Comprehensive Parasitology,stool, x1

BACTERIOLOGY CULTURE		
Expected/Beneficial flora	**Commensal (Imbalanced) flora**	**Dysbiotic flora**
3+ Bacteroides fragilis group	1+ Alpha hemolytic strep	3+ Staphylococcus aureus
4+ Bifidobacterium spp.	3+ Gamma hemolytic strep	
3+ Escherichia coli		
1+ Lactobacillus spp.		
NG Enterococcus spp.		
1+ Clostridium spp.		
NG = No Growth		

BACTERIA INFORMATION

Expected /Beneficial bacteria make up a significant portion of the total microflora in a healthy & balanced GI tract. These beneficial bacteria have many health-protecting effects in the GI tract including manufacturing vitamins, fermenting fibers, digesting proteins and carbohydrates, and propagating anti-tumor and anti-inflammatory factors.

Clostridia are prevalent flora in a healthy intestine. Clostridium spp. should be considered in the context of balance with other expected/beneficial flora. Absence of clostridia or over abundance relative to other expected/beneficial flora indicates bacterial imbalance. If *C. difficile* associated disease is suspected, a Comprehensive Clostridium culture or toxigenic *C. difficile* DNA test is recommended.

Commensal (Imbalanced) 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. They can be present due to a number of factors including: consumption of contaminated water or food, exposure to chemicals that are toxic to beneficial bacteria; the use of antibiotics, oral contraceptives or other medications; poor fiber intake and high stress levels.

YEAST CULTURE	
Normal flora	**Dysbiotic flora**
1+ Candida albicans	

MICROSCOPIC YEAST	
Result:	**Expected:**
Many	None - Rare

The microscopic finding of yeast in the stool is helpful in identifying whether there is proliferation of yeast. Rare yeast may be normal; however, yeast observed in higher amounts (few, moderate, or many) is abnormal.

YEAST INFORMATION

Yeast normally can be found in small quantities in the skin, mouth, intestine and mucocutaneous junctions. Overgrowth of yeast can infect virtually every organ system, leading to an extensive array of clinical manifestations. Fungal diarrhea is associated with broad-spectrum antibiotics or alterations of the patient's immune status. Symptoms may include abdominal pain, cramping and irritation. When investigating the presence of yeast, disparity may exist between culturing and microscopic examination. Yeast are not uniformly dispersed throughout the stool, this may lead to undetectable or low levels of yeast identified by microscopy, despite a cultured amount of yeast. Conversely, microscopic examination may reveal a significant amount of yeast present, but no yeast cultured. Yeast does not always survive transit through the intestines rendering it unvialble.

Comments:
Date Collected: 11/28/2011
Date Received: 12/1/2011
Date Completed: 12/9/2011

* Aeromonas, Campylobacter, Plesiomonas, Salmonella, Shigella, Vibrio, Yersinia, & Edwardsiella tarda have been specifically tested for and found absent unless reported.

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LAB #: F$$$$$$!$$$$!$
PATIENT: GUa d`Y˙DUh¡Ybh
ID: P$$$$$$$$$
SEX: Male
AGE: 11

CLIENT #: %&' ( )
DOCTOR:
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GH"7 \ Uˉ`Ygz˜=@* $%+(

Comprehensive Parasitology, stool, x1

PARASITOLOGY/MICROSCOPY *
Sample 1
None   Ova or Parasites
Many   Yeast

*A trichrome stain and concentrated iodine wet mount slide is read for each sample submitted.

PARASITOLOGY INFORMATION

Intestinal parasites are abnormal inhabitants of the gastrointestinal tract that have the potential to cause damage to their host. The presence of any parasite within the intestine generally confirms that the patient has acquired the organism through fecal-oral contamination. Factors such as contaminated food and water supplies, day care centers, increased international travel, pets, carriers such as mosquitoes and fleas, and sexual transmission have contributed to an increased prevalence of intestinal parasites. It is estimated that close to one billion people worldwide are infected. Damage to the host includes parasitic burden, migration, blockage and pressure. Immunologic inflammation, hypersensitivity reactions and cytotoxicity also play a large role in the morbidity of these diseases. The infective dose often relates to severity of the disease and repeat encounters can be additive.

