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Date of Birth : [REDACTED]
Sex : F
Collected : 7/Sep/2020
Received: 09-Sep-2020
Lab id : [REDACTED] UR# : [REDACTED]

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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	Semiformed		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.	4.1	0.0 - 50.0	ug/g	
Pancreatic Elastase	>500.0	> 200.0	ug/g	
Faecal Secretory IgA	712.9	510.0 - 2010.0	ug/g	
Faecal Zonulin	105.0	0.0 - 107.0	ng/g	
Faecal B-Glucuronidase	2145.0	337.0 - 4433.0	U/g	
Steatocrit	24.0 *H	0.0 - 15.0	%	
anti-Gliadin IgA	160.0 *H	0.0 - 157.0	units/L	

Microbiome Mapping Summary

Parasites & Worms

Dientamoeba fragilis.

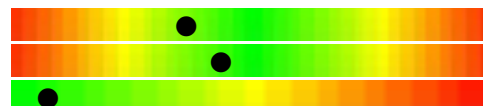
Bacteria & Viruses

Bacillus species.
Pseudomonas species
Citrobacter freundii.

Fungi and Yeasts

Key Phyla Microbiota

Bacteroidetes	13.90	8.61 - 33.10	x10 ¹¹ org/g
Firmicutes	15.80	5.70 - 30.40	x10 ¹⁰ org/g
Firmicutes:Bacteroidetes Ratio	0.11	< 1.00	RATIO





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Parasites and Worms.

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.	132.7 *H	< 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
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

Comment: Not Detected results indicate the absence of detectable DNA in this sample for the worms reported.

Opportunistic Bacteria/Overgr

Bacillus species.	8.4 *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	2.9 *H	< 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	0.2	< 1.0	x10 ³ org/g	
Methanobacteriaceae	1.44	< 5.00	x10 ⁹ org/g	

Potential Autoimmune Triggers

Citrobacter species.	<dl	< 5.0	x10 ⁵ org/g	
Citrobacter freundii.	324.1 *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	0.75	< 10.00	x10 ⁷ org/g	

Fungi & Yeast

Candida species.	<dl	< 5.0	x10 ³ org/g	
Candida albicans.	<dl	< 5.0	x10 ² org/g	
Geotrichum species.	0.4	< 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	
Listeria monocytogenes	<dl	< 1.0	x10 ³ 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	2.6	1.6 - 250.0	x10 ⁹ CFU/g	
Bifidobacterium species	327.8	> 6.7	x10 ⁷ CFU/g	
Enterococcus species	29.1	1.9 - 2000.0	x10 ⁵ CFU/g	
Escherichia species	1.5 *L	3.7 - 3800.0	x10 ⁶ CFU/g	
Lactobacillus species	47.5	8.6 - 6200.0	x10 ⁵ CFU/g	
Clostridium species	7.1	5.0 - 50.0	x10 ⁶ CFU/g	
Enterobacter species	5.1	1.0 - 50.0	x10 ⁶ CFU/g	
Akkermansia muciniphila	<DL (a) *L	0.01 - 50.00	x10 ³ CFU/g	
Faecalibacterium prausnitzii	640.0	1.0 - 500000	x10 ³ CFU/g	

Short Chain Fatty Acids	Result	Range	Units	
Short Chain Fatty Acids, Beneficial	31.4	> 13.6	umol/g	
Butyrate	28.5	10.8 - 33.5	%	
Acetate	50.1	44.5 - 72.4	%	
Propionate	20.9	0.0 - 32.0	%	
Valerate	0.5	0.5 - 7.0	%	



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Pathogen Summary:

Macroscopy Comment

BROWN coloured stool is considered normal in appearance.

SEMI FORMED stools may indicate dysbiosis, food allergy or intolerance, laxative use, high dose Vitamin C and magnesium. May also indicate an infection (bacteria or viral), amoeba or Giardia, Irritable Bowel Syndrome, Intestinal permeability, Coeliac Disease, malabsorption, maldigestion or stress.

Treatment:

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

ELEVATED FAECAL anti-GLIADIN IgA LEVEL:

Gliadin is a component of gluten, the protein found in wheat and other field grass grains such as barley, malt, and rye. The presence of faecal anti-gliadin antibodies can indicate an immune response (in the gut) to gluten in the diet. Faecal anti-gliadin antibodies do not necessarily correlate with blood levels.

When levels are elevated it is suggested to investigate underlying causes, such as chronic dysbiosis, acute infections, acute stress, or food sensitivities. Review Zonulin levels in conjunction with anti-gliadin IgA.

