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Date of Birth : 08-Jul-1987
Sex : F
Collected : 25/May/2021
Received: 27-May-2021
1 CLISBY CLOSE
COOK ACT 2614
Lab id : **3743038** UR#: 6584867

CANBERRA WELLNESS CENTRE
2/25 MANUKA CIRCLE
FORREST ACT 2603

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	Formed		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	NEG	< +	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.	3.0	0.0 - 50.0	ug/g	
Pancreatic Elastase	>500.0	> 200.0	ug/g	
Faecal Secretory IgA	566.0	510.0 - 2010.0	ug/g	
Faecal Zonulin	75.6	0.0 - 107.0	ng/g	
Faecal B-Glucuronidase	2365.7	337.0 - 4433.0	U/g	
Steatocrit	7.0	0.0 - 15.0	%	
anti-Gliadin IgA	<20	0.0 - 157.0	units/L	

Microbiome Mapping Summary

Parasites & Worms

Bacteria & Viruses

Bacillus species.
Streptococcus species
Citrobacter freundii.

Fungi and Yeasts

Candida species.

Key Phyla Microbiota

Bacteroidetes	8.64	8.61 - 33.10	x10 ¹¹ org/g	
Firmicutes	20.91	5.70 - 30.40	x10 ¹⁰ org/g	
Firmicutes:Bacteroidetes Ratio	0.24	< 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.	1.8 *H	< 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	1.3	< 5.0	x10 ² org/g	
Streptococcus species	6.5 *H	< 1.0	x10 ³ org/g	
Methanobacteriaceae	0.25	< 5.00	x10 ⁹ org/g	
Desulfovibrio piger	<dl	0.0 - 18.0	x10 ⁷ org/g	
Oxalobacter formigenes	741.2	> 15.0	x10 ⁷ org/g	
Potential Autoimmune Triggers				
Citrobacter species.	<dl	< 5.0	x10 ⁵ org/g	
Citrobacter freundii.	6.2 *H	< 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	<dl	< 5.0	x10 ⁴ org/g	
Proteus mirabilis.	<dl	< 1.0	x10 ³ org/g	
Fusobacterium species	<dl	< 10.00	x10 ⁷ org/g	
Fungi & Yeast	Result	Range	Units	
Candida species.	50.4 *H	< 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	2.2	1.6 - 250.0	x10 ⁹ CFU/g	●
Bifidobacterium species	6.3 *L	> 6.7	x10 ⁷ CFU/g	●
Bifidobacterium longum	1.4 *L	> 5.2	x10 ⁶ CFU/g	●
Enterococcus species	11.3	1.9 - 2000.0	x10 ⁵ CFU/g	●
Escherichia species	3.1 *L	3.7 - 3800.0	x10 ⁶ CFU/g	●
Lactobacillus species	3.9 *L	8.6 - 6200.0	x10 ⁵ CFU/g	●
Lactobacillus Rhamnosus	1.5 *L	8.3 - 885.0	x10 ⁴ CFU/g	●
Clostridium species	27.8	5.0 - 50.0	x10 ⁶ CFU/g	●
Enterobacter species	2.6	1.0 - 50.0	x10 ⁶ CFU/g	●
Akkermansia muciniphila	<dl *L	0.01 - 50.00	x10 ³ CFU/g	●
Faecalibacterium prausnitzii	1008.1	1.0 - 500000	x10 ³ CFU/g	●

Short Chain Fatty Acids	Result	Range	Units	
Short Chain Fatty Acids, Beneficial	29.7	> 13.6	umol/g	●
Butyrate	12.0	10.8 - 33.5	%	●
Acetate	66.3	44.5 - 72.4	%	●
Propionate	19.6	0.0 - 32.0	%	●
Valerate	2.0	0.5 - 7.0	%	●



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Pathogen Summary:

Macroscopy Comment

BROWN coloured stool is considered normal in appearance.

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.

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.



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Opportunistic Bacteria Comment

ELEVATED BACILLUS SPECIES LEVEL:

Bacillus species are spore forming, gram-positive rods belonging to the Bacillaceae family. There are currently 50 valid species within the genus.

It has been noted that some strains are used as probiotics.

Sources:

Meat dishes are a common source of infection in other species of Bacillus such as *B. subtilis* and *B. licheniformis*. *B. cereus* food poisoning includes meats, pasta, vegetable dishes, desserts, cakes, sauces and milk.

Pathogenicity:

As yet, no toxins or other virulence factors have been identified in association with the symptoms that accompany non-*B. cereus* species.

Symptoms:

B. licheniformis and *B. subtilis* are associated with food-borne diarrheal illness.

Treatment:

It should be noted that the level of Bacillus spp should be considered in context of clinical symptoms. The level may be neither beneficial nor pathogenic. Where present, often inadequate levels of beneficial bacteria are also noted. These organisms may become dysbiotic at high levels where treatment may become necessary.