There are two main classes of intestinal parasites that can cause human intestinal disease. They include protozoa and helminths. The protozoa typically have two stages; the trophozoite stage that is the metabolically active, invasive stage and the cyst stage, which is the vegetative inactive form resistant to unfavorable environmental conditions outside the human host. Helminths are large, multicellular organisms that are generally visible to the naked eye in their adult stages. Like protozoa, helminths can be either free-living or parasitic in nature. In their adult form, helminths cannot multiply in humans.

In general, acute manifestations of parasitic infection may involve diarrhea with or without mucus and or blood, fever, nausea, or abdominal pain. However these symptoms do not always occur. Consequently, parasitic infections may not be diagnosed or eradicated. If left untreated, chronic parasitic infections can cause damage to the intestinal lining and can be an unsuspected cause of illness and fatigue. Chronic parasitic infections can also be associated with increased intestinal permeability, irritable bowel syndrome, irregular bowel movements, malabsorption, gastritis or indigestion, skin disorders, joint pain, allergic reactions, and decreased immune function.

In some instances, parasites may enter the circulation and travel to various organs causing severe organ diseases such as liver abscesses and cysticercosis. In addition, some larval migration can cause pneumonia and in rare cases hyper infection syndrome with large numbers of larvae being produced and found in every tissue of the body.

GIARDIA/CRYPTOSPORIDIUM IMMUNOASSAY

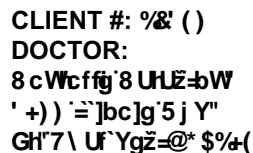|	Within	Outside	Reference Range
Giardia lamblia	Neg		Neg
Cryptosporidium	Neg		Neg

Giardia lamblia is flagellated protozoan that infects the small intestine and is passed in stool and spread by the fecal-oral route. Waterborne transmission is the major source of giardiasis.
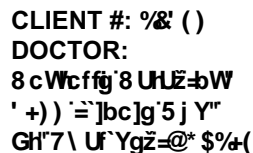**Cryptosporidium** is a coccidian protozoa that can be spread from direct person-to-person contact or waterborne transmission.

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v5.09

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LAB #: F$$$$$$!$$$$!$
PATIENT: GUa d`Y´DUh]Ybh
ID: P$$$$$$$$
SEX: Male
AGE: 11

CLIENT #: %&'( )
DOCTOR:
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Bacterial Susceptibilities: **Staphylococcus aureus**

NATURAL ANTIBACTERIALS		

	Low Sensitivity	High Sensitivity
Berberine		
Black Walnut		
Caprylic Acid		
Oregano		
Uva Ursi		
Grapefruit Seed Extract		
Silver		

Natural antibacterial agents may be useful for treatment of patients when organisms display in-vitro sensitivity to these agents. The test is performed by using standardized techniques and filter paper disks impregnated with the listed agent. Relative sensitivity is reported for each natural agent based upon the diameter of the zone of inhibition surrounding the disk. Data based on over 5000 individual observations were used to relate the zone size to the activity level of the agent. A scale of relative sensitivity is defined for the natural agents tested.

PRESCRIPTIVE AGENTS		

	Resistant	Intermediate	Susceptible
Benzylpenicillin	R		
Clindamycin			S
Oxacillin			S
Tetracycline			S
Trimeth-sulfa			S
Vancomycin			S

Susceptible results imply that an infection due to the bacteria may be appropriately treated when the recommended dosage of the tested antimicrobial agent is used.
Intermediate results imply that response rates may be lower than for susceptible bacteria when the tested antimicrobial agent is used.
Resistant results imply that the bacteria will not be inhibited by normal dosage levels of the tested antimicrobial agent.

Comments:
Date Collected: 11/28/2011
Date Received: 12/1/2011
Date Completed: 12/9/2011

Natural antibacterial agent susceptibility testing is intended for research use only.
Not for use in diagnostic procedures.

v10.11

Yeast Susceptibilities: **Candida albicans**

NATURAL ANTIFUNGALS

	Low Sensitivity		High Sensitivity

Berberine
Caprylic Acid
Uva Ursi
Plant Tannins
Oregano
Undecylenic Acid
Grapefruit Seed Extract

Natural antifungal agents may be useful for treatment of patients when organisms display in-vitro sensitivity to these agents. The test is performed by using standardized techniques and filter paper disks impregnated with the listed agent. Relative sensitivity is reported for each natural agent based upon the diameter of the zone of inhibition surrounding the disk. Data based on over 5000 individual observations were used to relate the zone size to the activity level of the agent. A scale of relative sensitivity is defined for the natural agents tested.

