

**TEST PATIENT****Dr.TEST DOCTOR**

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Date of Birth : 01-Jan-1959  
 Sex : F  
 Collected : 11/Aug/2021  
 Received: 11-Aug-2021

TEST HEALTH CENTRE  
 123 TEST STREET  
 BURWOOD VIC 3125

Lab id : **3759607** UR#:

## COMPLETE DIGESTIVE STOOL ANALYSIS - Level 2

### MACROSCOPIC DESCRIPTION

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

### Macroscopy Comment

Unformed 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 markers such as pH, pancreatic elastase 1 & microbiology markers.





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## MICROSCOPIC DESCRIPTION

	Result	Range	Markers
RBCs (Micro)	<b>NEG</b>	< +	<b>RBC(Micro)</b> - The presence of RBCs in the stool may indicate the presence of an infection, inflammation or haemorrhage.
WBCs (Micro)	<b>0</b>	< 10	<b>WBC(Micro)</b> - The presence of WBCs in the stool may indicate the presence of an infection, inflammation or haemorrhage.
Food Remnants	<b>+</b>	< ++	<b>Food Remnants</b> - The presence of food remnants may indicate maldigestion.
Fat Globules	<b>++</b>	< +	<b>Fat Globules</b> -The presence of fat globules may indicate fat maldigestion.
Starch	<b>NEG</b>	< +	<b>Starch</b> - The presence of starch grains may indicate carbohydrate maldigestion.
Meat Fibres	<b>NEG</b>	< +	<b>Meat Fibres</b> - The presence of meat fibres may indicate maldigestion from gastric hypoacidity or diminished pancreatic output.
Vegetable Fibres	<b>+</b>	< ++	<b>Vegetable Fibres</b> - The presence of vegetable fibres may indicate maldigestion from gastric hypoacidity or diminished pancreatic output.

## Microscopy Comment

### FAT GLOBULES PRESENT:

The presence of fat globules in faeces is an indirect indicator of incomplete fat digestion. Consider high dietary fat intake, cholestasis, malabsorption & digestion (diarrhoea, pancreatic or bile salt insufficiency), intestinal dysbiosis, parasites, NSAIDs use, short bowel syndrome, whipples disease, Crohn's disease, food allergies & sensitivities.

### Treatment:

- Prebiotic and probiotic supplementation
- Supplement hydrochloride, digestive enzymes or other digestive aids
- Investigate underlying causes
- Investigate food sensitivities and allergies
- Remove potential irritants
- Assess other CDSA markers such as pancreatic elastase 1, calprotectin, & microbiology markers.

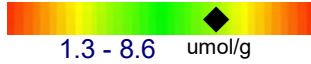
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**DIGESTIVE AND ABSORPTION MARKERS****Short Chain Fatty Acids, Putrefactive****12.0**

**Short Chain Fatty Acids, Putrefactive** - Putrefactive SCFAs are produced when anaerobic bacteria ferment undigested protein, indicating protein maldigestion.

**Pancreatic Elastase 1****180**

**Pancreatic Elastase** is used to assess pancreatic exocrine function. Pancreatic insufficiency is associated with diabetes mellitus, cholelithiasis, pancreatic tumour, cystic fibrosis and osteoporosis. This test is not affected by substitution therapy with enzymes of animal origin. PE-1 levels decline with age.

**Long Chain Fatty Acids****13.0**

**Long Chain Fatty Acids** - Elevated levels of total LCFAs in the stool may indicate inadequate lipid absorption

**Absorption Comment**

Putrefactive SCFAs are ELEVATED:  
 Suspect hypochlorhydria, exocrine pancreatic insufficiency, or protein malabsorption.  
 Other causes include bacterial overgrowth of the small bowel, gastrointestinal disease, and/or rapid transit time.

