Exploring the GI360™ Profiles Through a Women's Health Lens

Jeannie Gorman, MS, CCN

Doctor's Data, Clinical Education Specialist

DOCTOR'S DATA INC

SCIENCE + INSIGHT

For 50+ years, DDI has been recognized and respected by many American and European regulating and governing agencies.

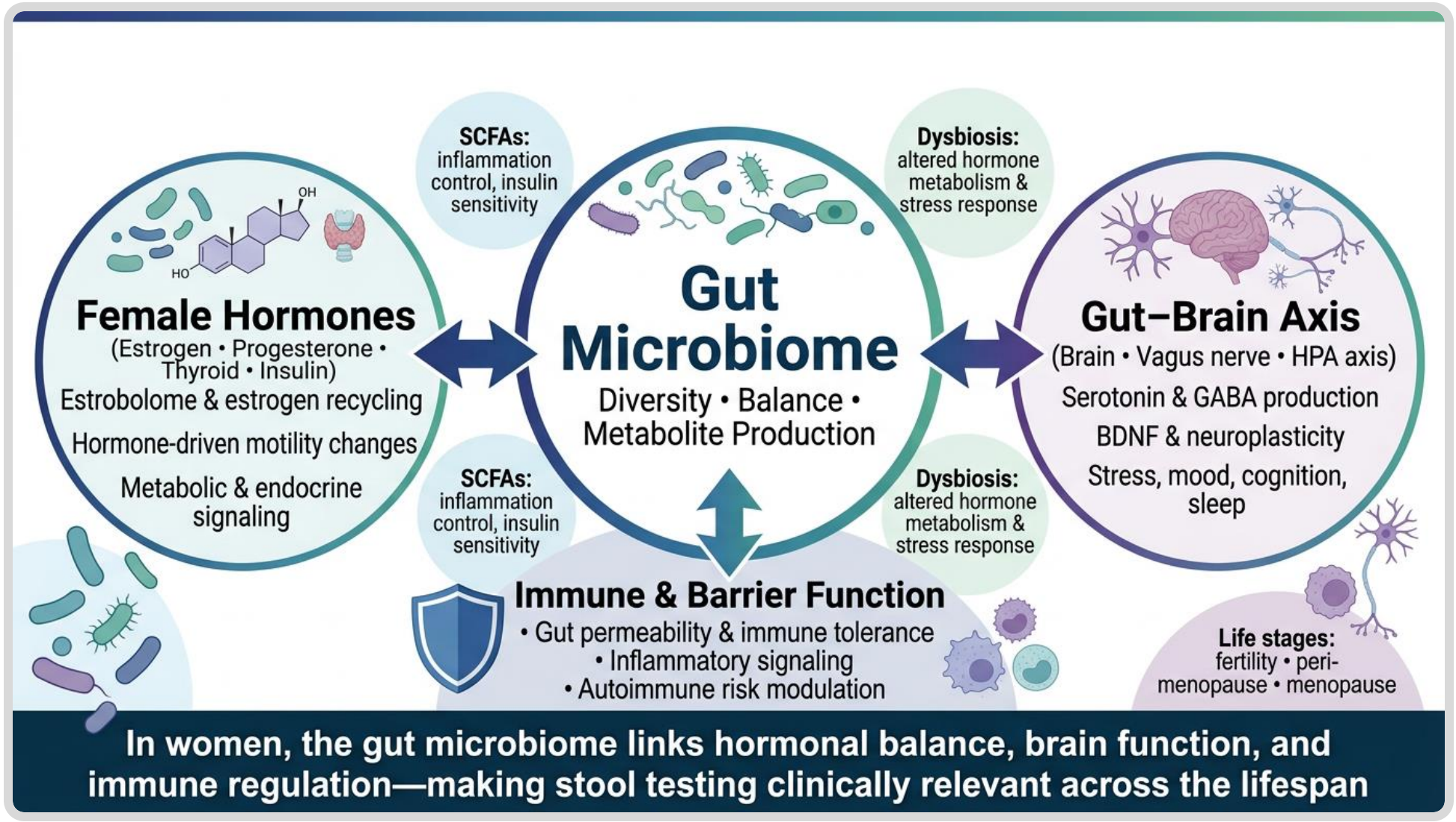
- Doctor's Data is a federally licensed CLIA laboratory with appropriate state certifications and licenses.
- We participate in quality assurance and proficiency testing programs including those offered by the College of American Pathology (CAP), Centers for Disease Control (CDC), New York State Department of Health, Le Centre de Toxicologie du Quebec and others.
- DDI is an approved provider for the Joint Research Centre of the European Commission: Reference Material Unit
  - We assist with the certification of reference materials
  - We do the same for the NY State Department of Health

Qualifications-and-Licensing

Today's session objectives:

Women's Health and the Importance of Assessing the Microbiome

- Describe the role of the gut microbiome in women's hormonal, gastrointestinal, immune and metabolic health.
- Recognise how diet, stress, medications, and other lifestyle factors influencing the gut microbiome.
- Identify patients who may benefit from comprehensive stool testing, compare the GI360™ Complete and GI360™ Select profiles, and apply best practices for stool collection.
- Interpret GI360™ findings and apply results to individualised, evidence-informed clinical strategies, including complementary testing and retesting where appropriate.


SCFAs:
inflammation control, insulin sensitivity
Dysbiosis:
altered hormone metabolism & stress response
Female Hormones
(Estrogen • Progesterone • Thyroid • Insulin)
Estrobolome & estrogen recycling
Hormone-driven motility changes
Metabolic & endocrine signaling
Gut Microbiome
Diversity • Balance • Metabolite Production
Gut–Brain Axis
(Brain • Vagus nerve • HPA axis)
Serotonin & GABA production
BDNF & neuroplasticity
Stress, mood, cognition, sleep
SCFAs:
inflammation control, insulin sensitivity
Dysbiosis:
altered hormone metabolism & stress response
Immune & Barrier Function
• Gut permeability & immune tolerance
• Inflammatory signaling
• Autoimmune risk modulation
Life stages:
fertility • peri-menopause • menopause
In women, the gut microbiome links hormonal balance, brain function, and immune regulation—making stool testing clinically relevant across the lifespan

