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Date of Birth : 20-Oct-1986
Sex : F
Collected : 9/Aug/2021
Received: 12-Aug-2021
11/51 MCDONALD STREET
FRESHWATER NSW 2096
Lab id : **3759996** UR#: 6589449

6 EDWARDS BAY ROAD
MOSMAN NSW 2088

COMPLETE MICROBIOME MAPPING

General Macroscopic Description

| | Result | Range | Markers |
|--------------|-----------------|-------|---|
| Stool Colour | Brown | | Colour - Brown is the colour of normal stool. Other colours may indicate abnormal GIT conditions. |
| Stool Form | Unformed | | Form - A formed stool is considered normal. Variations to this may indicate abnormal GIT conditions. |
| Mucous | NEG | < + | Mucous - Mucous production may indicate the presence of an infection, inflammation or malignancy. |
| Occult Blood | + | < + | Blood (Macro) - The presence of blood in the stool may indicate possible GIT ulcer, and must always be investigated immediately. |

GIT Functional Markers

| | Result | Range | Units | |
|------------------------|------------------|----------------|---------|--|
| Calprotectin. | 9.6 | 0.0 - 50.0 | ug/g | |
| Pancreatic Elastase | >500.0 | > 200.0 | ug/g | |
| Faecal Secretory IgA | 798.2 | 510.0 - 2010.0 | ug/g | |
| Faecal Zonulin | 108.2 *H | 0.0 - 107.0 | ng/g | |
| Faecal B-Glucuronidase | 3639.9 | 337.0 - 4433.0 | U/g | |
| Steatocrit | 22.0 *H | 0.0 - 15.0 | % | |
| anti-Gliadin IgA | <20 | 0.0 - 157.0 | units/L | |

Microbiome Mapping Summary

Parasites & Worms

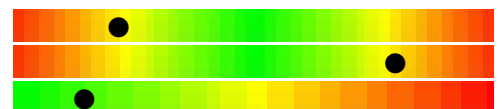
Bacteria & Viruses

Streptococcus species
Proteus species

Fungi and Yeasts

Key Phyla Microbiota

| | | | |
|---------------------------------------|----------------|--------------|-------------------------|
| Bacteroidetes | 6.90 *L | 8.61 - 33.10 | x10 ¹¹ org/g |
| Firmicutes | 30.33 | 5.70 - 30.40 | x10 ¹⁰ org/g |
| Firmicutes:Bacteroidetes Ratio | 0.44 | < 1.00 | RATIO |





