WellLab

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

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

COMPLETE DIGESTIVE STOOL ANALYSIS - Level 4+

MACROSCOPIC DESCRIPTION

	Result	Range	Markers
Stool Colour	TAN	Brown	**Colour** - Brown is the colour of normal stool. Other colours may indicate abnormal GIT conditions.
Stool Form	Semiformed	Formed	**Form** -A formed stool is considered normal. Variations to this may indicate abnormal GIT conditions.
Mucous	+	< +	**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

TAN or GREY coloured stool:
Consider biliary obstruction, pancreatic insufficiency (greasy stool) or steatorrhoea.
Treatment:
• Investigate and treat possible underlying causes.
• Assess other CDSA markers such as pH, fat globules & pancreatic elastase 1.

SEMI FORMED stools may indicate dysbiosis, food allergy or intolerance, laxative use, high dose Vitamin C and magnesium. May also indicate an infection (bacterila or viral), amoeba or Giardia, Irritable Bowel Syndrome,Intestinal permeablilty, 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.

MUCOUS PRESENT:
The presence of mucous (or pus), which are normally absent, can indicate Irritable Bowel Syndrome, intestinal wall inflammation (from infection), diverticulitis or other intestinal abscess.
Treatment:
• Investigate and treat possible underlying cause.
• Assess other CDSA markers such as calprotectin, M2PK & microbiology markers.

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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	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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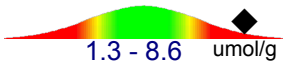
DIGESTIVE MARKERS

Chymotrypsin

8.6

Short Chain Fatty Acids, Putrefactive

13.1



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.

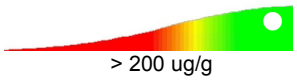
Digestive Markers Comment

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

314



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.

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.

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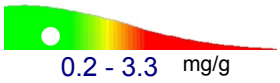
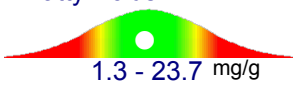
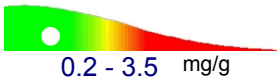
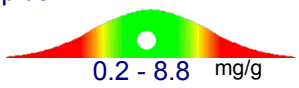
Loose watery stools, Undigested food in the stools, Post-prandial abdominal pain, Nausea or colicky abdominal pain, Gastroesophageal reflux symptoms, Bloating or food intolerance.

ABSORPTION MARKERS

Triglycerides, Stool
1.6

0.2 - 3.3 mg/g

Long Chain Fatty Acids
18.4

1.3 - 23.7 mg/g

Cholesterol, Stool
2.1

0.2 - 3.5 mg/g

Phospholipids
3.3

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.

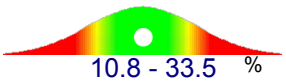
Phospholipids - Elevated levels of Phospholipids in the stool may indicate inadequate absorption.

METABOLIC MARKERS

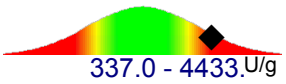
Markers

Short Chain Fatty Acids, Beneficial
57.0

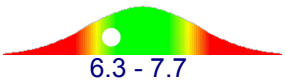

Short Chain Fatty Acids, Beneficial (Total) - Elevated SCFAs may indicate bacterial overgrowth. Inadequate SCFAs may indicate inadequate normal flora.

Butyrate
16.9


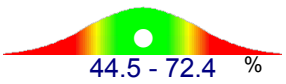
Butyrate - Decreased Butyrate levels may indicate inadequate colonic function.

b-Glucuronidase
4489.0


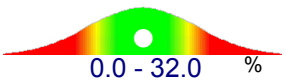
b-Glucuronidase - Increased levels of b-Glucuronidase may reverse the effects of Phase II detoxification processes.

pH
6.4


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

Acetate
62.8


Acetate - Decreased Acetate levels may indicate inadequate colonic function.