PANCREATIC ELASTASE: MILD TO MODERATE INSUFFICIENCY.  
 Pancreatic insufficiency reflects trypsin, chymotrypsin, amylase and lipase activity.  
 PE1 is also useful in monitoring exocrine pancreatic function caused by: Chronic pancreatitis, Autoimmunopathies & connective tissue diseases, Chronic inflammatory bowel disease, Intestinal malabsorption with mucosal atrophy.  
 Treatment:  
 • Digestive enzyme supplementation  
 • A low-fat diet to control steatorrhea (excess fat in stools)  
 • Vitamin and mineral supplementation  
 • Investigate underlying causes for reduced pancreatic function (for eg. Coeliac disease, duodenal enteropathy, pancreatitis).



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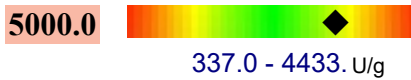
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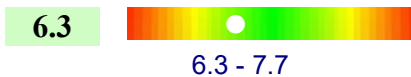
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## METABOLIC MARKERS

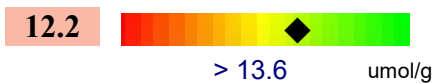
### b-Glucuronidase



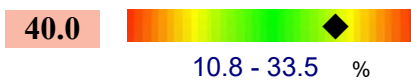
### pH



### Short Chain Fatty Acids, Beneficial



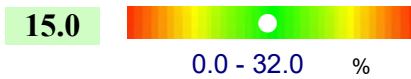
### Butyrate



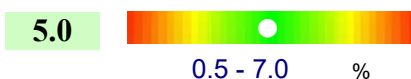
### Acetate



### Propionate



### Valerate



### Markers

**b-Glucuronidase** - Increased levels of b-Glucuronidase may reverse the effects of Phase II detoxification processes.

**pH** - Imbalances in gut pH, will influence SCFA production and effect.

**Short Chain Fatty Acids, Beneficial (Total)** - Elevated SCFAs may indicate bacterial overgrowth. Inadequate SCFAs may indicate inadequate normal flora.

**Butyrate** - Decreased Butyrate levels may indicate inadequate colonic function.

**Acetate** - Decreased Acetate levels may indicate inadequate colonic function.

**Propionate** - Decreased Propionate levels may indicate inadequate colonic function.

**Valerate** - Decreased Valerate levels may indicate inadequate colonic function.

## Metabolic Markers Comment

In a healthy gut Short Chain Fatty Acids are exhibited in the following proportions;  
Butyrate, Acetate, Propionate ( 16% : 60% : 24% )

### LOW BENEFICIAL SCFAs:

Low Short chain Fatty Acid, Beneficial levels may be indicated by reduced beneficial flora such as Lactobacillus, Bifidobacterium, Escherichia and other normal bacterial gut flora levels.

Suspect increased susceptibility to pathogenic bacterial infection, increased toxic enzyme exposure, increased risk for mucosal barrier defects and immune dysregulation.

### ELEVATED 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. Elevated levels are associated with carbohydrate intolerance and diarrhoea.

### beta GLUCURONIDASE ELEVATED:

Suspect increased activation and enterohepatic recirculation of toxins, hormones, and various drugs within the body. Increased burden on glucuronidation pathway is associated with increased risk of colorectal, prostate and breast cancers.

### 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.

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**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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<b>BENEFICIAL BACTERIA</b>		Result	Range		Result	Range
Bifidobacterium longum.	2+	2 - 4+	Lactobacillus plantarum	1+ *L	2 - 4+	
Bifidobacterium bifidum	1+ *L	2 - 4+	Lactobacillus rhamnosus.	2+	2 - 4+	
Bifidobacterium animalis	2+	2 - 4+	Lactobacillus paracasei	1+ *L	2 - 4+	
Bifidobacterium pseudocaten.	1+ *L	2 - 4+	Lactobacillus casei	2+	2 - 4+	
Bifidobacterium breve	2+	2 - 4+	Lactobacillus acidophilus	1+ *L	2 - 4+	
Escherichia coli	2+	2 - 4 +	Enterococci	2+	1 - 2 +	

**COMMENTS:**

Significant numbers of Lactobacilli, Bifidobacteria and E coli are normally present in the healthy gut: Lactobacilli and Bifidobacteria, in particular, are essential for gut health because they contribute to 1) the inhibition of gut pathogens and carcinogens. 2) the control of intestinal pH, 3) the reduction of cholesterol, 4) the synthesis of vitamins and disaccharidase enzymes.

