

COMPLETE DIGESTIVE STOOL ANALYSIS - Level 3

MACROSCOPIC DESCRIPTION

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

Macroscopy Comment

YELLOW or GREEN coloured stool suggests diarrhoea or a bowel sterilized by antibiotics.

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:

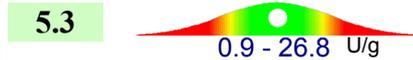
- Investigate and treat possible underlying cause.
- Assess other CDSA markers such as pH, pancreatic elastase 1 & microbiology markers."

MICROSCOPIC DESCRIPTION

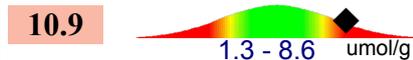
	Result	Range	Markers
RBCs (Micro)	ND	<+	RBC(Micro) - The presence of RBCs in the stool may indicate the presence of an infection, inflammation or haemorrhage.
WBCs (Micro)	0	<10	WBC(Micro) - The presence of WBCs in the stool may indicate the presence of an infection, inflammation or haemorrhage.
Food Remnants	+	<++	Food Remnants - The presence of food remnants may indicate maldigestion.
Fat Globules	ND	<+	Fat Globules -The presence of fat globules may indicate fat maldigestion.
Starch	ND	<+	Starch - The presence of starch grains may indicate carbohydrate maldigestion.

DIGESTIVE MARKERS

Chymotrypsin



Short Chain Fatty Acids, Putrefactive



Markers

Chymotrypsin - Chymotrypsin is involved in protein digestion. Low levels of chymotrypsin may indicate protein maldigestion due to pancreatic insufficiency.

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

	Result	Range
Meat Fibres	ND	< +
Vegetable Fibres	+	< ++

Markers

Meat Fibres - The presence of meat fibres may indicate maldigestion from gastric hypoacidity or diminished pancreatic output.

Vegetable Fibres - The presence of vegetable fibres may indicate maldigestion from gastric hypoacidity or diminished pancreatic output.

Digestive Markers 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: 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.

Pancreatic Elastase 1



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.

Sample Test Name

 Date Of Birth: 04 OCT 1972
 Sex: M
 Lab ID: #####

Test Physician

 Dr. Edward Chan
 11 - 1, Wisma Laxton,
 Jalan Desa, Taman Desa, 58100.

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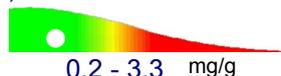
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ABSORPTION MARKERS

Triglycerides, Stool

1.9



0.2 - 3.3 mg/g

Long Chain Fatty Acids

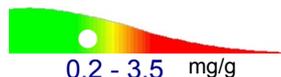
17.5



1.3 - 23.7 mg/g

Cholesterol, Stool

2.8



0.2 - 3.5 mg/g

Phospholipids

4.7



0.2 - 8.8 mg/g

Markers

Triglycerides, Stool - Elevated levels of Triglycerides in the stool may indicate lipid maldigestion.

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

Cholesterol, Stool - Elevated levels of Cholesterol in the stool may indicate inadequate absorption.

Phospholipids - Elevated levels of Phospholipids in the stool may indicate inadequate absorption.

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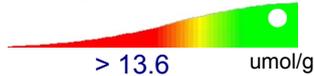
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METABOLIC MARKERS

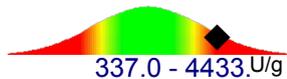
Short Chain Fatty Acids, Beneficial

69.0


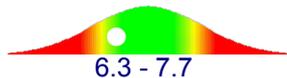
Butyrate

16.2

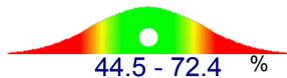

b-Glucuronidase

5116.0


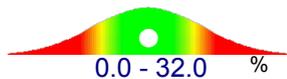
pH

6.4


Acetate

63.7


Propionate

12.9

Markers

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.

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.

Acetate - Decreased Acetate levels may indicate inadequate colonic function.

Propionate - Decreased Propionate levels may indicate inadequate colonic function.

Metabolic Markers Comment

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

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BENEFICIAL BACTERIA

	Result	Range
Bifidobacteria	+	2 - 4 +
Lactobacilli	++	2 - 4 +
Eschericia coli	++	2 - 4 +
Enterococci	+	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.

OTHER BACTERIA

	Result	Range
Klebsiella	+++	< +++
Pseudomonas	ND	< +++
Campylobacter	ND	< +
Citrobacter	+++	< +++
Yersinia	ND	< +
Other Bacteria.	++	< +++

COMMENTS:
YEASTS

	Result	Range
Candida albicans	++	< +
Other Yeasts	+	< +

COMMENTS:
PARASITES

	Result	Range
Cryptosporidium	ND	< +
Giardia lamblia	ND	< +
Entamoeba Histolytica	ND	< +
Blastocystis Hominis	ND	< +
Other Parasites	ND	< +

COMMENTS:

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MICROORGANISM SUMMARY**BENEFICIAL BACTERIA LEVELS LOW:**

Consider possible causes and symptoms include antibiotics use, chlorinated water consumption, food allergy or sensitivity, IBS, IBD, inadequate dietary fiber or water, low intestinal sIgA, maldigestion, NSAIDs use, nutrient insufficiencies, parasite infection and slow transit time.