Propionate
13.1


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

INFLAMMATION MARKERS

Transglutaminase IgA

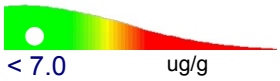
119.0

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

2.1



< 7.0 ug/g

Comment -

Calprotectin

Range	
	Normal <50 ug/g
	Mildly Elevated 50 -100 ug/g
132.0	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 SIGNIFICANTLY ELEVATED:
Values above 100 mcg/g indicate SIGNIFICANT inflammation in the gastrointestinal tract.
Etiology could be associated with the following: IBD, infection, NSAID use, polyps, adenomas, or colorectal cancer. Calprotectin may also be elevated in children with chronic diarrhea secondary to cow's milk allergy or multiple food allergies. Further investigative procedures are necessary to determine the cause of inflammation.

Whether inflammatory or neoplastic, the cause of elevated calprotectin MUST be ascertained by endoscopy or radiography. If these evaluations do not yield signs of overt disease, other tests may be considered to uncover causes of chronic bowel inflammation:
o Intestinal Dysbiosis Assessment, o Allergy Antibody Assessment, o Celiac Panel,
o Comprehensive Parasitology Profile.

FAECAL TRANSGLUTAMINASE IgA: POSITIVE
Tissue Transglutaminase is the most specific test for Coeliac Disease.
Levels greater than 100 are deemed as POSITIVE.
Treatment: Avoid gluten containing foods.

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TUMOUR/ULCER MARKERS

M2 Pyruvate Kinase

	Range
3.8	<= 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

POSITIVE

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 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:

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.

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 pneumoniae	Proteus mirabilis	Citrobacter freundii
Antibiotics			
	Susceptible	Susceptible	Susceptible
Penicillin.	YES	YES	NO
Ampicillin	YES	YES	NO
Erythromycin	NO	NO	NO
Tetracycline	YES	NO	YES
Sulphonamides	YES	YES	YES
Trimethoprim	YES	YES	YES
Ciprofloxacin	YES	YES	YES
Gentamycin.	NO	NO	NO
Ticarcillin	NO	NO	NO
Tobramycin	NO	NO	NO
Augmentin	NO	NO	NO
Cephalexin	YES	YES	NO
Inhibitors			
	Inhibition %	Inhibition %	Inhibition %
Berberine	60%	60%	60.00
Oregano	60%	80%	60.00
Plant Tannins	60%	80%	80.00
Uva-Ursi	80%	100%	60.00

LEGEND

Low Inhibition — High Inhibition

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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	40%
Undecylenic Acid	40%
Uva-Ursi.	60%

LEGEND

Low Inhibition — High Inhibition

0	20	40	60	80	100

PARASITOLOGY

Wet Prep/Concentrate	**Blastocystis hominis: +++** **Dientamoeba fragilis trophozoites: +**
Cryptosporidium, EIA	**Negative**
Giardia EIA	**Negative**
Entamoeba Histolytica EIA	**Negative**

Parasitology Comment

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.

PATHOGEN SUMMARY

OTHER BACTERIA PRESENT:

Organism	Growth	Growth Level	Classification
alpha-haemolytic Streptococcus	3+	0 - 3+	Non-Pathogen
gamma-haemolytic Streptococcus	3+	0 - 3+	Non-Pathogen
Haemolytic Escherichia coli	2+	0 - 3+	Non-Pathogen
Mucoid Escherichia coli	1+	0 - 3+	Non-Pathogen
Streptococcus agalactiae Group B	2+	0 - 3+	Non-Pathogen
Citrobacter freundii	3+	0 - 3+	Non-Pathogen
Klebsiella pneumoniae	2+	0 - 3+	Non-Pathogen
Proteus mirabilis	4+ * H	0 - 3+	POSSIBLE 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	3+ * H	< 1+	PATHOGEN
Dientamoeba fragilis	1+ * H	< 1+	PATHOGEN

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 disorders.
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.

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.

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.

WellLab

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

Test Physcian
Dr. Edward Chan
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