



P: 1300 688 522
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A: PO Box 442 Ashburton VIC 3142

Date of Birth : 05-Sep-1961
Sex : F
Collected : 25/Feb/2019
Received: 27-Feb-2019
16 KENDALL STREET
WOOLLAHRA NSW 2025
Lab id : **3586972** UR#:

12/50 BELLEVUE ROAD
BELLEVUE HILL NSW 2023

COMPLETE DIGESTIVE STOOL ANALYSIS - Level 3+

MACROSCOPIC DESCRIPTION

| | Result | Range | Markers |
|---------------|---------------|--------|---|
| Stool Colour | BROWN | Brown | Colour - Brown is the colour of normal stool. Other colours may indicate abnormal GIT conditions. |
| Stool Form | Formed | 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

BROWN coloured stool is considered normal in appearance.





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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 | + | < + | Fat Globules -The presence of fat globules may indicate fat maldigestion. |
| Starch | ND | < + | Starch - The presence of starch grains may indicate carbohydrate maldigestion. |

Microscopy Comment

FOOD REMNANTS PRESENT: Consider hypochlorhydria, pancreatic insufficiency, inadequate chewing.
 Treatment:

- Consider hydrochloride, digestive enzymes or other digestive aids
- Improve chewing
- Assess other CDSA markers such as pH, pancreatic elastase 1, H. pylori & other food fibres.

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 MARKERS

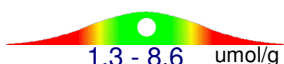
Chymotrypsin

9.6



Short Chain Fatty Acids, Putrefactive

3.4



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

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.

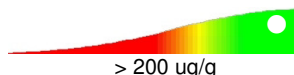
Healthy individuals produce on average 500 ug/g of PE-1. Thus, levels below 500 ug/g and above 200 ug/g suggest a deviation from optimal pancreatic function.

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

>500



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.



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Digestive Markers Comment

PANCREATIC ELASTASE: Normal exocrine pancreatic function.

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

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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.

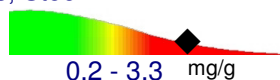
The clinician should therefore consider digestive enzyme supplementation if one or more of the following conditions is present:

Loose watery stools, Undigested food in the stools, Post-prandial abdominal pain, Nausea or colicky abdominal pain, Gastroesophageal reflux symptoms, Bloating or food intolerance.

ABSORPTION MARKERS

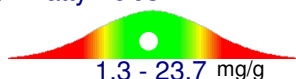
Triglycerides, Stool

6.7



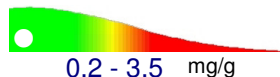
Long Chain Fatty Acids

13.9



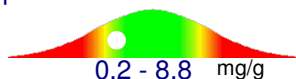
Cholesterol, Stool

0.7



Phospholipids

1.6



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.

Absorption Markers Comment

Faecal Triglycerides are ELEVATED:

Suspect incomplete fat hydrolysis. Rule out Bile insufficiency, Reduced pancreatic function, High fat diet, Hypochlorhydria.



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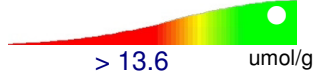
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METABOLIC MARKERS

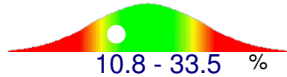
Short Chain Fatty Acids, Beneficial

28.4



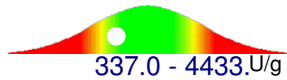
Butyrate

13.7



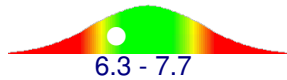
b-Glucuronidase

600.0



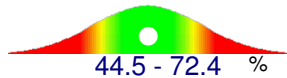
pH

6.5



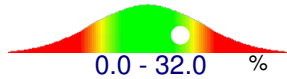
Acetate

57.7



Propionate

28.7



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

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



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INFLAMMATION MARKERS

Transglutaminase IgA

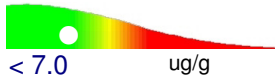
24.0

10.0 - 100.0 ug/g

Comment- Tissue transglutaminase is the most specific test for Coeliac Disease. Gluten-sensitive patients react to Gliadin (found in wheat, barley and rye gluten) and to an antigenic component of the gut endomysium, now known to be tissue Transglutaminase (tTg), which uses gliadin as a substrate in creating antigenic neo-epitopes which generate the immune response in genetically susceptible individuals. After several weeks on a Gluten-free diet, tTg antibody levels may return towards normal levels.