NON-ABSORBED ANTIFUNGALS

	Low Sensitivity		High Sensitivity

Nystatin

Non-absorbed antifungals may be useful for treatment of patients when organisms display in-vitro sensitivity to these agents. The test is performed using standardized commercially prepared disks impregnated with Nystatin. Relative sensitivity is reported based upon the diameter of the zone of inhibition surrounding the disk.

AZOLE ANTIFUNGALS

	Resistant	S-DD	Susceptible
Fluconazole			S
Itraconazole			S
Ketoconazole			S

Susceptible results imply that an infection due to the fungus may be appropriately treated when the recommended dosage of the tested antifungal agent is used.
Susceptible - Dose Dependent (S-DD) results imply that an infection due to the fungus may be treated when the highest recommended dosage of the tested antifungal agent is used.
Resistant results imply that the fungus will not be inhibited by normal dosage levels of the tested antifungal agent.

Standardized test interpretive categories established for Candida spp. are used for all yeast isolates.

Comments:
Date Collected: 11/28/2011
Date Received: 12/1/2011
Date Completed: 12/9/2011

Yeast antifungal susceptibility testing is intended for research use only.
Not for use in diagnostic procedures.

v10.11

INTRODUCTION

This analysis of the stool specimen provides fundamental information about the overall gastrointestinal health of the patient. When abnormal microflora or significant aberrations in intestinal health markers are detected, specific interpretive paragraphs are presented. If no significant abnormalities are found, interpretive paragraphs are not presented.

Beneficial Flora

One or more of the expected (beneficial) bacteria are low in this specimen. Beneficial flora include lactobacilli, bifidobacteria, clostridia, Bacteroides fragilis group, enterococci, and some strains of Escherichia coli. The beneficial flora have many health-protecting effects in the gut, and as a consequence, are crucial to the health of the whole organism. Some of the roles of the beneficial flora include digestion of proteins and carbohydrates, manufacture of vitamins and essential fatty acids, increase in the number of immune system cells, break down of bacterial toxins and the conversion of flavinoids into anti-tumor and anti-inflammatory factors. Lactobacilli, bifidobacteria, clostridia, and enterococci secrete lactic acid as well as other acids including acetate, propionate, butyrate, and valerate. This secretion causes a subsequent decrease in intestinal pH, which is crucial in preventing an enteric proliferation of microbial pathogens, including bacteria and yeast. Many GI pathogens thrive in alkaline environments. Lactobacilli also secrete the antifungal and antimicrobial agents lactocidin, lactobacillin, acidolin, and hydrogen peroxide. The beneficial flora of the GI have thus been found useful in the inhibition of microbial pathogens, prevention and treatment of antibiotic associated diarrhea, prevention of traveler's diarrhea, enhancement of immune function, and inhibition of the proliferation of yeast.

In a healthy balanced state of intestinal flora, the beneficial flora make up a significant proportion of the total microflora. Healthy levels of each of the beneficial bacteria are indicated by either a 3+ or 4+ (0 to 4 scale). However, some individuals have low levels of beneficial bacteria and an overgrowth of nonbeneficial (imbalances) or even pathogenic microorganisms (dysbiosis). Often attributed to the use of antibiotics, individuals with low beneficial bacteria may present with chronic symptoms such as irregular transit time, irritable bowel syndrome, bloating, gas, chronic fatigue, headaches, autoimmune diseases (e.g., rheumatoid arthritis), and sensitivities to a variety of foods. Treatment may include the use of probiotic supplements containing various strains of lactobacilli, bifidobacteria and enterococci and consumption of cultured or fermented foods including yogurt, kefir, miso, tempeh and tamari sauce. Polyphenols in green and ginseng tea have been found to increase the numbers of beneficial bacteria. If dysbiosis is present, treatment may also include the removal of pathogenic bacteria, yeast, or parasites.

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Oksanen P, Salminen S, Saxelin M, et al. Prevention of Travelers' Diarrhea by Lactobacillus GG. Ann Med. 1990; 22:53-56.

