quantities, elevated levels can lead to excessive methane production, contributing to gastrointestinal issues such as bloating, constipation, and irritable bowel syndrome (IBS). Overgrowth of M. smithii may result from dysbiosis, which is often triggered by factors such as a high-fat, low-fiber diet, antibiotic use, or chronic stress. Consider SIBO LActulose, Fructose and Glucose breath testing.

Suggested Treatment:

Natural support: Use antimicrobial herbs like oregano oil, berberine, and garlic to help regulate overgrowth.

Probiotics: Supplement with Lactobacillus rhamnosus and Saccharomyces boulardii to restore a healthy gut flora balance.

Dietary changes: Focus on increasing fiber intake, particularly from prebiotics like inulin and resistant starch, which help maintain microbial balance. Reduce excessive fat and refined sugar intake, as these can encourage M. smithii overgrowth.

Lifestyle: Engage in regular physical activity to improve digestion and reduce stress. Ensure proper hydration to support overall gut health and encourage the movement of gases in the digestive system.

STREPTOCOCCUS AGALACTIAE ELEVATED: PHYLUM: Firmicutes

DESCRIPTION: Streptococcus agalactiae, also known as Group B Streptococcus (GBS), is a Gram-positive bacterium that can colonize the human gut and genital tract. While typically harmless, elevated levels of S. agalactiae can cause infections such as neonatal sepsis, pneumonia, and urinary tract infections, particularly in pregnant women or immunocompromised individuals. Dysbiosis and imbalances in the vaginal or gastrointestinal microbiota can increase the risk of S. agalactiae overgrowth.

Suggested Treatment:

Natural support: Use antimicrobial herbs like garlic and goldenseal to control bacterial overgrowth.

Probiotics: Supplement with Lactobacillus reuteri and Lactobacillus rhamnosus to support the urogenital and gut microbiota.

Dietary changes: Emphasise whole, anti-inflammatory foods and fermented products to promote microbial health.

Lifestyle: Practice good hygiene, stay hydrated, and engage in regular physical activity to support immune health.

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PSEUDOMONAS AERUGINOSA ELEVATED: PHYLUM: Proteobacteria

DESCRIPTION: Pseudomonas aeruginosa is a versatile, Gram-negative bacterium that is commonly found in soil, water, and the human body. It is an opportunistic pathogen, particularly in individuals with weakened immune systems, cystic fibrosis, or chronic lung conditions. Elevated levels of P. aeruginosa can lead to serious infections, including pneumonia, wound infections, and sepsis. The overgrowth of this pathogen is often linked to antibiotic resistance, making it difficult to treat.

Suggested Treatment:

Natural support: Incorporate antimicrobial herbs like oregano oil, garlic, and goldenseal to reduce bacterial overgrowth.

Probiotics: Supplement with Lactobacillus rhamnosus and Saccharomyces boulardii to restore healthy gut flora.

Dietary changes: Focus on a nutrient-dense, anti-inflammatory diet with plenty of fiber and fermented foods to enhance microbial balance.

Lifestyle: Maintain proper hydration, manage stress, and engage in regular physical activity to support immune function and gut health.

CITROBACTER YOUNGAE ELEVATED: PHYLUM: Proteobacteria

DESCRIPTION: Citrobacter youngae is a Gram-negative bacterium typically found in the environment and as a commensal organism in the gut. Elevated levels may be indicative of dysbiosis or microbial imbalance resulting from dietary factors, stress, or recent antibiotic use. Though less commonly associated with infections compared to other Citrobacter species, its overgrowth may signal an underlying disruption in the gut microbiome. C. youngae has been occasionally implicated in opportunistic infections, especially in immunocompromised individuals, and may exacerbate gut inflammation.

Suggested Treatment:

Natural support: Introduce natural antimicrobials like berberine, grapefruit seed extract, and oregano oil to control overgrowth.

Probiotic therapy: Use strains like Lactobacillus plantarum and Bifidobacterium breve to support a healthy gut.

Dietary recommendations: Increase the consumption of prebiotic-rich foods such as chicory root, asparagus, and dandelion greens.

Lifestyle improvements: Focus on stress reduction techniques and regular exercise to enhance gut microbial diversity.

DESULFOVIBRIO PIGER ELEVATED: PHYLUM: Proteobacteria

DESCRIPTION: Desulfovibrio piger is a Gram-negative sulfate-reducing bacterium involved in the production of hydrogen sulfide (H2S) in the gut. While present in low levels in a healthy microbiome, its elevation is often linked to diets high in animal protein and sulfur-containing compounds. Elevated D. piger levels can contribute to gut dysbiosis, epithelial damage, and increased intestinal permeability due to H2S's toxic effects on gut epithelial cells. This bacterium's overgrowth has been associated with inflammatory bowel diseases and other chronic gastrointestinal conditions.

