

Patient: **SAMPLE**
PAIENT

DOB:

Sex:

MRN:

2000 CDSA (Comprehensive Digestive Stool Analysis) - Stool

Methodology: MALDI-TOF MS, Automated and Manual Biochemical Methods, Vitek 2® System Microbial identification and Antibiotic susceptibility, Automated Chemistry, GC-FID, Microscopic Evaluation, ELISA, Ion Selective Electrode, Immunoassay, GCMS

Digestion

	Value	Reference Range
Chymotrypsin	5.3	0.9-26.8 U/g
Putrefactive SCFAs (Total*)	61.0	1.3-8.6 micromol/g

* Total values equal the sum of all measurable parts.

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

Absorption

	Value	Reference Range
Triglycerides	0.3	0.2-3.3 mg/g
Long Chain Fatty Acids	12.4	1.3-23.7 mg/g
Cholesterol	0.5	0.2-3.5 mg/g
Phospholipids	1.5	0.2-8.8 mg/g
Fecal Fat (Total*)	14.7	2.6-32.4 mg/g

* Total values equal the sum of all measurable parts.

Metabolic Markers

	Value	Reference Range
Beneficial SCFAs (Total*)	21.3	>= 13.6 micromol/g
n-Butyrate	3.9	>= 2.5 micromol/g
Beta-Glucuronidase	1,019	337-4,433 U/g
pH	6.9	6.1-7.9

* Total values equal the sum of all measurable parts.

SCFA distribution

	Value	Reference Range
Acetate %	61.0	44.5-72.4 %
Propionate %	20.8	<= 32.1 %
n-Butyrate %	18.3	10.8-33.5 %

Immunology

	Inside	Outside	Reference Range
Fecal Lactoferrin ♦	Negative		Negative

Macroscopic

	Inside	Outside	Reference Range
Color	Brown		Brown
Mucus	Negative		Negative
Occult blood ♦	Negative		Negative

Microbiology

Bacteriology

Beneficial Bacteria

Lactobacillus species	<NG	
Escherichia coli		(4+)
Bifidobacterium		(4+)

Additional Bacteria

alpha haemolytic Streptococcus	NP	(4+)
gamma haemolytic Streptococcus	NP	(4+)
Mucoid Escherichia coli	NP	(4+)
Pseudomonas species	NP	(4+)

Mycology


Yeast, not Candida albicans	NP	(1+)
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*NG	NP	PP	P
*NG			
No Growth	Non-Pathogen	Possible Pathogen	Pathogen



Additional Tests (if indicated)

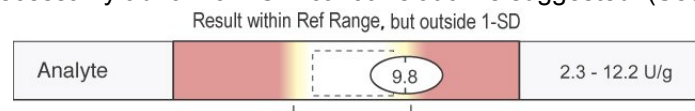
Commentary

The performance characteristics of all assays have been verified by Genova Diagnostics, Inc. Unless otherwise noted with , the assay has not been cleared by the U.S. Food and Drug Administration.

Commentary is provided to the practitioner for educational purposes, and should not be interpreted as diagnostic or as treatment recommendations. Diagnosis and treatment decisions are the practitioner's responsibility.

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)



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



Commentary

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.

Valerate, iso-valerate and iso-butyrate are "putrefactive" short chain fatty acids, produced when anaerobic bacteria ferment undigested protein. Thus, elevated levels of these putrefactive short chain fatty acids generally indicate inadequate protein digestion in the small intestine, leading to fermentation of proteins in the large intestine. Poor protein digestion may be associated with inadequate mastication, excessive protein intake, pancreatic insufficiency, hypo- or achlorhydria, with deficient pepsin. Elevated levels may also reflect fast transit or bacterial overgrowth of the small intestine, particularly when total SCFAs and n-butyrate are also elevated.

Long chain fatty acids (LCFAs) are within the reference range, suggesting 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 *Bifidobacteria* and *E. coli* appear to be present in the stool, however *Lactobacilli* is below optimal levels. Ample amounts of *E. coli* have been associated with a balanced gut flora. The "friendly bacteria", *Lactobacilli* and *Bifidobacteria*, 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. Ideally, levels of *Lactobacillus* and *E. coli* should be 2+ or greater. *Bifidobacteria* being a predominate anaerobe should be recovered at levels of 4+.

Pseudomonas is found in water and soil as well as fruits and vegetables. Bottled water can be a common source of infection. This organism is not usually considered a pathogen, however in high numbers in immunosuppressed individuals may potentially lead to GI distress or systemic infection.

There is no detection of fecal lactoferrin. This indicates no active intestinal inflammation. However, non-inflammatory diarrhea caused by irritable bowel syndrome, small intestinal viral infections, non-invasive parasitic infections, or other etiologies may still be present even in the absence of lactoferrin.



Commentary

A 1+ quantity of yeast is considered an acceptable amount of yeast in the stool. However, it may, reflect a condition of yeast overgrowth, especially if paired with a microscopic observation of moderate to many yeast. A 1+ growth quantity of yeast also may lead to symptoms in individuals with dysbiosis.