How Chronic Stress Shapes the Gut Microbiome

Microbiome Consequences

- Reduced microbial diversity (lower ***Bifidobacterium*** *spp.*, ***Lactobacillus*** *spp.*, *A. muciniphila spp.)*
- Reduced butyrate and total SCFA production
- Increased intestinal permeability and inflammatory tone
- Expansion of opportunistic organisms, including Proteobacteria phyla

Potential Clinical Consequences

- Impaired gut barrier function and motility
- Altered metabolic signaling
- Increased immune activation
- Greater susceptibility to dysbiosis

Pharmacomicrobiomic Effects on the Microbiome

Metabolic & Weight Management

- Incretin-Based Therapies (GLP-1 and GIP/GLP-1 receptor agonists)
  Associated with increases in *Akkermansia spp.*, *F. prausnitzii spp.*, *Eubacterium*, *Bifidobacterium spp.*
- Biguanides (Metformin)
  Enrich short-chain fatty acid–producing taxa, including *Akkermansia spp.*and *Bifidobacterium spp.*, while also increasing *Escherichia coli*, which may contribute to GI intolerance.
- Statins (HMG-CoA Reductase Inhibitors)
  Modulate bile acid metabolism and microbial enzymatic activity, influencing drug metabolism and trimethylamine N-oxide (TMAO) production.

Gastrointestinal

- Proton Pump Inhibitors (PPIs)
  Increase gastric and intestinal pH and alter bile acid metabolism, promoting overgrowth of *Clostridioides difficile* and *Enterococcus spp.*

Pharmacomicrobiomic Effects (cont'd)

Neuropsychiatric

- Selective Serotonin Reuptake Inhibitors (SSRIs)
  Exhibit antimicrobial activity and may alter microbial community structure and oxidative stress responses.
- Atypical Antipsychotics (e.g., olanzapine, risperidone)
  Shift the microbiome toward increased Firmicutes and reduced *Bifidobacterium* and *Lactobacillus spp.*, patterns associated with metabolic dysregulation.

Hormonal & Reproductive Health

- Hormonal Contraceptives (BCPs)
  Emerging evidence suggests microbiome composition and timing of exposure may influence susceptibility to mood-related and metabolic effects.

Pain & Inflammation

- Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)
  Disrupts mucosal integrity, reduce microbial diversity, and increase pro-inflammatory signaling.
- Cannabinoids (CBD, THC)
  Exhibit bidirectional interactions with the microbiome and have been associated with increased *Akkermansia spp.* and *Faecalibacterium prausnitzii* in some studies.

Patient Stool Testing Indications

- **Known GI diagnoses with symptoms:**
  - IBD, IBS, Entero-pathogens
- **Chronic Metabolic Conditions:**
  - Diabetes, Obesity, GLP-1 use, Metabolic Syndrome
- **Immune Dysfunction:**
  - Autoimmunity, MCASynd, prolonged SARS-Cov-2
- **Chronic Inflammatory Diseases:**
  - CVD, Alzheimer's, arthritis, cancer
- **Mental health:**
  - Chronic stress, depression, anxiety, cognition (Gut Brain Axis conditions)
- **Low Soluble Fibre Diets:**
  - Processed foods, Low FODMAP, Keto, Vegan/Vegetarian, Carnivore
- **General Health Concerns:**
  - Fertility and hormonal health
  - Obesity and/or use of GLP-1 agonists
  - Liver, adrenal and thyroid dysfunction
  - Iron malabsorption
- **Optimal health and longevity**

DOI: https://doi.org/10.1016/j.cell.2015.11.001

GI360™ Complete vs. GI360™ Select

GI360™ Complete	
Microbiome Diversity and Abundance; PCR	✓
Viruses, Pathogens, and Parasites; PCR	✓
Expanded Parasitology; Microscopy	✓
Bacterial and Fungal Culturomics w/ Direct Susceptibilities; MALDI-TOF MS	✓
Stool Chemistries	✓
Beta-Glucuronidase	✓

*GI360 does not include H. pylori

GI360™ Select	
Microbiome Diversity and Abundance; PCR	✓
Viruses, Pathogens, and Parasites; PCR	✓
Stool Chemistries	✓
Beta-Glucuronidase	✓
H. Pylori	✓

*Stool Chemistries: GI360 Select does not include Lactoferrin

DOCTOR'S DATA INC
SCIENCE+INSIGHT

Collection Instructions

PPIs H2 blockers are contraindicated for H. pylori Antigen testing to avoid false negative.

③ IMPORTANT PREP INFO

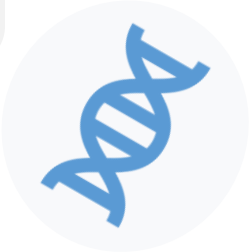
BEFORE YOU START: Please read all of the instructions carefully before beginning. Consult your physician for specific instructions and before stopping any medications.

DISCONTINUE THE FOLLOWING	
2 weeks before test	Antibotics, antiparasitics, antifungals, or probiotic supplements, proton pump inhibitors (PPIs) and Bismuth
2 days before test	Aspirin and other NSAIDs, digestive enzymes, laxatives (particularly mineral oil, castor oil, and glycerin enemas/suppositories), activated charcoal, betaine HCl, antacids or bentonite clay

OTHER INFORMATION		
Do not collect samples when there is active bleeding from hemorrhoids or menstruation	Wait at least 4 weeks from a colonoscopy or barium enema before collecting	Do not contaminate the stool with urine or water

PCR for Clinical Microbiology

Validated, targeted, and clinically actionable



- **Amplifies specific DNA targets** ("barcodes")
- Requires DNA extraction; results depend on validated primer/probe sets
- **High analytical sensitivity and specificity**
- **FDA-cleared platforms** provide standardized, reliable, reproducible detection
- Ideal for **quickly identifying** pathogenic bacteria, parasites, and viruses

Multiplex PCR, Laboratory Validations

Technical verification	
Parameter	**Results**
Repeatability	2.6% CV
Reproducibility	4.2% CV

DDI's PCR Platform Reliability & Standards

- Rapid, **reproducible results** within and across labs
- **FDA-approved & CE-marked probes** ensure clinical validity
- **<5% variability between runs**, confirmed in international labs
- Minimizes **false positives and false negatives** for reliable interpretation

Evidence-Based Microbiome Testing

- PCR-based microbial **detection methods vary in accuracy** across the industry.
- DDI provides **validated assay performance**, including sensitivity, specificity, reproducibility, and clinical relevance. Published validation and independent peer review **ensure scientific rigor, defensible targets, and reliable reporting algorithms.**
- Peer-reviewed validation elevates microbiome testing from informational to clinically actionable, supporting more **precise care and therapeutic planning.**