Suggested Treatment:

Natural support: Use polyphenol-rich foods like green tea, pomegranate, and blueberries to counteract H2S toxicity.

Probiotics: Include Lactobacillus plantarum and Bifidobacterium bifidum to reduce sulfate-reducing bacteria.

Dietary changes: Encourage plant-based, high-fiber foods such as lentils, quinoa, and leafy greens to reduce sulfur availability.

Lifestyle modifications: Engage in regular exercise and stress management to support microbial balance.

PREVOTELLA BIVIA ELEVATED: PHYLUM: Bacteroidetes

DESCRIPTION: Prevotella bivia is a Gram-negative bacterium typically found in the oral and gastrointestinal microbiota. Overgrowth can contribute to periodontal disease, gut dysbiosis, and inflammation, often exacerbated by poor diet and antibiotic use.

Suggested Treatment:

Natural support: Include antimicrobial herbs such as garlic and goldenseal to control overgrowth.

Probiotics: Supplement with Saccharomyces boulardii and Lactobacillus casei to support microbial balance.

Dietary changes: Focus on fiber-rich and anti-inflammatory foods, and include fermented foods to improve gut health.

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Lifestyle: Maintain good oral hygiene, manage stress, and stay hydrated to support overall wellness.

Probiotics/Beneficial Bacteria Comment

AKKERMANSIA MUCINIPHILA ELEVATED: PHYLUM: Verrucomicrobiota

DESCRIPTION: Akkermansia muciniphila is a Gram-negative, anaerobic bacterium that primarily resides in the intestinal mucus layer. It plays an important role in maintaining gut barrier integrity, regulating immune responses, and supporting metabolic health by degrading mucin. Elevated levels of A. muciniphila have been associated with enhanced gut barrier function and improved metabolic outcomes, including better insulin sensitivity and reduced inflammation. While the bacterium is generally considered beneficial, abnormally high levels may indicate an overgrowth, often as a result of specific interventions such as prebiotic supplementation, high-fiber diets, or probiotic use. Excessive numbers could potentially contribute to gut dysbiosis or a shift in the microbiota composition, disrupting microbial balance. Elevated levels may also reflect an underlying metabolic or inflammatory condition, where A. muciniphila is responding to an altered environment in the gut. In some cases, an overabundance could have adverse effects, particularly when there is an imbalance with other gut microbiota species, suggesting the need for careful management of diet and lifestyle interventions.

Suggested Treatment:

Natural support: Reduce intake of excessive prebiotics or fiber-rich foods that could contribute to overgrowth.

Probiotics: Consider a balanced probiotic regimen to restore diversity and ensure a healthy microbiome.

Dietary changes: Ensure a well-rounded diet with moderate fiber intake to prevent A. muciniphila overgrowth.

Lifestyle: Engage in balanced physical activity and manage stress levels to maintain a healthy gut environment.

TOTAL BIFIDOBACTERIUM LEVELS ELEVATED: PHYLUM: Actinobacteria

DESCRIPTION: The total count of Bifidobacterium provides a comprehensive view of the collective abundance of species in this genus within the microbiome. These Gram-positive, anaerobic bacteria are key contributors to fermenting dietary fibers into short-chain fatty acids (SCFAs) like acetate and butyrate, which support gut health, immune function, and microbial diversity. They also inhibit pathogenic bacteria and modulate inflammation.

Elevated levels are less common and typically result from probiotic supplementation or dietary shifts. Review diet and probiotic use and consider retesting in 6-8 weeks.

Parasites/Helminths 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. 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.

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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 diarrhea) 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.

Viral Pathogens Comment

ROTAVIRUS DETECTED:

DESCRIPTION: Rotavirus is a very contagious viral illness and transmission is via the faecal-oral route, usually through direct contact between people. Common cause of childhood diarrhoea eosinophilic gastroenteritis. neonates and infants, Childcare outbreaks are common. Symptoms include foul smelling green watery stools (diarrhoea), abdominal pain, low-grade fever, irritable and dehydration. Short-lived, lasting about 24-72 hours. A repeat test for Enteric Viral Pathogens should be requested to ensure that the virus has cleared.

TREATMENT SUGGESTIONS: Conservative hygiene measures such as handwashing, Hydration and strict isolation is recommended for cases as such. Other immune modulators that may be beneficial are Vitamins A, C, and D, zinc, Echinacea.

PLEASE NOTE: Rotavirus detection has been confirmed through a secondary PCR test. Rotavirus is a Notifiable Disease. This result has been notified to the Department of Health.

NOTIFICATION BY THE REFERRING PRACTITIONER may also be required under the Public Health and Wellbeing Act 2009.

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), Next Generation Sequencing (NGS), Polymerase Chain Reaction (PCR)