Natural Microbials:

In high levels of Bacillus spp, a combination of berberine and plant tannins have shown a high susceptibility success for treatment.

Antibiotics:

B. species is almost always susceptible to clindamycin, erythromycin and vancomycin.

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.

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.

METHANOBACTERIACEAE:

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 oxalate 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.



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Potential Autoimmune Comments

ELEVATED CITROBACTER FREUNDII LEVEL:

Sources:

Citrobacter is a gram-negative bacteria in the Enterobacteriaceae family. Common in the environment and may be spread by person-to-person contact. Several outbreaks have occurred in babies in hospital units. Isolated from water, fish, animals and food.

Pathogenicity:

Citrobacter is considered an opportunistic pathogen and therefore can be found in the gut as part of the normal flora.

Symptoms:

Citrobacter has occasionally been implicated in diarrheal disease, particularly *C. freundii* and *C. diversus* and *C. koseri*

Treatment:

Treatment is not generally required in low amounts. However, where high levels are present and patients are symptomatic. A combination of oregano, plant tannins and oregano has shown high susceptibility.

For further information, 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.

Fungi/Yeasts Comment

ELEVATED CANDIDA SPECIES LEVEL:

Sources:

Most sources of Candida infection are thought to be of endogenous origin. While yeast are ubiquitous in the environment and are found on fruits, vegetables and other plant materials, contamination from external sources is linked to patients and health care workers.

Pathogenicity:

A normal inhabitant of the GI tract. May become an opportunistic pathogen after disruption of the mucosal barrier, imbalance of the normal intestinal flora and/or impaired immunity.

Risk factors for colonization include: Antibiotics, corticosteroids, antacids, H2 blockers, oral contraceptives, irradiation, GI surgery, Diabetes mellitus, burns, T cell dysfunction, chronic stress and chronic renal disease.

Symptoms:

The most common symptom attributable to non-invasive yeast overgrowth is diarrhoea. Symptoms of chronic candidiasis affect four main areas of the body.

1. Intestinal system - symptoms include: diarrhoea, constipation, abdominal discomfort, distention, flatulence and rectal itching.
2. Genital Urinary system - symptoms include: menstrual complaints, vaginitis, cystitis and urethritis.
3. Nervous system - symptoms include: severe depression, extreme irritability, inability to concentrate, memory lapses and headaches.
4. Immune system - symptoms include urticaria, hay fever, asthma, and external otitis.

Sensitivities to tobacco, perfumes, diesel fumes and other chemicals.

Treatment:

Currently, standard texts provide no specific antifungal guidelines for GI overgrowth of Candida.

Oral azoles have been recommended for extra intestinal infections.

Susceptibility testing is advised due to increasing drug resistance.



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Normal Bacterial Flora Comment

LOW BIFIDOBACTERIUM LEVEL:

Organism of the Actinobacteria phylum.

Low levels may result from low fiber intake or reduced mucosal health. Thrives on a wide variety of prebiotic fibers.

LOW BIFIDOBACTERIUM LONGUM LEVEL:

Bifidobacterium longum is one of the well-established probiotic strains with numerous profound health benefits in humans. Supplementing with Bifidobacterium longum has been effective in alleviating gastrointestinal, immunological and infectious diseases. Increasingly, evidence is accumulating which shows beneficial effects of supplementation with bifidobacteria for the improvement of human health conditions ranging from protection against infection to different extra- and intra-intestinal positive effects. Moreover, bifidobacteria have been associated with the production of a number of potentially health promoting metabolites including short chain fatty acids.

LOW ESCHERICHIA SPECIES LEVEL:

Organism of the Proteobacteria phylum. Escherichia coli (E. coli) is the primary species in this genus, and most are nonpathogenic. Low levels may indicate reduced mucosal health and decreased protection against pathogenic E. coli.

LOW LACTOBACILLUS SPECIES LEVEL:

Lactate-producing bacteria in the Firmicutes phylum.

Low levels may be due to low carbohydrate intake or high salt intake, and may also indicate reduced mucosal health.

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.

LOW AKKERMANSIA MUCINIPHILA LEVEL:

Akkermansia muciniphila is an organism that lives in the mucus lining of your gut and uses mucus as its primary energy source. This species plays an important role in regulating mucus turnover in the gut so that there is a good balance between mucus breakdown and mucus production. Akkermansia muciniphila promotes healthy intestinal barrier and modulates immune responses.

Low levels of Akkermansia muciniphila has been observed in individuals with IBS, high fat diets, obesity, and type 2 diabetes. Reducing intake of high fat foods may help increase levels of this bacteria.



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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, Saccharomyces 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	Saccharomyces boulardii, lauric acid
		INTESTINAL BARRIER REPAIR	L-Glutamine, aloe vera, liquorice, marshmallow root, okra, quercetin, slippery elm, zinc camosine, Saccharomyces boulardii, omega 3 essential fatty acids, B vitamins
		SUPPORT CONSIDERATION	Sleep, diet, exercise, and stress management