GENOVA
DIAGNOSTICS

63 Zillicoa Street
Asheville, NC 28801
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Patient: **SAMPLE**
PATIENT

DOB:

Sex:

MRN:

Digestion

		Reference Range
Chymotrypsin	3.2	0.9-26.8 U/g
Putrefactive SCFAs (Total*)	2.2	1.3-8.6 micromol/g

* Total values equal the sum of all measurable parts.

	Inside	Outside	Reference Range
Meat Fibers ◆		Rare	None
Vegetable Fibers	Rare		None - Few

Absorption

		Reference Range
Triglycerides	1.2	0.2-3.3 mg/g
Long Chain Fatty Acids	1.1	1.3-23.7 mg/g
Cholesterol	1.1	0.2-3.5 mg/g
Phospholipids	1.0	0.2-8.8 mg/g
Fecal Fat (Total*)	4.4	2.6-32.4 mg/g

* Total values equal the sum of all measurable parts.

Metabolic Markers

		Reference Range
Beneficial SCFAs (Total*)	64.6	>= 13.6 micromol/g
n-Butyrate	19.6	>= 2.5 micromol/g
Beta-Glucuronidase	1,502	337-4,433 U/g
pH ◆	6.3	6.1-7.9

* Total values equal the sum of all measurable parts.

SCFA distribution

		Reference Range
Acetate %	56.8	44.5-72.4 %
Propionate %	12.9	<= 32.1 %
n-Butyrate %	30.3	10.8-33.5 %

Immunology

	Inside	Outside	Reference Range
Fecal Lactoferrin ◆		Positive	Negative

Macroscopic

	Inside	Outside	
Color	Brown		Brown
Mucus	Negative		Negative
Occult blood ◆	Negative		Negative

Microbiology

Bacteriology

Beneficial Bacteria

Lactobacillus species	4+
Escherichia coli	4+
Bifidobacterium	4+

Additional Bacteria

gamma haemolytic Streptococcus	NP	3+

Mycology

Yeast, not Candida albicans	NP	1+

*NG	NP	PP	P
*NG			
No Growth	Non-Pathogen	Possible Pathogen	Pathogen

Additional Tests (if indicated)

Reference Range

Test	Value	Reference Range
Pancreatic Elastase ◆	>500	>= 201 mcg/g
Eosinophil Protein X	32.7	<= 7.0 mcg/g
Calprotectin ◆	440	<=50 mcg/g

Bile Acids

Test	Value	Reference Range
Lithocholic Acid (LCA)	2.96	0.65-5.21 mg/g
Deoxycholic Acid (DCA)	4.46	0.67-6.76 mg/g
LCA/DCA Ratio	0.66	0.39-2.07
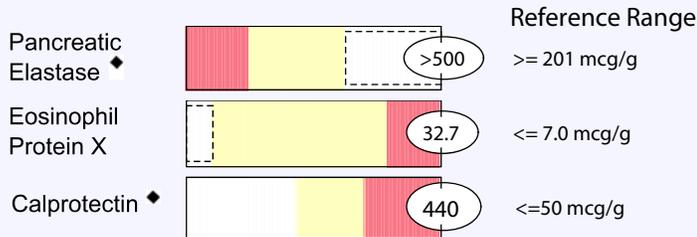
Commentary

Lab Comments
Fecal lactoferrin EIA result confirmed by repeat testing. 10/18/2011 sm

The performance characteristics of all assays have been verified by Genova Diagnostics, Inc.   Unless otherwise noted with ◆ as cleared by the U.S. Food and Drug Administration, assays are For Research Use Only.

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The **Reference Range** is a statistical interval representing 95% or 2 Standard Deviations (2 S.D.) of the reference population.

One Standard Deviation (1 S.D.) is a statistical interval representing 68% of the reference population. Values between 1 and 2 S.D. are not necessarily abnormal. Clinical correlation is suggested. (See example below)

Result within Ref Range, but outside 1-SD

Analyte	9.8	2.3 - 12.2 U/g
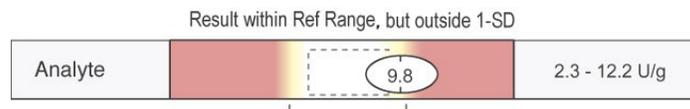
Human microflora is influenced by environmental factors and the competitive ecosystem of the organisms in the GI tract. Pathological significance should be based upon clinical symptoms and reproducibility of bacterial recovery.

Triglycerides constitute the major component of dietary fat and are normally broken down by pancreatic lipase into glycerol and free fatty acids. Triglycerides are within the reference range, indicating adequate fat digestion or a lack of dietary fat.

Chymotrypsin is within the reference range. Chymotrypsin is a key pancreatic enzyme that catalyzes protein digestion. Thus, the fecal level is a measure of proteolytic activity and a marker for pancreatic enzyme output as a whole. A value within the reference range suggests normal enzyme production. Levels are also influenced by transit time, such that faster transit results in higher fecal levels.

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Valerate, iso-valerate and iso-butyrate are "putrefactive" short chain fatty acids, produced when anaerobic bacteria ferment undigested protein. Levels within the reference range suggest adequate protein digestion.

Elevated amounts of meat and/or vegetable fibers were seen in the stool. High concentrations of these fibers are normally absent from the feces. Increased amounts are indirect indicators of maldigestion due to hydrochloric acid/pepsin insufficiency, pancreatic enzyme insufficiency, or inadequate mastication of food.

Long chain fatty acids (LCFAs) are at low levels in the stool. Non-elevated levels suggest adequate absorption of fats by the mucosa of the small intestine or a lack of dietary fat.