**PATHOGENIC BACTERIA**

Organism	Growth	Range	Classification
Aeromonas species	NEG		
Campylobacter	NEG		
Salmonella	NEG		
Shigella	NEG		
Yersinia	NEG		

**COMMENTS:**

The above Pathogenic Bacteria are those that have the potential to cause disease in the GI tract. A result of **ISOLATED** may require a notification to the Department of Health and also cross tested via a secondary method such as PCR or sequencing. Should this be the case, you will also be notified.

**OPPORTUNISTIC AND DYSBIOTIC BACTERIA**

Organism	Growth	Range	Classification
Klebsiella pneumoniae	4+ *H	< 4+	Possible Pathogen
Klebsiella oxytoca	3+ *H	< 3+	Possible Pathogen
Citrobacter freundii	2+	< 4+	Non-Pathogen
Enterococcus faecium.	2+	< 3+	Non-Pathogen

**COMMENTS:**

Commensal bacteria are usually neither pathogenic nor beneficial to the host GI tract. Imbalances can occur when there are insufficient levels of beneficial bacteria and increased levels of commensal bacteria. Certain commensal bacteria are reported as dysbiotic at higher levels.

Dysbiotic bacteria consist of known pathogenic bacteria and those that have the potential to cause disease in the GI tract. A detailed explanation of bacteria that may be present can be found in the Pathogen Summary at the end of this report.

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**YEASTS**

Organism	Growth	Range	Classification
Candida albicans	<b>2+ *H</b>	NEG - +	Possible Pathogen
Saccharomyces cerevisiae	<b>3+</b>	NEG - +++	Non-Pathogen
Geotrichum spp	<b>1+</b>	NEG - +	Non-Pathogen
Rhodotorula spp	<b>1+</b>	NEG - +++	Non-Pathogen
Other Yeasts	<b>NEG</b>	NEG - +++	

**COMMENTS:**

Yeast may normally be present in small quantities in the skin, mouth, and intestine. A detailed explanation of yeast that may be present can be found in the Pathogen Summary at the end of this report.

**PARASITES****Result**

Blastocystis Hominis	<b>NOT DETECTED</b>
Dientamoeba fragilis	<b>NOT DETECTED</b>
Cryptosporidium	<b>NOT DETECTED</b>
Giardia lamblia	<b>NOT DETECTED</b>
Entamoeba Histolytica	<b>NOT DETECTED</b>
Other Parasites	<b>NOT DETECTED</b>

**COMMENTS:** Parasites are organisms that are not present in a normal/healthy GIT. A detailed explanation of parasites that may be present can be found in the Pathogen Summary at the end of this report.

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**ANTIBIOTIC SENSITIVITIES and NATURAL INHIBITORS**

	<b>Klebsiella oxytoca</b>	<b>Klebsiella pneumoniae</b>	<b>Citrobacter freundii</b>
<b>Antibiotics</b>	Susceptible	Susceptible	Susceptible
Augmentin	N/A	N/A	N/A
Ciprofloxacin	S	S	S
Norfloxacin	S	S	S
Meropenem	S	S	S
Gentamycin.	N/A	N/A	N/A
Trimethoprim/Sulpha	S	S	S
Erythromycin	N/A	N/A	N/A
Penicillin.	N/A	N/A	N/A

LEGEND

S = Sensitive	R = Resistant	N/A = Not Tested
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**Inhibitors**

	<b>Inhibition %</b>	<b>Inhibition %</b>	<b>Inhibition %</b>
Berberine	60%	80%	60%
Black Walnut	40%	40%	40%
Caprylic Acid	100%	100%	100%
Citrus Seed	40%	40%	40%
Coptis	40%	40%	40%
Garlic-	60%	60%	60%
Golden seal	20%	20%	40%
Oregano	20%	20%	60%