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| Parasites and Worms. | Result | Range | Units | |
|--------------------------------------|--------------|------------|------------------------|---|
| Parasitic Organisms | | | | |
| Cryptosporidium. | <dl | < 1.0 | x10 ⁶ org/g | ● |
| Entamoeba histolytica. | <dl | < 1.0 | x10 ⁴ org/g | ● |
| Giardia lamblia. | <dl | < 5.0 | x10 ³ org/g | ● |
| Blastocystis hominis. | <dl | < 2.0 | x10 ³ org/g | ● |
| Dientamoeba fragilis. | <dl | < 1.0 | x10 ⁵ org/g | ● |
| Endolimax nana | <dl | < 1.0 | x10 ⁴ org/g | ● |
| Entamoeba coli. | <dl | < 5.0 | x10 ⁶ org/g | ● |
| Pentatrichomonas hominis | <dl | < 1.0 | x10 ² org/g | ● |
| Worms | | | | |
| Ancylostoma duodenale, Roundworm | Not Detected | | | Comment: Not Detected results indicate the absence of detectable DNA in this sample for the worms reported. |
| Ascaris lumbricoides, Roundworm | Not Detected | | | |
| Necator americanus, Hookworm | Not Detected | | | |
| Trichuris trichiura, Whipworm | Not Detected | | | |
| Taenia species, Tapeworm | Not Detected | | | |
| Enterobius vermicularis, Pinworm | Not Detected | | | |
| Opportunistic Bacteria/Overgr | Result | Range | Units | |
| Bacillus species. | <dl | < 1.5 | x10 ⁵ org/g | ● |
| Enterococcus faecalis | <dl | < 1.0 | x10 ⁴ org/g | ● |
| Enterococcus faecium | <dl | < 1.0 | x10 ⁴ org/g | ● |
| Morganella species | <dl | < 1.0 | x10 ³ org/g | ● |
| Pseudomonas species | <dl | < 1.0 | x10 ⁴ org/g | ● |
| Pseudomonas aeruginosa. | <dl | < 5.0 | x10 ² org/g | ● |
| Staphylococcus species | <dl | < 1.0 | x10 ⁴ org/g | ● |
| Staphylococcus aureus | <dl | < 5.0 | x10 ² org/g | ● |
| Streptococcus species | 8.5 *H | < 1.0 | x10 ³ org/g | ● |
| Methanobacteriaceae | 0.52 | < 5.00 | x10 ⁹ org/g | ● |
| Desulfovibrio piger | <dl | 0.0 - 18.0 | x10 ⁷ org/g | ● |
| Oxalobacter formigenes | 21.0 | > 15.0 | x10 ⁷ org/g | ● |
| Potential Autoimmune Triggers | | | | |
| Citrobacter species. | <dl | < 5.0 | x10 ⁵ org/g | ● |
| Citrobacter freundii. | <dl | < 5.0 | x10 ⁵ org/g | ● |
| Klebsiella species | <dl | < 5.0 | x10 ³ org/g | ● |
| Klebsiella pneumoniae. | <dl | < 5.0 | x10 ⁴ org/g | ● |
| Prevotella copri | <dl | < 1.0 | x10 ⁷ org/g | ● |
| Proteus species | 345.5 *H | < 5.0 | x10 ⁴ org/g | ● |
| Proteus mirabilis. | <dl | < 1.0 | x10 ³ org/g | ● |
| Fusobacterium species | 0.19 | < 10.00 | x10 ⁷ org/g | ● |
| Fungi & Yeast | Result | Range | Units | |
| Candida species. | 0.9 | < 5.0 | x10 ³ org/g | ● |
| Candida albicans. | <dl | < 5.0 | x10 ² org/g | ● |
| Geotrichum species. | <dl | < 3.0 | x10 ² org/g | ● |
| Microsporidium species | <dl | < 5.0 | x10 ³ org/g | ● |
| Rhodotorula species. | <dl | < 1.0 | x10 ³ org/g | ● |



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| Bacterial Pathogens | Result | Range | Units | |
|---------------------------------|--------|-------|------------------------|---|
| Aeromonas species. | <dl | < 1.0 | x10 ³ CFU/g | ● |
| Campylobacter. | <dl | < 1.0 | x10 ³ CFU/g | ● |
| C. difficile, Toxin A | <dl | < 1.0 | x10 ³ CFU/g | ● |
| C. difficile, Toxin B | <dl | < 1.0 | x10 ³ CFU/g | ● |
| Enterohemorrhagic E. coli | <dl | < 1.0 | x10 ³ CFU/g | ● |
| E. coli O157 | <dl | < 1.0 | x10 ² CFU/g | ● |
| Enteroinvasive E. coli/Shigella | <dl | < 1.0 | x10 ³ CFU/g | ● |
| Enterotoxigenic E. coli LT/ST | <dl | < 1.0 | x10 ³ CFU/g | ● |
| Shiga-like Toxin E. coli stx1 | <dl | < 1.0 | x10 ³ CFU/g | ● |
| Shiga-like Toxin E. coli stx2 | <dl | < 1.0 | x10 ³ CFU/g | ● |
| Salmonella. | <dl | < 1.0 | x10 ⁴ CFU/g | ● |
| Vibrio cholerae | <dl | < 1.0 | x10 ⁵ CFU/g | ● |
| Yersinia enterocolitica. | <dl | < 1.0 | x10 ⁵ CFU/g | ● |
| Helicobacter pylori | <dl | < 1.0 | x10 ³ CFU/g | ● |