Eosinophil Protein X

4.3



Comment -

Calprotectin

Range

3.0

Normal <50 ug/g

Mildly Elevated 50 -100 ug/g

Highly Elevated 100+ - 250 ug/g

Extremely Elevated >250 ug/g

Comments: Calprotectin is a protein that is abundant in neutrophilic granulocytes and is a sensitive and direct indicator of bowel inflammation. In patients with Inflammatory Bowel Disease (Crohn's Disease, Ulcerative Colitis), including those in relapse, there is a close positive correlation between faecal Calprotectin levels and the degree of inflammation; patients with Irritable Bowel Syndrome do not have elevated levels of Calprotectin. Calprotectin is very stable in stool samples.

Inflammation Markers Comment

CALPROTECTIN Normal:

Low/Absent inflammation of the GIT.

Patients without GIT inflammation and untreated IBS sufferers have levels below 50 ug/g.

FAECAL TRANSGLUTAMINASE IgA: Negative

Tissue Transglutaminase is the most specific test for Coeliac Disease.

Levels less than 100 are considered NEGATIVE.

Treatment:

No treatment required. However, If there is clinical suspicion of Coeliac disease consider testing serum Coeliac markers.

Also assess IgG/IgA Food sensitivity tests to identify specific food intolerances.



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TUMOUR/ULCER MARKERS

M2 Pyruvate Kinase

| Range | |
|------------|----------|
| 0.3 | <= 4U/ml |
| | >4 U/ml |

Comment - The majority of human tumours strongly over-express the tumour M2 isoform of the glycolytic enzyme Pyruvate Kinase (M2-PK), which is released from tumour cells and is quantitatively detectable in body fluids. M2-PK is the key regulator of tumour metabolism and its measurement in faeces identifies gastrointestinal tumours, even in the absence of gastrointestinal bleeding.

H. PYLORI, Antigen

Negative

Comment - Helicobacter Pylori antigen indicates the patient's current status and is not affected by the presence of other organisms, antacids, barium sulphate, blood or fat. This test may be used on its own to monitor the success of eradication therapy one month after completion of the therapy.

Tumour/Ulcer Markers Comment

H. PYLORI ANTIGEN:

This test, if POSITIVE, indicates the presence of a current infection and is not affected by the presence of other organisms, antacids, barium sulphate, blood or fat.

If the patient has diagnosed gastritis or a peptic ulcer consider:

- Standard triple therapy: eg. PPI, clarithromycin and amoxicillin/or metronidazole, 7-14 days
- Lactobacillus Probiotics

If the patient is asymptomatic consider natural products including:

- Black currant seed oil and fish oil
- Lactobacillus Probiotics
- Vitamin C
- Mastic gum.

M2-PYRUVATE KINASE: Negative

M2-PK values greater than 4 U/mL may indicate gastrointestinal adenoma, colorectal cancer or other gastrointestinal carcinomas.

Tumor M2-PK has a higher sensitivity than markers CEA and CA72-4, and M2-PK values greater than 4 U/mL may indicate gastrointestinal adenoma, colorectal cancer or other gastrointestinal carcinomas.

M2-PK has a lower sensitivity and specificity in diagnosing pancreatic cancer compared to Ca 19-9.

However, in patients with adenocarcinoma there is a simultaneous increase of M2-PK and Ca 19-9. In addition, M2-PK is more commonly elevated in metastatic disease and may be an additional criterium to decide on radical surgery of pancreatic cancer.