Ideally, Bifidobacteria should be recovered at levels of 4+, whilst Lactobacillus and E. coli should be 2+ or greater.

To Improve the levels of beneficial bacteria follow the four R's:

REMOVE

- Allergenic foods, Alcohol, NSAIDs, Pathogens, Sugar, refined carbohydrates, saturated fat, red meat, fermented foods

REPLACE

- Supplement hydrochloride, digestive enzymes or other digestive aids (see pancreatic elastase 1 results)

REINOCULATE

- Prebiotic and probiotic supplementation (see bacterial culture results)

REPAIR

- Use nutraceutical agents that will help heal the gastrointestinal lining. eg. L-glutamine, aloe vera, zinc, slippery elm.

Adequate levels of Lactobacilli detected.

Klebsiella sp. PRESENT:

Klebsiella is 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.

Klebsiella forms part of the normal GI flora in small numbers, but can be an opportunistic pathogen.

Currently, standard texts provide no specific antimicrobial guidelines for GI overgrowth of Klebsiella. Klebsiella organisms are resistant to multiple antibiotics. Treatment depends on the organ system involved.

CITROBACTER PRESENT:

Citrobacter is considered an opportunistic pathogen and therefore can be found in the gut as normal flora. It is occasionally implicated in diarrheal disease, particularly C. freundii, C. diversus and C. koseri.

Treatment: Currently no specific antimicrobial guidelines for GI overgrowth of Citrobacter exist.

Carbapenems and fluoroquinolones are the antibiotics of choice for extra-intestinal sites.

Low numbers of the bacteria should be ignored whilst supplementing with adequate levels of probiotics if indicated.

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ANTIBIOTIC SENSITIVITIES and NATURAL INHIBITORS

	Klebsiella oxytoca	Citrobacter freundii
Antibiotics	Susceptible	Susceptible
Penicillin.	YES	NO
Ampicillin	NO	NO
Erythromycin	NO	NO
Tetracycline	YES	YES
Sulphonamides	YES	YES
Trimethoprim	YES	YES
Ciprofloxacin	YES	YES
Gentamycin.	NO	NO
Ticarcillin	NO	NO
Tobramycin	NO	NO
Augmentin	NO	NO
Cephalexin	YES	NO
Inhibitors	Inhibition %	Inhibition %
Berberine	60%	60%
Oregano	60%	60%
Plant Tannins	80%	60%
Uva-Ursi	80%	40%

LEGEND

Low Inhibition

High Inhibition



YEAST - SENSITIVITIES and NATURAL ANTIFUNGALS

	Candida albicans	Geotrichum species
Antifungals	Inhibition	Inhibition
Fluconazole	<=1.0=S	>64=NI
Voriconazole	<=0.12=S	
Itraconazole		1.0=NI

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 %
Nystatin	60%	60%

Natural Antifungals

	Inhibition %	Inhibition %
Berberine.	60%	40%
Caprylic Acid	20%	20%
Garlic	60%	60%
Undecylenic Acid	40%	20%
Uva-Ursi.	60%	60%

LEGEND

Low Inhibition

High Inhibition





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PATHOGEN SUMMARY

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OTHER BACTERIA PRESENT:

Organism	Growth	Growth Level	Classification
alpha-haemolytic Streptococcus	2+	0 - 3+	Non-Pathogen
gamma-haemolytic Streptococcus	3+	0 - 3+	Non-Pathogen
Haemolytic Escherichia coli	3+	0 - 3+	Non-Pathogen
Muroid Escherichia coli	1+	0 - 3+	Non-Pathogen
beta Strep (Not Group A or B)	2+	0 - 3+	Non-Pathogen
Streptococcus agalactiae Group B	1+	0 - 3+	Non-Pathogen
Citrobacter freundii	3+	0 - 3+	Non-Pathogen
Klebsiella oxytoca	3+	0 - 3+	Non-Pathogen

OTHER YEASTS PRESENT:

Organism	Growth	Growth Level	Classification
Candida albicans	2+ * H	0 - 1+	POSSIBLE Pathogen
Geotrichum species	1+	0 - 1+	Non-Pathogen

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 fluoroquinolones are the recommended antibiotics for extraintestinal sites.

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 fluoroquinolones are the recommended antimicrobial agents for

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extra-intestinal sites.

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.