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

| | | | |
|---------------------------------|--------------|---------------------------------|--------------|
| H.pylori Virulence Factor, babA | Not Detected | H.pylori Virulence Factor, cagA | Not Detected |
| H.pylori Virulence Factor, dupA | Not Detected | H.pylori Virulence Factor, iceA | Not Detected |
| H.pylori Virulence Factor, oipA | Not Detected | H.pylori Virulence Factor, vacA | Not Detected |
| H.pylori Virulence Factor, virB | Not Detected | H.pylori Virulence Factor, virD | Not Detected |

| Viral Pathogens | Result | Range | Units | |
|------------------|--------|-------|-------------------------|---|
| Adenovirus 40/41 | <dl | < 1.0 | x10 ¹⁰ CFU/g | ● |
| Norovirus GI/II | <dl | < 1.0 | x10 ⁷ CFU/g | ● |
| Bocavirus | <dl | < 1.0 | x10 ¹⁰ CFU/g | ● |

| Normal Bacterial GUT Flora | Result | Range | Units | |
|------------------------------|---------------|--------------|------------------------|---|
| Bacteroides fragilis | 1.2 *L | 1.6 - 250.0 | x10 ⁹ CFU/g | ● |
| Bifidobacterium species | 46.9 | > 6.7 | x10 ⁷ CFU/g | ● |
| Bifidobacterium longum | 42.5 | > 5.2 | x10 ⁶ CFU/g | ● |
| Enterococcus species | 4.2 | 1.9 - 2000.0 | x10 ⁵ CFU/g | ● |
| Escherichia species | 660.6 | 3.7 - 3800.0 | x10 ⁶ CFU/g | ● |
| Lactobacillus species | 29.3 | 8.6 - 6200.0 | x10 ⁵ CFU/g | ● |
| Lactobacillus Rhamnosus | 5.1 *L | 8.3 - 885.0 | x10 ⁴ CFU/g | ● |
| Clostridium species | 31.7 | 5.0 - 50.0 | x10 ⁶ CFU/g | ● |
| Enterobacter species | 3.1 | 1.0 - 50.0 | x10 ⁶ CFU/g | ● |
| Akkermansia muciniphila | 2.63 | 0.01 - 50.00 | x10 ³ CFU/g | ● |
| Faecalibacterium prausnitzii | 930.4 | 1.0 - 500000 | x10 ³ CFU/g | ● |

| Short Chain Fatty Acids | Result | Range | Units | |
|-------------------------------------|-------------|-------------|--------|---|
| Short Chain Fatty Acids, Beneficial | 24.1 | > 13.6 | umol/g | ● |
| Butyrate | 19.4 | 10.8 - 33.5 | % | ● |
| Acetate | 62.3 | 44.5 - 72.4 | % | ● |
| Propionate | 16.0 | 0.0 - 32.0 | % | ● |
| Valerate | 2.3 | 0.5 - 7.0 | % | ● |



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Pathogen Summary:

Macroscopy Comment

BROWN coloured stool is considered normal in appearance.

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

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

Treatment:

- Investigate and treat possible underlying cause.
- Assess other CDSA markers such as pH, pancreatic elastase 1 & microbiology markers."

BLOOD PRESENT: Consider blood vessel injury, inflammation, infection, ulceration, hemorrhoids, severe constipation & other injury.

Treatment:

- Investigate the cause of bleeding using other diagnostic tools such as endoscopy
- Assess other CDSA markers such as calprotectin, H. pylori, M2PK & microbiology markers.

Metabolism Comment

In a healthy gut Short Chain Fatty Acids are exhibited in the following proportions;

Butyrate, Acetate, Propionate (16% : 60% : 24%)

VALERATE:

Valerate is a short chain fatty acid that is important for gut health. Although Acetate, propionate, and butyrate make up the the most abundant SCFAs in gastrointestinal tract (95%), Valerate and other SCFA's make up the remaining and work optimally when within range.