Perdigon G, Alvarez M, et al. The Oral Administration of Lactic Acid Bacteria Increases the Mucosal Intestinal Immunity in Response to Enteropathogens. J Food Prot. 1990;53:404-410.

Valeur, N, et al. Colonization and Immunomodulation by Lactobacillus reuteri ATCC 55730 in the Human Gastrointestinal Tract. Appl Environ. Microbiol. 2004 Feb; 70(2):1176-81.

Elmer G, Surawicz C, and McFarland L. Biotherapeutic agents - a Neglected Modality for the Treatment and Prevention of Intestinal and Vaginal Infections. JAMA. 1996; 275(11):870-876.

Fitzsimmons N and Berry D. Inhibition of Candida albicans by Lactobacillus acidophilus: Evidence for Involvement of a Peroxidase System. Microbio. 1994; 80:125-133

Weisburger JH. Proc Soc Exp Biol Med 1999;220(4):271-5.

Imbalanced flora

Imbalanced flora are those bacteria that reside in the host gastrointestinal tract and neither injure nor benefit the host. Certain dysbiotic bacteria may appear under the imbalances category if found at low levels because they are not likely pathogenic at the levels detected. When imbalanced flora appear, it is not uncommon to find inadequate levels of one or more of the beneficial bacteria and/or a fecal pH which is more towards the alkaline end of the reference range (6.5 - 7.2). It is also not uncommon to find hemolytic or mucoid E. coli with a concomitant deficiency of beneficial E. coli and alkaline pH, secondary to a mutation of beneficial E. coli in alkaline conditions (DDI observations). Treatment with antimicrobial agents is unnecessary unless bacteria appear under the dysbiotic category.

Mackowiak PA. The normal microbial flora. N Engl J Med. 1982;307(2):83-93.

Dysbiotic Flora

In a healthy balanced state of intestinal flora, the beneficial bacteria make up a significant proportion of the total microflora. However, in many individuals there is an imbalance or deficiency of beneficial flora and an overgrowth of non-beneficial (imbalance) or even pathogenic microorganisms (dysbiosis). This can be due to a number of factors including: consumption of contaminated water or food; daily exposure of chemicals that are toxic to beneficial bacteria; the use of antibiotics, oral contraceptives or other medications; poor fiber intake and high stress levels.

A number of toxic substances can be produced by the dysbiotic bacteria including amines, ammonia, hydrogen sulfide, phenols, and secondary bile acids which may cause inflammation or damage to the brush border of the intestinal lining. If left unchecked, long-term damage to the intestinal lining may result in leaky gut syndrome, allergies, autoimmune disease (e.g. rheumatoid arthritis), irritable bowel syndrome, fatigue, chronic headaches, and sensitivities to a variety of foods. In addition, pathogenic bacteria can cause acute symptoms such as abdominal

pain, nausea, diarrhea, vomiting, and fever in cases of food poisoning.

Bacterial sensitivities to a variety of prescriptive and natural agents have been provided for the pathogenic bacteria that were cultured from this patient's specimen. This provides the practitioner with useful information to help plan an appropriate treatment regimen. Supplementation with probiotics or consumption of foods (yogurt, kefir, miso, tempeh, tamari sauce) containing strains of lactobacilli, bifidobacteria, and enterococci can help restore healthy flora levels. Polyphenols in green and ginseng tea have been found to increase the numbers of beneficial bacteria. Hypochlorhydria may also predispose an individual to bacterial overgrowth, particularly in the small intestine. Nutritional anti-inflammatories can aid in reversing irritation to the GI lining. These include quercetin, vitamin C, curcumin, gamma-linoleic acid, omega-3 fatty acids (EPA, DHA), and aloe vera. Other nutrients such as zinc, beta-carotene, pantothenic acid, and L-glutamine provide support for regeneration of the GI mucosa. A comprehensive program may be helpful in individuals in whom a dysbiotic condition has caused extensive GI damage.

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Murray MT. Stomach Ailments and Digestive Disturbances. Rocklin, CA: Prima Publishing; 1997.

Staphylococcus aureus

S. aureus is well documented as an opportunistic human pathogen. However, S. aureus is considered as dysbiotic in the amount of 3 - 4+. Staphylococci are widespread in nature and have been cultured from skin, mucous membranes of the nose and throat, hair, blood, stool, mammary glands, intestinal tract, and genitourinary tract of healthy individuals.