Treatment:

Consider a gluten elimination diet for a trial period. If patients have been gluten-free, consider hidden sources of gluten and gliadin cross-reactive food such as dairy, corn, oats, millet, rice and yeast. A food sensitivity panel may benefit the patient in this case to identify hidden food sensitivities. Other intestinal barrier support may include supplements such as L-glutamine, zinc carnosine, and colostrum.

Parasites/Worms Comment

ELEVATED DIENTAMOEBIA FRAGILIS LEVEL:

Significant copies per gene of Dientamoeba fragilis have been detected in this stool sample. Dientamoeba fragilis is closely related to Histomonas and Trichomonas species. D. fragilis is known to cause non-invasive diarrheal illness in humans. 90% of children are symptomatic, whereas only 15-20% of adults are. The most common symptoms associated with D. fragilis are intermittent diarrhoea, fatigue, abdominal pain, fatigue, nausea, anorexia, malaise and unexplained eosinophilia. Diarrhea is predominately seen during the first 1-2 weeks of infection and abdominal pain may persist for 1-2 months.

Treatment:

Iodoquinol, tetracycline or metronidazole have been used to treat D. fragilis. Another alternative is paromomycin.

Using a combination of herbs that contain berberine (e.g. Golden seal, Coptis chinensis, Barberry, Oregon grape and Phellodendron) is desirable for the treatment of certain organisms. It is important to investigate the percentage of berberine contained in the dry weight extract of the berberine containing herb and then dose accordingly for the therapeutic dose of berberine.

Total therapeutic dose of berberine: 200mg four times daily.

Further Investigation:

PCR stool analysis should be considered in 4 weeks' time to ensure infection has cleared.



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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.

ELEVATED PSEUDOMONAS SPECIES LEVEL:

Sources:

Pseudomonas is found in water and soil as well as fruits and vegetables.

Bottled water can be a common source of infection.

Because the organism is able to survive aqueous environments, it is an important nosocomial pathogen. Pseudomonas can also be found on a number of surfaces and in aqueous solutions.

Pathogenicity:

Pseudomonas is considered an opportunistic pathogen.

Symptoms:

In the gastrointestinal tract it can cause inflammation, epithelial barrier dysfunction, tight cell junction interruption, and intestinal permeability.

Treatment:

Ciprofloxacin is recommended for the treatment of Pseudomonas induced antibiotic-associated colitis. Pseudomonas is usually susceptible to antipseudomonal penicillins, aminoglycosides, carbapenems, 3rd generation cephalosporins and gentamycin.

For further treatment suggestions, refer to the 4R protocol 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.

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:



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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.

Normal Bacterial Flora Comment

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 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 carnosine, mastic gum, tribulus, berberine, black walnut, caprylic acid, oil of oregano
		ANTIFUNGAL	Oil of oregano, caprylic acid, berberine, black walnut
		ANTIPARASITIC	Artemesia, black walnut, berberine, oil of oregano
		ANTIVIRAL	Cat's claw, berberine, echinacea, vitamin C, vitamin D3, zinc, reishi mushrooms
		BIOFILM	Oil of oregano, protease
REPLACE	In cases of maldigestion or malabsorption, it may be necessary to restore proper digestion by supplementing with digestive enzymes.	DIGESTIVE SUPPORT	Betaine hydrochloride, tilactase, amylase, lipase, protease, apple cider vinegar, herbal bitters
REINOCULATE	Recolonisation with healthy, beneficial bacteria. Supplementation with probiotics, along with the use of prebiotics helps re-establish the proper microbial balance.	PREBIOTICS	Slippery elm, pectin, larch arabinogalactans
		PROBIOTICS	Bifidobacterium animalis sup lactise, lactobacillus acidophilus, lactobacillus plantarum, lactobacillus casei, bifidobacterium breve, bifidobacterium bifidum, bifidobacterium longum, lactobacillus salivarius ssp salivarius, lactobacillus paracasei, lactobacillus rhamnosus, Saccaromyces boulardii
REPAIR & REBALANCE	Restore the integrity of the gut mucosa by giving support to healthy mucosal cells, as well as immune support. Address whole body health and lifestyle factors so as to prevent future GI dysfunction.	INTESTINAL MUCOSA IMMUNE SUPPORT	Saccaromyces boulardii, lauric acid
		INTESTINAL BARRIER REPAIR	L-Glutamine, aloe vera, liquorice, marshmallow root, okra, quercetin, slippery elm, zinc carnosine, Saccaromyces boulardii, omega 3 essential fatty acids, B vitamins
		SUPPORT CONSIDERATION	Sleep, diet, exercise, and stress management