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GIT Markers Comment

PANCREATIC ELASTASE: Normal exocrine pancreatic function.

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

This test is not affected by supplements of pancreatic enzymes.

Healthy individuals produce on average 500 ug/g of PE-1. Thus, levels below 500 ug/g and above 200 ug/g suggest a deviation from optimal pancreatic function.

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.

CALPROTECTIN Normal:

Faecal calprotectin values <50 ug/g are not indicative of inflammation in the gastrointestinal tract. Subjects with low faecal calprotectin levels normally do not need to be further investigated by invasive procedures.

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.

ELEVATED ZONULIN LEVELS:

Zonulin is a protein that modulates intestinal barrier function. 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.

If it's gluten for gluten sensitivity or celiac disease, remove gluten.

If bacterial overgrowth or dysbiosis, treat the bacterial overgrowth.

Treatment:

Firstly, fix the gut. Treat/repair the gut before proceeding with other protocols; nutrients and other supplements can be damaging to the system if they get out of the gut

Follow a grain - free diet for at least 12 months.

Eliminate gluten, sugar, processed food, artificial flavorings, colors, trans fats.

Supplementation:

Caprylic acid, Probiotics, acidophylis and B complex, fish oil, Magnesium D3, CoQ10, Mg Citrate, Boswellia & Curcumin, Milk Thistle, Selenium

For patients with chronic digestive issue: Vitamin A, L-Glutamine, Probiotics

Further investigations to consider:

- SIBO Breath Test,
- IgG or IgA 96 Food Sensitivity

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

Opportunistic Bacteria Comment

STREPTOCOCCUS SPECIES:

Description:

Streptococcus is a gram-positive bacteria in the Firmicutes phylum. Streptococcus is generally a common isolate from gut flora. However, emerging research suggests that high levels in the intestine may result from low stomach acid, PPI use, reduced digestive capacity, SIBO or constipation; Elevated levels may also be indicative of intestinal inflammatory activity, and may cause loose stools.



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Sources:

Recent infections with streptococcus pyogenes or scarlet fever can be linked to the presence of this species in faeces.

Treatment:

Treatment of streptococcus in gut flora is not always recommended. A practitioner may take into consideration a range of patient factors and symptoms to determine if treatment is necessary. In this case please refer to the 4R treatment protocol located at the end of this report.

METHANOBACTERIAEAE:

Family of bacteria-like microbes that produce methane. Facilitates carbohydrate fermentation and short-chain fatty acid production by beneficial bacteria.

LOW levels may indicate reduced production of short-chain fatty acids and may be associated with inflammation.

HIGH levels linked to chronic constipation, as well as some types of SIBO and IBS.

DESULFOVIBRIO COMMENT:

Sulfate is present in different concentrations in the intestine dependent on diet. Remnants not absorbed, alongside the presence of lactate, promote the growth of Sulfate reducing bacteria (SRB). Desulfovibrio Piger is the dominant SRB genus and has been implicated in gastrointestinal disorders such as ulcerative colitis via the reduction of sulfate to hydrogen sulphide in the gut. High Desulfovibrio piger levels serves as an indicator of inflammatory bowel disease.

Treatment options include lowering the intake of sulfate rich foods such as some breads, dried fruits, beers, ciders and wines.

Reference: Kushkevych et. Al., J. Clin. Med. 2019, 8, 1054; doi:10.3390/jcm8071054

OXALOBACTER COMMENT:

Oxalate is formed in the liver by amino acid catabolism as well as present in a wide range of foods including tea, coffee, chocolate and certain fruits and vegetables. High concentration of oxalate in the urine is related to the potential formation of calcium oxalate kidney stones. Oxalobacter Formigenes is the main known bacterial species involved in oxalate degradation in the gut.

Levels of O. Formigenes tends to decrease with age as well as with the use of antibiotics or other drugs, with low levels identified as a risk factor for calcium oxide stone formation. Treatment options include probiotic treatment and low oxalate diet modification. Urinary oxalate levels can also be monitored by test code 4025 (oxalate urinary).