EVALUATION OF GUT BACTERIA: GENOMIC SEQUENCING VS. qPCR

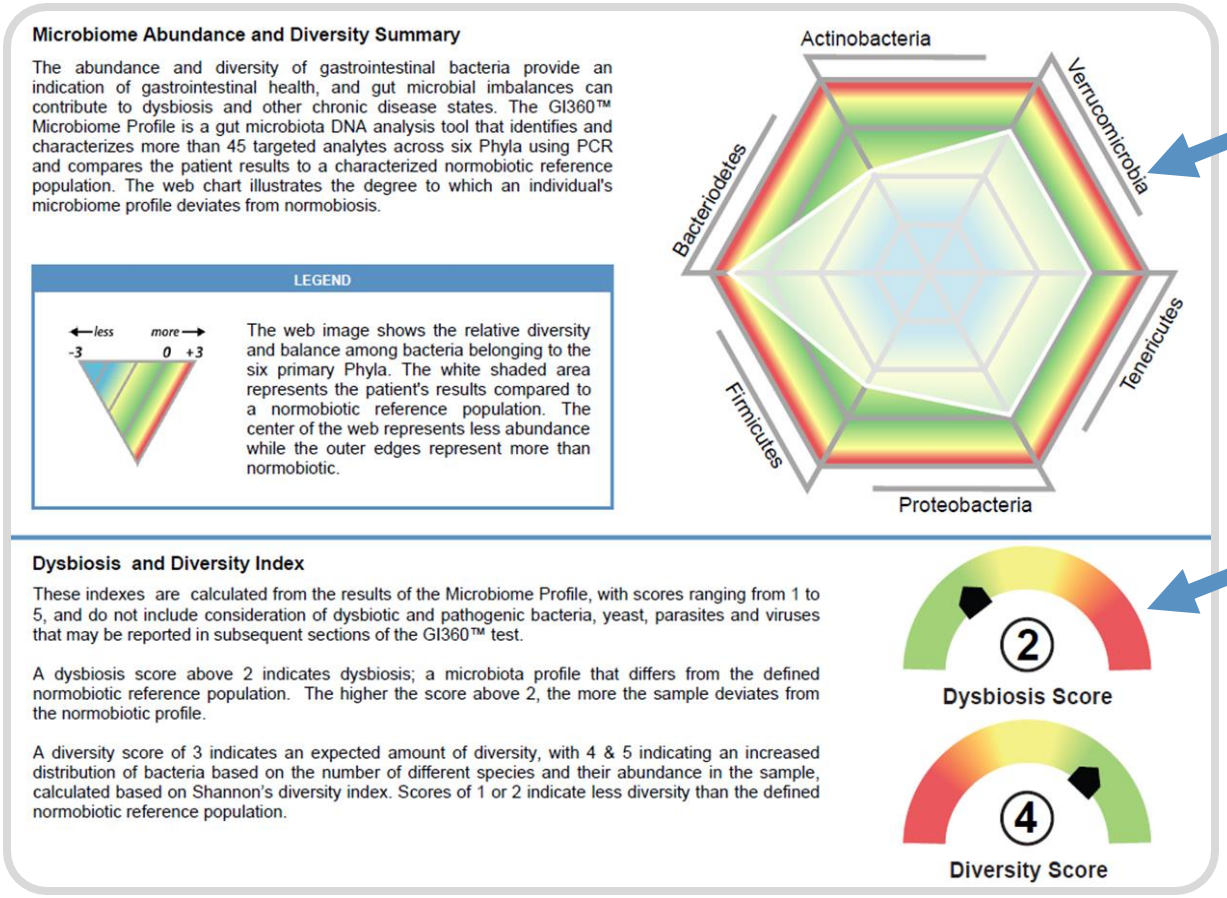
Sequencing

- Broad view of all DNA
- Answers *"Who's **all there**?"*
- Sequences random DNA fragments to assemble entire genomes
- Ideal for discovering new genes or genetic potential
- *Not diagnostic*
- *Lack established reference ranges*

qPCR

- Targeted amplification of specific DNA
- **Answers "*Is it there?*"**
- High sensitivity**, specificity**
  - Pathogen identification
- Validated PCR methods support precision care and improve confidence in clinical planning

GI360™ Complete Microbiome Abundance and Diversity



Patients results at a glance compared to the normobiotic reference population. Deviation from a hexagonal shape indicates variant abundance and diversity within the microbial community.

There are different types of dysbiosis. The Dysbiosis Index is calculated strictly from the Microbiota Abundance analytes, and does not include specific pathogenic and dysbiotic bacteria, yeast, parasites and viruses that may be identified in subsequent sections of the GI360™.

DDI DOCTOR'S DATA INC
SCIENCE+INSIGHT

PCR Detection of Clinically Relevant Species

Actinobacteria Phyla

- Bifidobacteria family

Bacteriodetes Phyla

- Pro-inflammatory
- Diet driven

Firmicutes Phyla

- Butyragenic species
- Lactobacillus family
- Phascolarctobacteria spp.