LEGEND

Low Inhibition			High Inhibition		
0	20	40	60	80	100



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**YEAST - SENSITIVITIES and NATURAL ANTIFUNGALS**

	<b>Candida albicans</b>	<b>Geotrichum spp</b>	<b>Rhodotorula spp</b>	<b>Saccharomyces cerevisiae</b>
<b>Antifungals</b>	Inhibition	Inhibition	Inhibition	Inhibition
Fluconazole	<b>&lt;=0.5=S</b>	256=NI	256=NI	<b>&lt;=0.5=S</b>
Voriconazole	<b>&lt;=0.12=S</b>	4.0=NI	4.0=NI	<b>&lt;=0.12=S</b>
Itraconazole				

**INHIBITION CATEGORY**

- R** Resistant This category indicates that the organism is not inhibited by obtainable levels of the pharmaceutical agent
- I** Intermediate This category indicates where the minimum inhibition concentrations (MIC) approach obtainable pharmaceutical agent levels and for which response rates may be lower than for susceptible isolates
- SDD** Susceptible, Dose Dependent This category indicates that clinical efficacy is achieved when higher than normal dosage of a drug is used to achieve maximal concentrations
- S** Susceptible This category indicates that the organisms are inhibited by the usual achievable concentration of the agent
- NI** No Interpretative Guidelines This category indicates that there are no established guidelines for MIC interpretation for these organisms

**Non-absorbed Antifungals**

	Inhibition %	Inhibition %	Inhibition %	Inhibition %
Nystatin	60%	60%	60.00	60%

**Natural Antifungals**

	Inhibition %	Inhibition %	Inhibition %	Inhibition %
Berberine.	60%	60%	60.00	40%
Garlic	40%	40%	40.00	60%
Black Walnut.	40%	40%	40.00	60%
Citrus Seed.	40%	60%	60.00	40%
Coptis.	20%	60%	60.00	60%
Golden seal.	20%	60%	60.00	40%
Oregano.	20%	40%	40.00	60%

**LEGEND**

Low Inhibition

High Inhibition



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## PATHOGEN SUMMARY

### **KLEBSIELLA:**

#### **Sources:**

Isolated from foods and environmental sources.  
 Klebsiella appears to thrive in individuals on a high starch diet.  
 Avoiding carbohydrates such as rice, potatoes, flour products and sugary foods reduces the amount of Klebsiella in the gut

#### **Pathogenicity:**

Part of the normal GI flora in small numbers, but can be an opportunistic pathogen.  
 Klebsiella is capable of translocating from the gut when in high numbers.  
 Certain strains of K. oxytoca have demonstrated cytotoxin production.

#### **Symptoms:**

K. pneumoniae and K. oxytoca have been associated with diarrhea in humans.  
 Cytotoxin-producing strains are associated with acute hemorrhagic enterocolitis.  
 Increased colonization of Klebsiella in the stool has been found in HLA-B27 + AS patients.

#### **Treatment:**

Currently, standard texts provide no specific antimicrobial guidelines for GI overgrowth of Klebsiella .  
 Third generation cephalosporins and fluroquinolones are the recommended antimicrobial agents for extra-intestinal sites.

#### **Other Herbal antimicrobials include:**

Lemon and clove, Burr marigold, Thyme, Licorice, euphobia, cordyceps.

### **CITROBACTER:**

#### **Sources:**

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:**

Currently, standard texts provide no specific antimicrobial guidelines for GI overgrowth of Citrobacter.  
 Carbapenems and fluroquinolones are the recommended antibiotics for extraintestinal sites.

### **ENTEROCOCCUS:**

#### **Description:**

Enterococcus species are gram-positive bacterium that are part of normal flora in the human gut. It can however be implicated in a variety of infections of which urinary tract infections are the most common. These infections can be exceptionally difficult to treat due to the genus exhibiting antibiotic resistance.

#### **Sources:**

Enterococcus infections spread from person to person through poor hygiene. Because these bacteria are found in faeces, people can transmit the infection if they don't wash their hands after using the bathroom. The bacteria can get into food or onto common touched surfaces.