Reference: Duncan et. al., Applied and Environmental Microbiology, Aug. 2002, p. 3841-3847

Kaufman et. al., J Am Soc Nephrol. 2008 Jun; 19(6): 1197-1203.

Potential Autoimmune Comments

ELEVATED PROTEUS SPECIES LEVEL:

Sources:

Food has been implicated as a vehicle of infection.

Pathogenicity;

Part of the normal flora of the GI tract, though has been shown to be an independent causative agent of intestinal disorders.

May also play a role as an opportunistic organism in enteric infection due to other pathogens.

Symptoms:

Occasionally implicated in diarrheal disorders.

Recently, it has been suggested that P. mirabilis may be an etiological agent in rheumatoid arthritis.

The mechanism may be related to the molecular cross reactivity between P. mirabilis and the HLA antigens, specifically HLA-DR4.

Treatment:

Currently, standard texts provide no specific antimicrobial guidelines for GI overgrowth of Proteus.

Ampicillin is recommended for extra-intestinal infections of P. mirabilis, followed by trimethoprim/sulfamethoxazole.

For further treatment suggestions, refer to the 4R treatment protocol located at the end of this report.

FUSOBACTERIUM SPECIES:

Fusobacterium species is a gram-negative bacteria in the Fusobacteria phylum. The bacteria is a common member of the human oral microbiome, this pro-inflammatory bacterium can also be found in the human gut. In the mouth, high levels are strongly linked to oral hygiene. In the gut, high levels have been observed in individuals with colon cancer and appendicitis.

Sources:

It primarily uses protein as its main source. However, research also shows that it can thrive from sugar.

Treatment:

Antimicrobial botanicals such as berberine, oregano, quercetin, curcumin, green and black tea extracts, blueberry extract, cinnamon and rosemary have shown to decrease levels.



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Phyla Microbiota Comment

LOW BACTEROIDETES LEVEL:

Gram-negative Bacteroidetes are a bacterial phyla that make up a large proportion of the human digestive tract, including the mouth, nose, throat, and colon. A low result in bacteroidetes may suggest imbalanced normal microbes in the GI tract. A lower level of bacteroidetes is considered an unfavourable outcome which allows for the potential of elevated firmicutes leading to a possible imbalanced firmicutes:bacteroidetes ratio.

Treatment:

It is suggested to eat a diverse range of foods including polyphenols. It is further suggested to decrease foods rich in fat and sugar as they encourage firmicute levels to rise. Investigate other causes relating to a low bacteroidetes level.

Normal Bacterial Flora Comment

LOW BACTEROIDES FRAGILIS LEVEL:

Organism of the Bacteroidetes phylum. Immune-modulating normal gut species believed to be involved in microbial balance, barrier integrity, and neuroimmune health.

Low levels may contribute to reduced anti-inflammatory activity in the intestine.

LOW LACTOBACILLUS RHAMNOSUS LEVEL:

Lactobacillus Rhamnosus is a bacteria in the Firmicutes phylum. Lactobacillus rhamnosus is one of the most widely used probiotic strains. Various health effects are well documented including the prevention and treatment of gastro-intestinal infections and diarrhea, and stimulation of immune responses. Low levels may be linked to poor digestive health, diarrhea and IBS symptoms.



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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 camosine, mastic gum, tribulus, berberine, black walnut, caprylic acid, oil of oregano |
| | | ANTIFUNGAL | Oil of oregano, caprylic acid, berberine, black walnut |
| | | ANTIPARASTIC | 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 subsp lactise, lactobacillus acidophilus, lactobacillus plantarum, lactobacillus casei, bifidobacterium breve, bifidobacterium bifidum, bifidobacterium longum, lactobacillus salivarius subsp 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 camosine, Saccaromyces boulardii, omega 3 essential fatty acids, B vitamins |
| | | SUPPORT CONSIDERATION | Sleep, diet, exercise, and stress management |