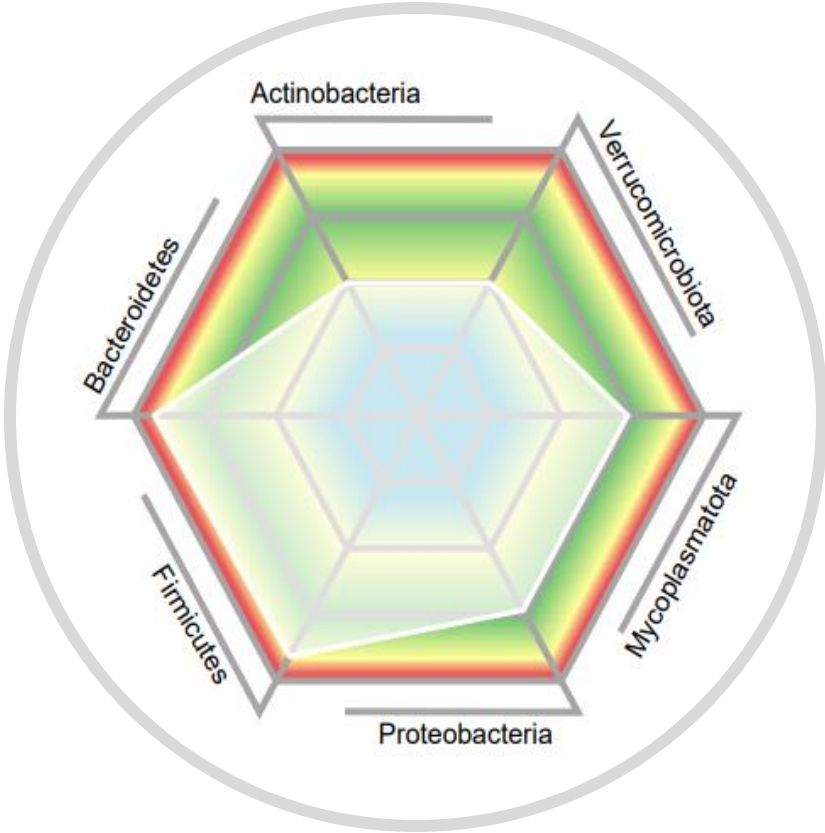
Proteobacteria Phyla

- Pro-inflammatory
- Diet driven

Mycoplasmatota Phyla

Verrucomicrobiota Phyla

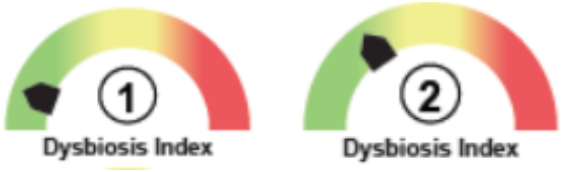
- Akkermansia spp.



WWW.GI360.COM

DOCTOR'S DATA INC
SCIENCE+INSIGHT

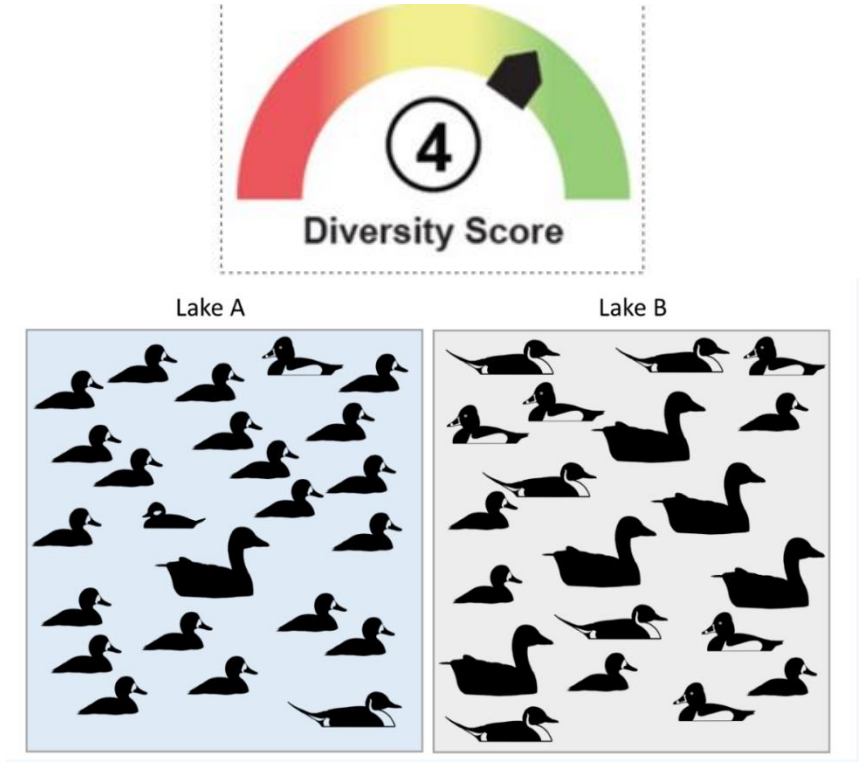
Dysbiosis Index Clinical Interpretation

DI Score	Interpretation	Clinical Significance
	Normobiotic	Microbiome composition consistent with a healthy reference population; balanced diversity and abundance.
	Borderline	Minor deviations from normobiosis
	Moderate Dysbiosis	Significant deviation from normobiosis;
	Severe Dysbiosis	Major deviation from normobiosis; likelihood of pathogenic or opportunistic overgrowth.

Diversity Score Clinical Interpretation

Shannon Diversity Index

- **Measures Microbiome Diversity:** Combines **richness** (number of species) and **evenness** (distribution of individuals across species).
- **Sensitive to Rare Species:** Particularly responsive to changes in the abundance of **low-prevalence species**, making it a sensitive indicator of microbial shifts.
- **Clinical Benchmark:** Normobiotic: High Diversity Score (4–5) indicates a balanced and resilient gut microbiome.



DOCTOR'S DATA INC
SCIENCE+INSIGHT

Microbiome Ecosystem Balance Interpretation

Dysbiosis Index:

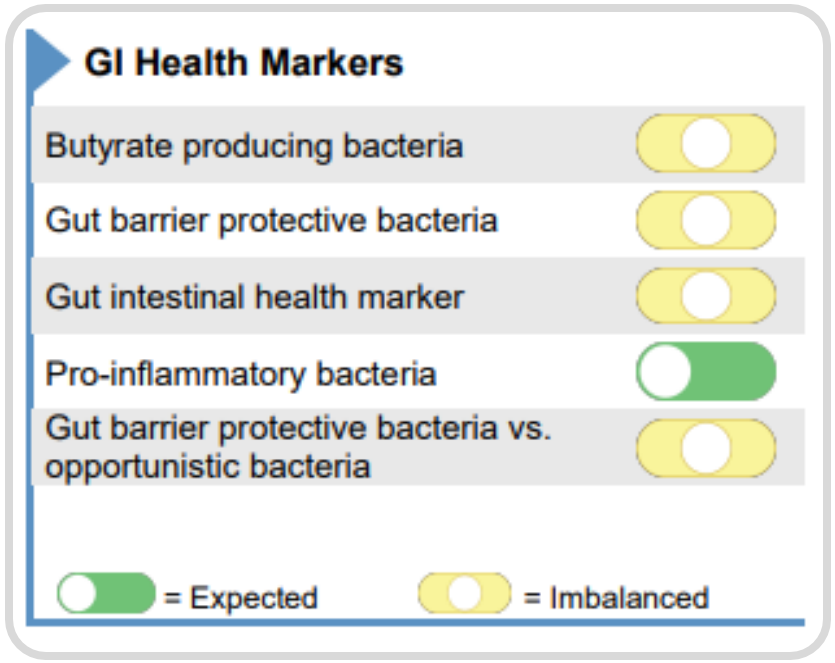
Measures divergence from a healthy normobiotic profile