S. aureus can cause acute food poisoning. Due to the high rate of human carriage of S. aureus, food handlers play a significant role in its spread. The presence of enterotoxigenic strains of S. aureus in various food products is regarded as a public health hazard because of the ability of these strains to produce intoxication or food poisoning. Foods commonly associated with staphylococcal food poisoning are meat, meat products, salads, cream-filled bakery products, and dairy products. The toxin produced is heat-stable and not easily destroyed by cooking. The toxin can remain even though the organism has been destroyed. Staphylococcal bacteria are also one of the most common causes of skin infections in the United States.

Symptoms of staphylococcal food poisoning usually appear within 2-4 hours of consumption of contaminated food and typically last for only 24 hours. Common symptoms include nausea, vomiting, dizziness, weakness, subnormal temperatures and occasional headaches and diarrhea. Symptoms may be confused with those of Bacillus cereus food poisoning. Symptoms usually

resolve within 2 days, but may take up to 3 days and sometimes longer.

Due to the self-limiting nature of typical infection, treatment is often unnecessary. If treatment is necessary, refer to the bacterial sensitivities to identify the most appropriate pharmaceutical or natural agent.

Buckingham S, McDougal L, Cathey L. Emergence of Community-Associated Methicillin-Resistant Staphylococcus aureus at a Memphis, Tennessee Children's Hospital. Ped Inf Dis J, 23(7):619-624, 2004.

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Murray PR, Baron EJ, Jorgensen JH, Pfaller MA, Yolken RH. Manual of Clinical Microbiology, 8th edition. Washington, DC: ASM Press; 2003. pg 384-390.

Cultured Yeast

Yeast, such as Candida are normally present in the GI tract in very small amounts. Many species of yeast exist and are commensal; however, they are always poised to create opportunistic infections and have detrimental effects throughout the body. Factors that contribute to a proliferation of yeast include frequent use of wide-spread antibiotics/low levels of beneficial flora, oral contraceptives, pregnancy, cortisone and other immunosuppressant drugs, weak immune system/low levels of sIgA, high-sugar diet, and high stress levels.

When investigating the presence of yeast, disparity may exist between culturing and microscopic examination. Yeast grows in colonies and is typically not uniformly dispersed throughout the stool. This may lead to undetectable or low levels of yeast identified by microscopy, despite a cultured amount of yeast. Conversely, microscopic examination may reveal a significant amount of yeast present, but no yeast cultured. Yeast does not always survive transit through the intestines rendering it unviable for culturing. Therefore, both microscopic examination and culture are helpful in determining if abnormally high levels of yeast are present.

Microscopic yeast

Microscopic examination has revealed yeast in this stool sample. The microscopic finding of yeast in the stool is helpful in identifying whether the proliferation of fungi, such as Candida albicans, is present. Yeast is normally found in very small amounts in a healthy intestinal tract. While small quantities of yeast (reported as none or rare) may be normal, yeast observed in higher amounts (few, moderate to many) is considered abnormal.

An overgrowth of intestinal yeast is prohibited by beneficial flora, intestinal immune defense (secretory IgA), and intestinal pH. Beneficial bacteria, such as Lactobacillus colonize in the intestines and create an environment unsuitable for yeast by producing

acids, such as lactic acid, which lowers intestinal pH. Also, lactobacillus is capable
of releasing antagonistic substances such as hydrogen peroxide, lactocidin, lactobacillin,
and acidolin.

Many factors can lead to an overgrowth of yeast including frequent use of antibiotics
(leading to insufficient beneficial bacteria), synthetic corticosteroids, oral contraceptives,
and diets high in sugar. Although there is a wide range of symptoms which can result from
intestinal yeast overgrowth, some of the most common include brain fog, fatigue, reccurring
vaginal or bladder infections, sensitivity to smells (perfumes, chemicals, environment),
mood swings/depression, sugar and carbohydrate cravings, gas/bloating, and constipation or
loose stools.

A positive yeast culture (mycology) and sensitivity to prescriptive and natural agents is
helpful in determining which anti-fungal agents to use as part of a therapeutic treatment plan
for chronic colonic yeast. However, yeast are colonizers and do not appear to be dispersed
uniformly throughout the stool. Yeast may therefore be observed microscopically, but not
grow out on culture even when collected from the same bowel movement.