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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 | ND | < + |
| Other Yeasts | ND | < + |

COMMENTS:

PARASITES

| | Result | Range |
|-----------------------|--------|-------|
| Cryptosporidium | ND | < + |
| Giardia lamblia | ND | < + |
| Entamoeba Histolytica | ND | < + |
| Blastocystis Hominis | ND | < + |
| Dientamoeba fragilis | 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 Bifidobacteria 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 pneumoniae | Proteus mirabilis | Citrobacter freundii | Providencia alcalifaciens |
|--------------------|------------------------------|--------------------------|-----------------------------|----------------------------------|
| Antibiotics | Susceptible | Susceptible | Susceptible | Susceptible |
| Penicillin. | YES | YES | NO | NO |
| Ampicillin | NO | YES | NO | NO |
| Erythromycin | NO | NO | NO | NO |
| Tetracycline | YES | NO | YES | NO |
| Sulphonamides | YES | YES | YES | YES |
| Trimethoprim | YES | YES | YES | YES |
| Ciprofloxacin | YES | YES | YES | YES |
| Gentamycin. | NO | NO | NO | NO |
| Ticarcillin | NO | NO | NO | NO |
| Tobramycin | NO | NO | NO | NO |
| Augmentin | NO | NO | NO | NO |
| Cephalexin | YES | YES | NO | NO |
| Inhibitors | Inhibition % | Inhibition % | Inhibition % | Inhibition % |
| Berberine | 60% | 60% | 80.00 | 80% |
| Oregano | 60% | 60% | 60.00 | 60% |
| Plant Tannins | 80% | 80% | 80.00 | 100% |
| Uva-Ursi | 80% | 80% | 80.00 | 100% |

LEGEND

Low Inhibition

High Inhibition





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PATHOGEN SUMMARY

OTHER BACTERIA PRESENT:

Organism Result Range Classification
 The following group of organisms are deemed commensal, being neither beneficial or 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.

| | | | |
|--------------------------------|--------|--------|-------------------|
| alpha-haemolytic Streptococcus | 3+ | 0 - 3+ | Non-Pathogen |
| gamma-haemolytic Streptococcus | 3+ | 0 - 3+ | Non-Pathogen |
| Bacillus species | 3+ | 0 - 3+ | Non-Pathogen |
| Citrobacter freundii | 4+ * H | 0 - 3+ | POSSIBLE Pathogen |
| Klebsiella pneumoniae | 4+ * H | 0 - 3+ | POSSIBLE Pathogen |
| Proteus mirabilis | 4+ * H | 0 - 3+ | POSSIBLE Pathogen |
| Providencia alcalifaciens | 4+ * H | 0 - 3+ | POSSIBLE Pathogen |

OTHER YEASTS PRESENT:

Organism Result Range Classification
 NO FUNGAL ORGANISMS GROWN

OTHER PARASITES PRESENT:

Organism Result Range Classification
 NO PARASITIC ORGANISMS DETECTED

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.



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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 extra-intestinal sites.

Other Herbal antimicrobials include:

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

PROTEUS SPECIES:

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 disorder

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.

PROVIDENCIA ALCALIFACIENS:

Sources: GI tract infection with *P. alcalifaciens* has been associated with overseas travel.

Pathogenicity:

Providencia is not normally present in a healthy GI tract.

Its pathogenic role may lie in the ability of the organism to take advantage of conditions created by other infectious microbes.

Symptoms:

This organism has been implicated as a cause of diarrhea. *P. alcalifaciens* is thought to induce invasive diarrhea in patients by invading cells in the intestine, thus producing inflammatory changes in the ileum.

Treatment:

Currently, standard texts provide no specific antimicrobial guidelines for GI overgrowth of *Providencia*.
 3rd generation cephalosporins and fluoroquinolones are recommended for extra-intestinal sites.