Diversity Score:

Reflects overall microbiome resilience, richness, and ecosystem depletion

DOCTOR'S DATA INC
SCIENCE + INSIGHT

GI360™ Functional Guild Criteria

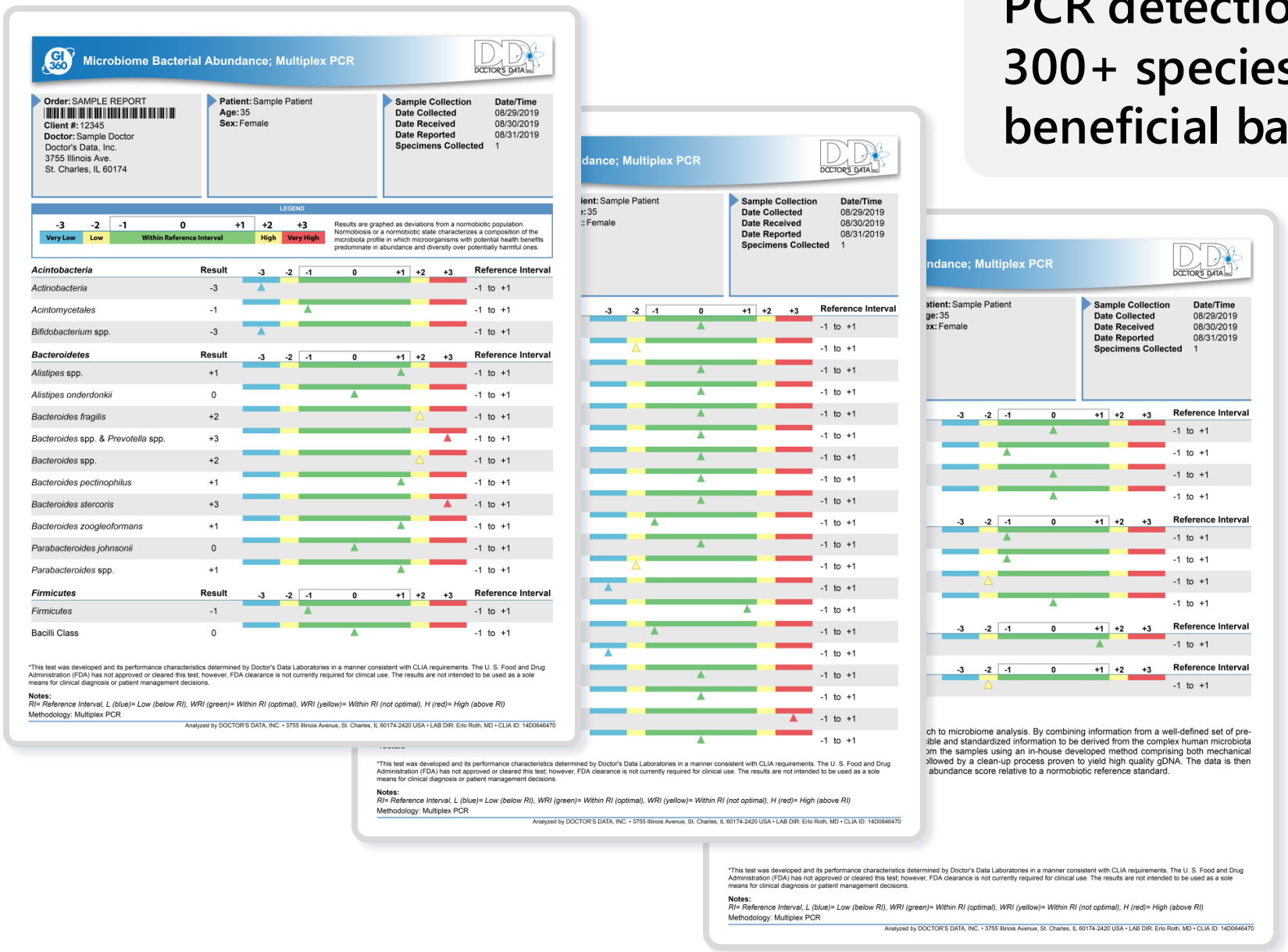


Functional Marker	Bacteria	Profile criteria for imbalance	Description
Butyrate producing bacteria	*Eubacterium hallii* *Eubacterium rectale* *Faecalibacterium prausnitzii*	At least two of the butyrate producers below healthy range	Insufficient levels of butyrate are associated with an impaired gastrointestinal health. Butyrate is a short-chain fatty acid produced by microbial fermentation in the large intestine of humans. It is important for regulating multiple functions of gut cells, may be important for regulating inflammatory and immunological responses and plays a role in the maintenance of intestinal barrier function. Beneficial bacteria belonging to the phylum Firmicutes are major butyrate producers.
Gut mucosa protective bacteria	*Faecalibacterium prausnitzii* *Akkermansia muciniphila*	Both mucosa protective below healthy range	Mucus and mucosa-associated bacteria form a specific protective environment in the gut. A disruption of the mucosa layer may promote specific bacterial colonization and immunological responses and enhance the development of gastrointestinal diseases. Imbalance of gut mucosa protective bacteria has been associated with various gastrointestinal disorders.
Gut intestinal health marker	*Faecalibacterium prausnitzii*	*F. prausnitzii* below healthy range with at least two (-2)	Faecalibacterium prausnitzii is one of the most prevalent bacteria within the human gastrointestinal tract. It is recognized as a major butyrate producer and can promote anti-inflammatory processes and intestinal barrier function. Lower levels of Faecalibacterium prausnitzii in the intestine have been associated with gastrointestinal and metabolomic disorders.
Gut barrier protective vs.opportunistic bacteria	*Faecalibacterium prausnitzii* *Ruminococcus gnavus* Proteobacteria *Shigella spp. & Escherichia spp.*	*F. prausnitzii* below healthy range and at least one of the opportunists above healthy range.	The intestinal epithelial barrier is not a static physical barrier but one that can interact with the gut microbiome and cells of the immune system. An imbalance between the gut barrier protective bacteria and potentially harmful bacteria may lead to gut barrier disruption and is associated with an increased susceptibility to certain diseases.
Pro-inflammatory bacteria	Proteobacteria *Shigella spp. & Escherichia spp.*	Both pro-inflammatory above healthy range, and of which at least one +2 above	Elevated Proteobacteria species are associated with inflammation in various - mainly gastrointestinal - disorders. In a healthy gut microbiota, their increase may promote intestinal inflammation due to molecules present on their surface which are potent triggers of inflammatory responses. Inflammation in itself may also promote the growth of Proteobacteria species. Pro-inflammatory bacteria levels may thus give indications of the susceptibility of the patient to intestinal inflammation and to the possible development of gastrointestinal disorders.

