**ORDER: SAMPLE REPORT**
**PATIENT: Sample Patient**
**ID:**
**SEX: Female**
**AGE: 35**

**CLIENT #: 12345**
**DOCTOR: Sample Doctor**
**Doctor's Data, Inc.**
**3755 Illinois Ave.**
**St. Charles, IL 60174**

BIOMETRIX #THE INSIDE INFO

DOCTOR'S DATA INC

**Parasitology**

| Protozoa | Result |
|---|---|
| *Balantidium coli* | Rare |
| *Blastocystis spp.* | Not Detected |
| *Chilomastix mesnili* | Not Detected |
| *Dientamoeba fragilis* | Not Detected |
| *Endolimax nana* | Not Detected |
| *Entamoeba coli* | Not Detected |
| *Entamoeba hartmanni* | Not Detected |
| *Entamoeba histolytica/Entamoeba dispar* | Few |
| *Entamoeba polecki* | Not Detected |
| *Enteromonas hominis* | Not Detected |
| *Giardia duodenalis* | Moderate |
| *Iodamoeba bütschlii* | Not Detected |
| *Isospora belli* | Not Detected |
| *Pentatrichomonas hominis* | Not Detected |
| *Retortamonas intestinalis* | Not Detected |
| **Nematodes - Roundworms** | |
| *Ascaris lumbricoides* | Not Detected |
| *Capillaria hepatica* | Not Detected |
| *Capillaria philippinensis* | Not Detected |
| *Enterobius vermicularis* | Not Detected |
| *Strongyloides stercoralis* | Not Detected |
| *Trichuris trichiura* | Not Detected |
| *Hookworm* | Not Detected |
| **Cestodes - Tapeworms** | |
| *Diphyllobothrium latum* | Not Detected |
| *Dipylidium caninum* | Not Detected |
| *Hymenolepis diminuta* | Not Detected |
| *Hymenolepis nana* | Not Detected |
| *Taenia* | Not Detected |

**SPECIMEN DATA**

**Comments:**

**Date Collected:** 05/10/2021
**Date Received:** 05/11/2021
**Date Reported:** 05/12/2021
**Methodology:** Microscopy

**Specimens Collected:** 3

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**Parasitology; Microscopy**

| Trematodes - Flukes | Result |
|---|---|
| *Clonorchis sinensis* | Not Detected |
| *Fasciola hepatica/Fasciolopsis buski* | Not Detected |
| *Heterophyes heterophyes* | Not Detected |
| *Paragonimus westermani* | Not Detected |

| Other Markers | | Reference Interval |
|---|---|---|
| Yeast | Many | None – Rare |
| RBC | Not Detected | None – Rare |
| WBC | Not Detected | None – Rare |
| Muscle fibers | Not Detected | None – Rare |
| Vegetable fibers | Not Detected | None – Few |
| Charcot-Leyden Crystals | Not Detected | None |
| Pollen | Not Detected | None |

| Macroscopic Appearance | | |
|---|---|---|
| Mucus | Negative | Negative |

## Parasitology Information

This test is not designed to detect *Cyclospora cayetanensis* or *Microsproridia* spp.

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. 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, 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. 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.

**Red Blood Cells** (RBC) in the stool may be associated with a parasitic or bacterial infection, or an inflammatory bowel condition such as ulcerative colitis. Colorectal cancer, anal fistulas, and hemorrhoids should also be ruled out.

**White Blood Cells** (WBC) and **Mucus** in the stool can occur with bacterial and parasitic infections, with mucosal irritation, and inflammatory bowel diseases such as Crohn's disease or ulcerative colitis

**Muscle fibers** in the stool are an indicator of incomplete digestion. Bloating, flatulence, feelings of "fullness" may be associated with increase in muscle fibers.

**Vegetable fibers** in the stool may be indicative of inadequate chewing, or eating "on the run".

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Parasitology; Microscopy

## SPECIMEN DATA

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**Methodology:**

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## GI Pathogens; Multiplex PCR

| Parasites | Result | | Reference Interval |
|---|---|---|---|
| *Cryptosporidium* (*C. parvum* and *C. hominis*) | Negative | | Negative |
| *Entamoeba histolytica* | Negative | | Negative |
| *Giardia duodenalis* (AKA *intestinalis & lamblia*) | Negative | | Negative |

## SPECIMEN DATA

**Comments:**

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**Methodology:** Multiplex PCR

**Specimens Collected:** 3

## 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 commentaries are presented. If no significant abnormalities are found, commentaries are not presented.

## GI Pathogens

### *Campylobacter*

Most *Campylobacter* infections in industrialized countries are caused by *C. jejuni, C. coli*, and *C. lari* with an estimated 1.5 million cases of foodborne illness due to *Campylobacter* per year in the US. *Campylobacter* spp. are responsible for approximately 15% of hospitalizations resulting from foodborne infections. Generally, campylobacteriosis presents as one to three days of fever, vomiting, and headaches followed by three to seven days of watery or bloody diarrhea and may include abdominal pain, cramping, nausea, headache, and/ or muscle pain within 2-5 days of infection. Contaminated water, pets, food, unpasteurized milk and undercooked poultry, are sources of infection. Use of antibiotics is controversial but may benefit children whom have had symptoms for less than 7 days, and immunocompromised individuals. Recommendations potentially include Azithromycin 500 mg daily for 3 days or Fluoroquinolone for 3 days, but infection may resist fluoroquinolones. Extracts of *Acacia nilotiac* show in vitro antibacterial activities against *Campylobacter* spp. isolated from sheep. Oral rehydration therapy is recommended to prevent dehydration, along with symptomatic treatment of fever and muscle aches.