Cholesterol is within the reference range, suggesting adequate absorption of cholesterol by the small intestine or low dietary intake.

Phospholipids are normal. 50% of phospholipids are derived from bile, with 25% coming from mucosal desquamation and 25% from dietary sources. Nearly 85% of intestinal phospholipids are absorbed. Normal levels of fecal phospholipids indicate average dietary fat intake and adequate digestion/ absorption.

Total fecal fats are within the reference range. The total fecal fat is calculated as the sum of fecal triglycerides, phospholipids, cholesterol and long chain fatty acids.

Beneficial (Total) short chain fatty acids (SCFAs) are acetate, propionate and n-butyrate. They are the end products of anaerobic microbial fermentation of dietary fiber. Levels thus reflect the concentration of intestinal flora as well as soluble fiber in the diet. These beneficial SCFAs are crucial to the health of the intestine, serving as sources of fuel for the cells and the rest of the body. They also help to regulate the fluid balance in the colon.

n-Butyrate is the most important of the beneficial SCFAs, and is the primary energy source for colonic epithelial cells. Adequate amounts are necessary for the healthy metabolism of the colonic mucosa, and have been shown to have protective effects against colorectal cancers.

Beta-glucuronidase is within the reference range. This is an inducible enzyme, produced by E. coli and anaerobes Bacteroides, and Clostridia. Its activity reverses the detoxication of compounds processed in the hepatic Phase II glucuronidation pathway (including many pharmaceuticals, carcinogens, bile acids, and estrogen).

Fecal pH is within the reference range. The pH of the stool is a reflection of several factors in the GI tract, such as gastric acid, pancreatic bicarbonate, short chain fatty acids, ammonia, bile, organic acids, and acids produced by beneficial flora. Proper levels enhance colonization by beneficial flora, deter possible pathogens, promote normal digestive processes, and promote SCFA production.

The SCFA Distribution reflects the relative proportions of the beneficial SCFAs (n-butyrate, propionate, and acetate), thus providing an indirect measure of balance among the anaerobic organisms in the colon.

Sufficient amounts of E. coli, Lactobacilli and Bifidobacteria appear to be present in the stool. Ample amounts of E. coli have been associated with a balanced gut flora. The "friendly bacteria" are important for gastrointestinal function, as they are involved in vitamin synthesis, natural antibiotic production, immune defense, digestion, detoxification of pro-carcinogens and a host of other activities. Maintaining these levels is important for supporting the health of the digestive system. Supplementation might be considered in selected cases where Lactobacilli are in the low range of normal. Ideally, levels of Lactobacillus and E. coli should be 2+ or greater.   Bifidobacteria being a predominate anaerobe should be recovered at levels of 4+.

The detection of fecal lactoferrin from leukocytes indicates an active inflammatory process. This can be seen in such conditions as bacterial or parasitic colitis, inflammatory bowel disease, or other inflammatory processes. Because lactoferrin is naturally present in breast milk, it has also been observed in the stool of breastfeeding infants. Bovine sources of lactoferrin are undetectable in this test.

A 1+ quantity of yeast is considered an acceptable amount of yeast in the stool. It may, however, reflect a condition of yeast overgrowth, especially when moderate or many yeast are reported on the microscopic (parasitology) exam, or may lead to symptoms in individuals showing deficient beneficial bacteria.

Pancreatic Elastase 1 (PE1) is a simple, noninvasive method of assessing exocrine pancreatic function, contributing

Commentary

to a prompt and reliable diagnosis in suspected cases of pancreatic insufficiency. Reduced PE1 has been found in patients with diabetes, cholelithiasis and osteoporosis. PE1 has been shown to decline with age and can be used to monitor/adjust the dosage of pancreatic enzyme supplementation.

Eosinophil Protein X (EPX) reflects inflammation and tissue damage, and can be elevated in celiac disease, collagenous colitis, helminthic/parasitic infection, and IgE mediated food allergies. Elevated EPX requires further diagnostic testing to determine the cause.

Calprotectin is a neutrophilic marker specific for inflammation in the gastrointestinal tract. It is elevated with infection, post-infectious IBS, and NSAID enteropathy. Fecal calprotectin can be used to differentiate IBD vs. IBS, to monitor treatment in IBD, and to determine which patients should be referred for endoscopy and/or colonoscopy. Levels between 50-120 should be repeated at 4-6 weeks and confirmed.

Bile Acids: Colonic bacteria metabolize primary bile acids to secondary bile acids. Dietary fiber and bacteria flora determine the rates of metabolism for the secondary bile acids, lithocholic acid (LCA) and deoxycholic acid (DCA). The LCA:DCA ratio may be an important discriminating marker in colorectal cancer susceptibility. An elevated secondary bile acid ratio is associated with an increased risk of breast and colorectal cancer. Elevated levels may also occur in patients with gall stones and after cholecystectomy.

GENOVA
DIAGNOSTICS

Patient: **JOHN**
DOE

DOB:

Sex:

MRN:

Parasitology

Microscopic Exam Results

Methodologies used for the Ova & Parasites examination are sedimentation concentration of specimens followed by analysis by iodine wet mount and Trichrome stain permanent smear.

No Ova or Parasites seen
Yeast: Rare

Parasitology EIA Tests

Inside	Outside	Reference Range
Negative		Negative
Cryptosporidium		
Negative		Negative
Giardia lamblia		
Negative		Negative
Entamoeba histolytica/dispar		

Macroscopic Exam for Larvae (if ordered)

No larvae seen macroscopically.

Commentary

Reported quantitation values were derived from a concentration of the sample(s) submitted and represent an "average" value.

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