DOCTORSDATA.COM/GI360-STOOL

DOCTOR'S DATA INC
SCIENCE+INSIGHT

PCR detection of 300+ species of beneficial bacterial



Microbiome Bacterial Abundance; Multiplex PCR

Order: SAMPLE REPORT
Client #: 12345
Doctor: Sample Doctor
Doctor's Data, Inc.
3755 Illinois Ave.
St. Charles, IL 60174

Patient: Sample Patient
Age: 35
Sex: Female

Sample Collection	Date/Time
Date Collected	08/29/2019
Date Received	08/30/2019
Date Reported	08/31/2019
Specimens Collected	1

LEGEND

-3	-2	-1	0	+1	+2	+3
Very Low	Low	Within Reference Interval			High	Very High

Results are graphed as deviations from a normobiotic population. Normobiosis or a normobiotic state characterizes a composition of the microbiota profile in which microorganisms with potential health benefits predominate in abundance and diversity over potentially harmful ones.

Acintobacteria	Result	Reference Interval
Actinobacteria	-3	-1 to +1
Acintomycetales	-1	-1 to +1
Bifidobacterium spp.	-3	-1 to +1

Bacteroidetes	Result	Reference Interval
Alistipes spp.	+1	-1 to +1
Alistipes onderdonkii	0	-1 to +1
Bacteroides fragilis	+2	-1 to +1
Bacteroides spp. & *Prevotella* spp.	+3	-1 to +1
Bacteroides spp.	+2	-1 to +1
Bacteroides pectinophilus	+1	-1 to +1
Bacteroides stercoris	+3	-1 to +1
Bacteroides zoogleoformans	+1	-1 to +1
Parabacteroides johnsonii	0	-1 to +1
Parabacteroides spp.	+1	-1 to +1

Firmicutes	Result	Reference Interval
Firmicutes	-1	-1 to +1
Bacilli Class	0	-1 to +1

*This test was developed and its performance characteristics determined by Doctor's Data Laboratories in a manner consistent with CLIA requirements. The U. S. Food and Drug Administration (FDA) has not approved or cleared this test; however, FDA clearance is not currently required for clinical use. The results are not intended to be used as a sole means for clinical diagnosis or patient management decisions.

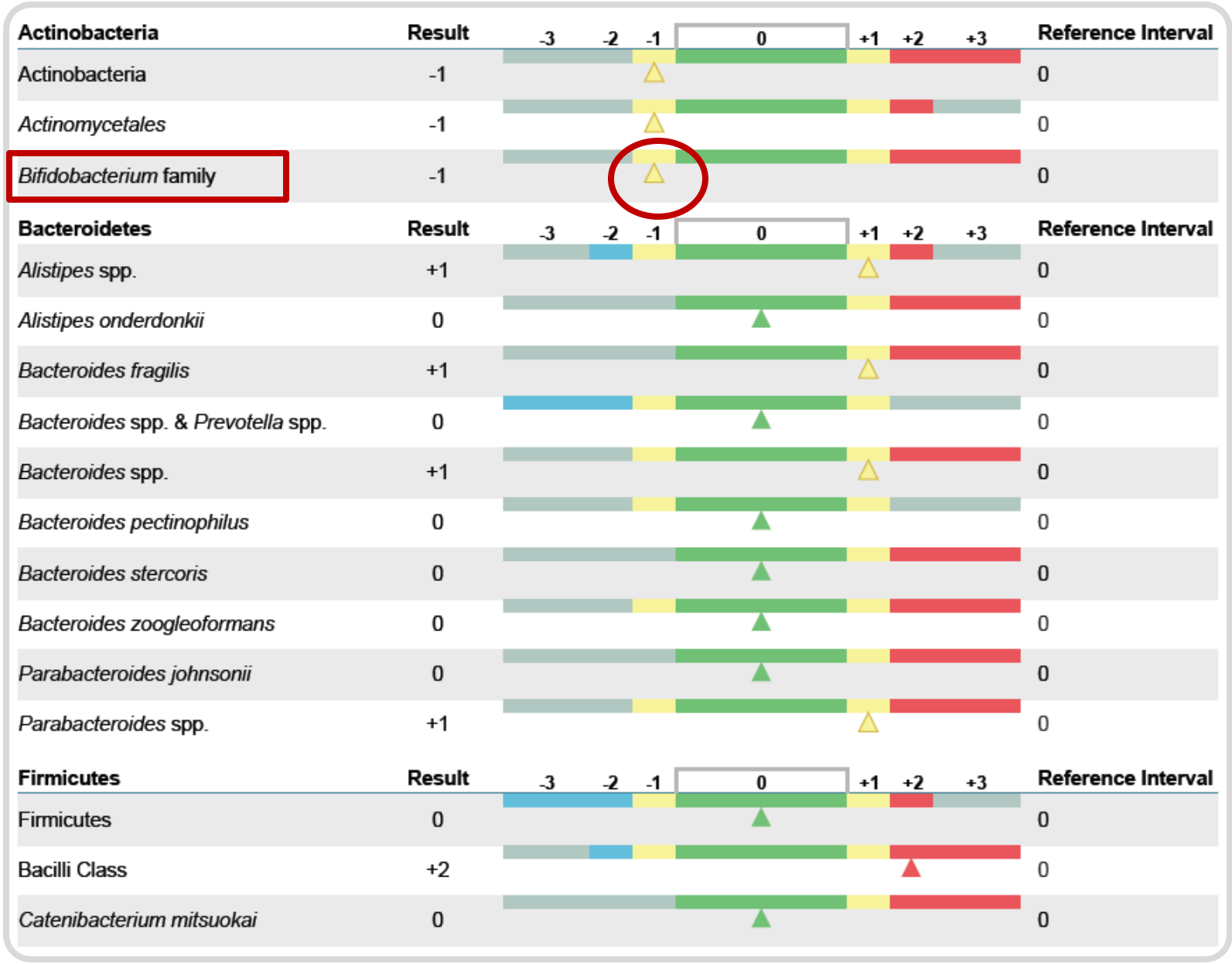
Notes:
RI= Reference Interval, L (blue)= Low (below RI), WRI (green)= Within RI (optimal), WRI (yellow)= Within RI (not optimal), H (red)= High (above RI)
Methodology: Multiplex PCR