## Parasitology

### Parasites

Parasites were detected by microscopic examination in this stool specimen. Intestinal parasites are abnormal inhabitants of the GI tract that live off and have the potential to cause damage to their host. 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.

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 and 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, decreased immune function, and fatigue.

### Microscopic yeast

Microscopic examination has revealed more yeast in this sample than normal. While small quantities of yeast (reported as rare) may be normal, yeast observed in higher amounts (moderate to many) is considered abnormal. Yeast does 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. Further, some yeast may not 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. If significant yeast are reported by microscopy, but not by culture, consider the presentation of patient symptoms.

### *Entamoeba dispar/histolytica/moshkovskii/bangladeshi*

*Entamoeba dispar/histolytica/moshkovskii/bangladeshi*, an amoeba, was detected in this specimen. The World Health Organization (WHO) defines amebiasis as infection with *Entamoeba histolytica* regardless of the symptomology. It is one of the most common parasitic diseases worldwide, infecting about 50 million people. Humans can be infected with three other species of *Entamoeba, E. dispar, E. moshkovskii and E. bangladeshi*, which are microscopically indistinguishable from *E. histolytica*. Among the 4 species that infect humans, *Entamoeba histolytica* unequivocally causes disease; *Entamoeba dispar* is a harmless commensal; *Entamoeba moshkovskii* seems to be an emerging pathogen; and the pathogenicity of *Entamoeba bangladeshi* remains to be investigated. This parasite normally infects the lumen of the large intestine, where it feeds on bacteria. In some cases, *E. histolytica* can invade the intestinal mucosa. Migration to the liver, lung, brain, skin, or other tissues can also occur. Infection occurs when cysts are ingested in food or water contaminated with feces. There is a high prevalence of *E. histolytica* in Mexico, China, and South East Asia.

*Entamoeba histolytica* infection is asymptomatic in about 90% of patients. Acute symptoms most commonly occur 1 to 4 weeks after exposure. Symptoms often are quite mild and can include loose stools and abdominal discomfort. Mucosal invasion and ulceration results in amebic dysentery, associated with severe abdominal pain, bloody stools, and fever. Elevated fecal lysozyme, a biomarker of GI inflammation, can indicate more invasive infection. Rarely, *E. histolytica* invades the liver and forms an abscess. Even less commonly, it spreads to other parts of the body, such as the lung or brain.

For asymptomatic infection paromomycin (500 mg tid x 7 days, adult dose) or iodoquinol (650 mg tid x 20 days, adult dose) is recommended. For mild/moderate disease metronidazole (500-750 mg tid x 10 days, adult dose) or tinidazole (2 gm qid x 3 days, adult dose), followed by paromomycin or iodoquinol as described above. For severe disease or extraintestinal infection intravenous antiparasitic therapy may be warranted. Anti-diarrheal medications should not be used. Natural agents include berberine, grapefruit seed extract, *Saccharomyces boulardii*, quassia, and curcumin. Limiting refined carbohydrates in the diet, repairing injured intestinal mucosa, and preventing constipation can also be beneficial.

***Parasitology continued...***

***Giardia duodenalis* (*intestinalis*, *lamblia*)**

*Giardia duodenalis* was detected in this specimen. *G. duodenalis*, a single celled protozoa, is the most frequent cause of non-bacterial diarrhea in the United States. The Centers for Disease Control and Prevention (CDC) estimates as many as 2.5 million cases of *Giardia* infection occur annually in the U.S. Symptomatic individuals may experience diarrhea, abdominal cramps, dehydration, malabsorption, loss of appetite, anemia, and weight loss 1-2 weeks following the ingestion of cysts. Typically, symptoms will last 1-2 weeks and infections are self-limiting. Most individuals will be completely asymptomatic. Prevalence of giardiasis in adults has been estimated to be 4-7%. Higher prevalence rates have been reported in children. According to the Food and Drug administration, the higher prevalence of giardiasis in children versus adults suggests that many individuals have a lasting immunity following infection. Approximately 40% of patients diagnosed with giardiasis will demonstrate disaccharide (particularly lactose) intolerance that may last up to six months. Chronic cases of giardiasis may last months to years and are difficult to treat. Chronic giardiasis may lead to a malabsorption syndrome, weight loss, and general weakness and fatigue.

*Giardia* lives in the intestines of infected humans or animals. Contamination with *Giardia* from soil, food, water, or surfaces can occur from contact with feces from infected sources. Person to person transmission is common in day-care centers where diapering is done, as well as in institutions for persons with special needs. Resistance to drug treatment is common; however, Metronidazole (Flagyl) is effective. Paromomycin is the alternative for treating *Giardia* during pregnancy. Other therapeutic alternatives include nitazoxanide, furazolidone, and quinacrine. Natural substances include berberine, grapefruit seed extract, and quassia. Fatty foods should be avoided, as *Giardia* feeds on bile salts.