#### **Treatment:**

Treatment of Enterococcus species in gut flora may not be necessary or recommended. However, overgrowth of this genus may be implicated in other infections such as urinary tract infections.

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Enterococci are challenging to treat due their drug-resistant mechanisms. Ampicillin is the preferred antibiotic used to treat enterococci infections if required.

**CANDIDA****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 diarrhea. Symptoms of chronic candidiasis affect four main areas of the body.

1. Intestinal system - symptoms include: diarrhea, 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, hayfever, 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.

**GEOTRICHUM SPECIES:**

Geotrichum are yeast belonging to the Endomyceteaceae family.

**Sources:**

This organism can be found in soil, dairy products and in human skin and mucosae.

**Pathogenicity:**

Usually only considered an opportunistic pathogen in immune-compromised hosts. Geotrichum candidum is the etiological agent of Geotrichosis. Geotrichum may also play a role in IBS.

**Symptoms:**

Symptoms of Geotrichum infection have been associated with diarrhea and enteritis. Symptoms of Geotrichosis may resemble those of candidiasis.

**Treatment:**

Currently, standard texts provide no specific antifungal guidelines for GI overgrowth of Geotrichum. Oral azoles and have been recommended for extra intestinal infections. Susceptibility testing is advised owing to increasing drug resistance.

**YEAST NOT CANDIDA ALBICANS or RHODOTORULA SPECIES or TRICHOSPORON SPECIES****Sources:**

Yeast are ubiquitous in the environment and can be found on fruits, vegetables and other plant materials. They can also live as normal inhabitants both within and on the body.

**Pathogenicity:**

Less common yeast such as those outlined in this section should only be considered opportunistic pathogens in the Immunocompromised host.

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Disseminated infections may include the intestinal tract and are usually associated with immunosuppressive diseases or conditions such as leukemia, organ transplant, multiple myeloma, aplastic anemia, diabetes mellitus with ketoacidosis, ICU patients, lymphoma, solid tumors and AIDS.

Immunosuppressive therapy such as corticosteroids, chemotherapeutic agents and cyclosporine can also enhance fungal overgrowth.

**Treatment:**

Currently, standard texts provide no specific antifungal guidelines for GI overgrowth of the fungi mentioned.

Treatment is at the discretion of the practitioner, and should be based upon clinical symptoms and a positive reculture of the organism.

**SACCHAROMYCES CEREVISIAE:****Sources:**

*S. cerevisiae* is a commonly used industrial microorganism and is ubiquitous in nature, being present on fruits and vegetables. Commonly known as Bakers or Brewers yeast, it has been used in bread manufacture and as a fermenter in alcoholic beverages.

**Pathogenicity:**

Commonly colonises mucosal surfaces but isn't considered an opportunistic pathogen. Overgrowth may be associated with dietary ingestion of *S. cerevisiae*/*S. boulardii* as part of a "health food" regimen.

**Symptoms:**

*S. cerevisiae* overgrowth usually accompanies an underlying disease through immunosuppression, prolonged hospitalization and antibiotic therapy.

**Treatment:**

Currently no specific treatment guidelines are reported for *S. cerevisiae* overgrowth.



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# The Four “R” Treatment Protocol

<b>REMOVE</b>	<p>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.</p> <p>Consider testing IgG96 foods as a tool for removing offending foods.</p>	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
		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
<b>REPLACE</b>	<p>In cases of maldigestion or malabsorption, it may be necessary to restore proper digestion by supplementing with digestive enzymes.</p>	DIGESTIVE SUPPORT	Betaine hydrochloride, tilactase, amylase, lipase, protease, apple cider vinegar, herbal bitters
<b>REINOCULATE</b>	<p>Recolonisation with healthy, beneficial bacteria. Supplementation with probiotics, along with the use of prebiotics helps re-establish the proper microbial balance.</p>	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 sp salivarius, lactobacillus paracasei, lactobacillus rhamnosus, Saccaromyces boulardii
<b>REPAIR &amp; REBALANCE</b>	<p>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.</p>	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	Seep, diet, exercise, and stress management