Analyzed by DOCTOR'S DATA, INC. • 3755 Illinois Avenue, St. Charles, IL 60174-2420 USA • LAB DIR: Erlo Roth, MD • CLIA ID: 14D0646470

ch to microbiome analysis. By combining information from a well-defined set of pre-
ible and standardized information to be derived from the complex human microbiota
om the samples using an in-house developed method comprising both mechanical
llowed by a clean-up process proven to yield high quality gDNA. The data is then
abundance score relative to a normobiotic reference standard.

SCIENCE+INSIGHT

Microbiome Bacterial Abundance;Multiplex PCR



Actinobacteria	Result	-3 -2 -1 0 +1 +2 +3	Reference Interval
Actinobacteria	-1		0
Actinomycetales	-1		0
Bifidobacterium family	-1		0

Bacteroidetes	Result	-3 -2 -1 0 +1 +2 +3	Reference Interval
Alistipes spp.	+1		0
Alistipes onderdonkii	0		0
Bacteroides fragilis	+1		0
Bacteroides spp. & *Prevotella* spp.	0		0
Bacteroides spp.	+1		0
Bacteroides pectinophilus	0		0
Bacteroides stercoris	0		0
Bacteroides zoogleoformans	0		0
Parabacteroides johnsonii	0		0
Parabacteroides spp.	+1		0

Firmicutes	Result	-3 -2 -1 0 +1 +2 +3	Reference Interval
Firmicutes	0		0
Bacilli Class	+2		0
Catenibacterium mitsuokai	0		0

SCIENCE+INSIGHT

Microbiome Bacterial Abundance;Multiplex PCR

Firmicutes	Result	-3 -2 -1 0 +1 +2 +3	Reference Interval
Clostridia Class	0		0
Clostridium methylpentosum	-1		0
Clostridium L2-50	0		0
Coprobacillus cateniformis	0		0
Dialister invisus	0		0
Dialister invisus & Megasphaera micronuciformis	0		0
Dorea spp.	-1		0
Holdemanella biformis	0		0
Anaerobutyricum hallii	-2		0
Agathobacter rectalis	-1		0
Eubacterium siraeum	0		0
Faecalibacterium prausnitzii	-3		0
Lachnospiraceae	0		0
Ligilactobacillus ruminis & Pediococcus acidilactici	0		0
Lactobacillus family	0		0
Phascolarctobacterium spp.	+3		0
Ruminococcus albus & R. bromii	0		0
Mediterraneibacter gnavus	+2		0
Streptococcus agalactiae & Agathobacter rectalis	-1		0
Streptococcus salivarius ssp. *thermophilus & S. sanguinis*	0		0

Butyragenic species

Lactobacillus family WNL

Phascolarcobacterium spp., M. gnavus spp

DOCTOR'S DATA INC
SCIENCE+INSIGHT

Microbiome Bacterial Abundance;Multiplex PCR

Firmicutes	Result	-3 -2 -1 0 +1 +2 +3	Reference Interval
Streptococcus salivarius ssp. *thermophilus*	-1		0
Streptococcus spp.	0		0
Veillonella spp.	0		0
Proteobacteria	**Result**	-3 -2 -1 0 +1 +2 +3	**Reference Interval**
Proteobacteria	0		0
Enterobacteriaceae	0		0
Escherichia spp.	0		0
Acinetobacter junii	0		0
Mycoplasmatota	**Result**	-3 -2 -1 0 +1 +2 +3	**Reference Interval**
Metamycoplasma hominis	0		0
Verrucomicrobiota	**Result**	-3 -2 -1 0 +1 +2 +3	**Reference Interval**
Akkermansia muciniphila	-1		0

Akkermansia muciniphila spp.

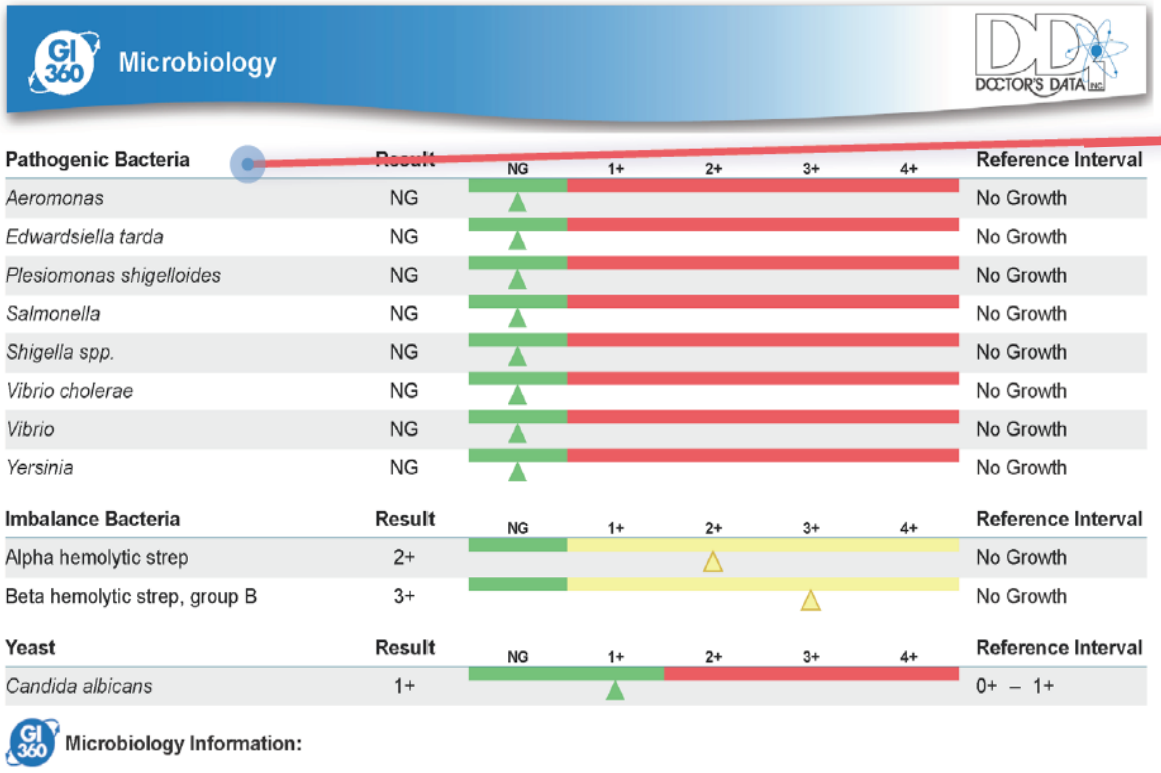
- Links microbial activity with **barrier integrity and host metabolic signaling**
- Mucin-degrading organism involved in **mucus layer turnover and barrier dynamics**
- Implicated in:
  - **Immune modulation** via mucosal signaling pathways
  - **Metabolic signaling**, including associations with GLP-1–related physiology (endogenous)
  - **Gut–metabolic cross-talk** influencing inflammatory and energy balance states
- **Levels are context dependent,** influenced by diet, microbial balance, and overall gut ecosystem function

