TEST PATIENT

Dr.TEST DOCTOR

NutriPATH
Integrative Pathology Services

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

Date of Birth : 10-Aug-1954
Sex : M
Collected : 11-Jul-2016
1 TEST STREET
MELBOURNE 3004
Lab id : **3436715** UR#:

TEST HEALTH CENTRE
123 TEST STREET
BURWOOD VIC 3125

# COMPLETE DIGESTIVE STOOL ANALYSIS - Level 4

## 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 | **Unformed** | Formed | **Form** -A formed stool is considered normal. Variations to this may indicate abnormal GIT conditions. |
| Mucous | **ND** | < + | **Mucous** - Mucous production may indcate 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.

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. |

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## DIGESTIVE MARKERS

**Markers**

Chymotrypsin

**5.9** 0.9 - 26.8 U/g

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

Short Chain Fatty Acids, Putrefactive

**8.8** 1.3 - 8.6 umol/g

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

| | Result | Range | Markers |
|---|---|---|---|
| Meat Fibres | ND | < + | **Meat Fibres** - The presence of meat fibres may indicate maldigestion from gastric hypoacidity or diminished pancreatic output. |
| Vegetable Fibres | + | < ++ | **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

**269** > 200 ug/g

**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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Suspect hypochlorhydria, exocrine pancreatic insufficiency, or protein malabsorption.
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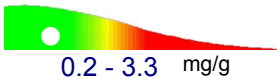
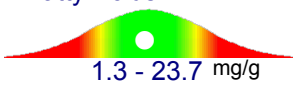
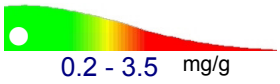
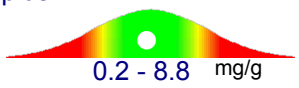
Loose watery stools, Undigested food in the stools, Post-prandial abdominal pain, Nausea or colicky abdominal pain, Gastroesophageal reflux symptoms, Bloating or food intolerance.

## ABSORPTION MARKERS

Triglycerides, Stool
**1.8**



Long Chain Fatty Acids
**15.5**



Cholesterol, Stool
**1.1**



Phospholipids
**3.4**



**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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## METABOLIC MARKERS

Short Chain Fatty Acids, Beneficial
**89.0**
> 13.6 umol/g

Butyrate
**17.2**
10.8 - 33.5 %

b-Glucuronidase
**3521.0**
337.0 - 4433.U/g

pH
**6.3**
6.3 - 7.7

Acetate
**56.3**
44.5 - 72.4 %

Propionate
**17.2**
0.0 - 32.0 %

**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.

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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 intetinal 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 | ND | < + |

**COMMENTS:**

## PARASITES

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

**COMMENTS:**

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## MICROORGANISM SUMMARY

Blastocystis hominis PRESENT:
The role of B. hominis in terms of colonization and disease is still considered controversial. When this organism is present in the absence of any other parasites, enteric organisms or viruses, it may be considered the etiological agent of disease.

Symptoms can include: diarrhea, cramps, nausea, fever, vomiting and abdominal pain.

B. hominis has been associated with irritable bowel syndrome, infective arthritis and intestinal obstruction.

Treatment: Metronidazole (Flagyl) is considered the most effective drug (750 mg tid x 10 days). Iodoquinol (Yodoxin) is also an effective medication (650 mg tid x 20 days). Recommended therapy can also eliminate G. lamblia, E. histolytica and D. fragilis, all of which may be concomitant undetected pathogens and part of patient symptamology.

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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 carbohyrates, 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 fluroquinolones 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 species |
|---|---|---|
| **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% | 80% |
| Uva-Ursi | 80% | 40% |

LEGEND

Low Inhibition — High Inhibition

| 0 | 20 | 40 | 60 | 80 | 100 |
|---|---|---|---|---|---|

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# YEAST - SENSITIVITIES and NATURAL ANTIFUNGALS

**Candida albicans**

## Antifungals

| | Inhibition |
|---|---|
| Fluconazole | <=1.0=S |
| Voriconazole | <=0.12=S |
| 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 inhibiition 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 efficay 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 interpreatation for these organisams |

## Non-absorbed Antifungals

| | Inhibition % |
|---|---|
| Nystatin | 60% |

## Natural Antifungals

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

LEGEND

Low Inhibition — High Inhibition

| 0 | 20 | 40 | 60 | 80 | 100 |
|---|---|---|---|---|---|

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## PARASITOLOGY

| | |
|---|---|
| Wet Prep/Concentrate | **Blastocystis hominis: ++**<br>**Dientamoeba fragilis trophozoites: +** |
| Cryptosporidium, EIA | **Negative** |
| Giardia EIA | **Negative** |
| Entamoeba Histolytica EIA | **Negative** |

### Parasitology Comment

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Symptoms can include: diarrhea, cramps, nausea, fever, vomiting and abdominal pain.

B. hominis has been associated with irritable bowel syndrome, infective arthritis and intestinal obstruction.

Treatment: Metronidazole (Flagyl) is considered the most effective drug (750 mg tid x 10 days). Iodoquinol (Yodoxin) is also an effective medication (650 mg tid x 20 days). Recommended therapy can also eliminate G. lamblia, E. histolytica and D. fragilis, all of which may be concomitant undetected pathogens and part of patient symptamology.

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OTHER BACTERIA PRESENT:

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

OTHER YEASTS PRESENT:

| Organism | Growth | Growth Level | Classification |
|---|---|---|---|
| Candida albicans | 1+ | 0 - 1+ | Non-Pathogen |

OTHER PARASITES PRESENT:

| Organism | Growth | Growth Level | Classification |
|---|---|---|---|
| Blastocystis hominis | 1+ * H | < 1+ | PATHOGEN |
| Dientamoeba fragilis | 1+ * H | < 1+ | PATHOGEN |
| Endolimax nana | 1+ * H | < 1+ | 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 fluroquinolones 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.

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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.

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.