SCIENCE+INSIGHT

State of the Art Culturomics*: MALDI/ToF

Matrix-Assisted Laser Desorption/Ionization Time-of-Flight mass spectrometry

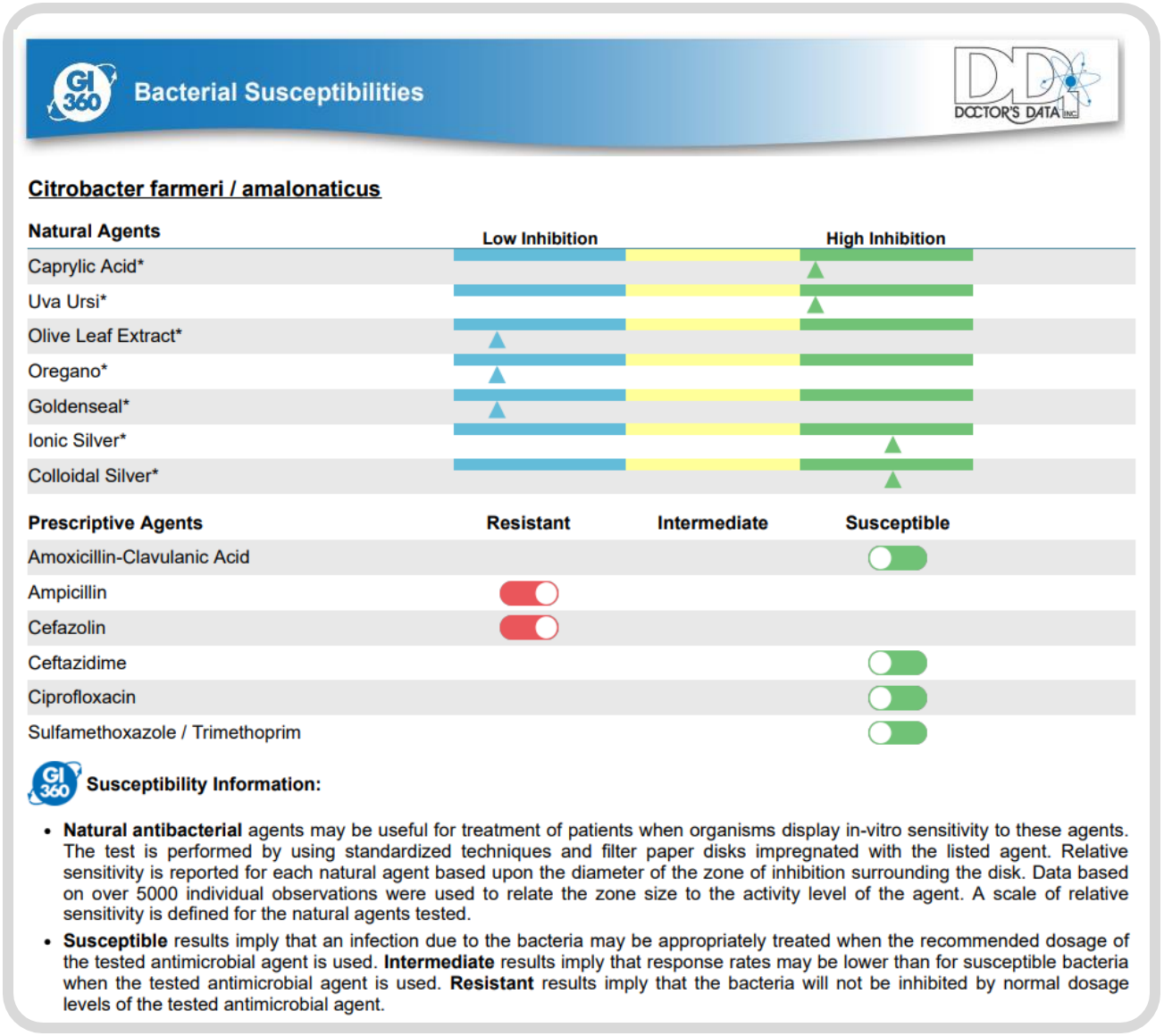
- Aerobic and Anaerobic culturing
- Ability to identify organisms outside of molecular DNA primer set
- Reports are specific to the individual, expandable fields



Culture complements PCR detection of dysbiotic and pathogenic bacteria and yeast. All sections within Microbiology are expandable fields. The greater the number of detected bacteria and yeast, the more expansive the reporting.

*Not included on the GI360™ Select

DOCTOR'S DATA SCIENCE+INSIGHT



Bacterial Susceptibilities

Citrobacter farmeri / amalonaticus

Natural Agents	Low Inhibition	High Inhibition
Caprylic Acid*		
Uva Ursi*		
Olive Leaf Extract*		
Oregano*		
Goldenseal*		
Ionic Silver*		
Colloidal Silver*		

Prescriptive Agents	Resistant	Intermediate	Susceptible
Amoxicillin-Clavulanic Acid			
Ampicillin			
Cefazolin			
Ceftazidime			
Ciprofloxacin			
Sulfamethoxazole / Trimethoprim			

Susceptibility Information:

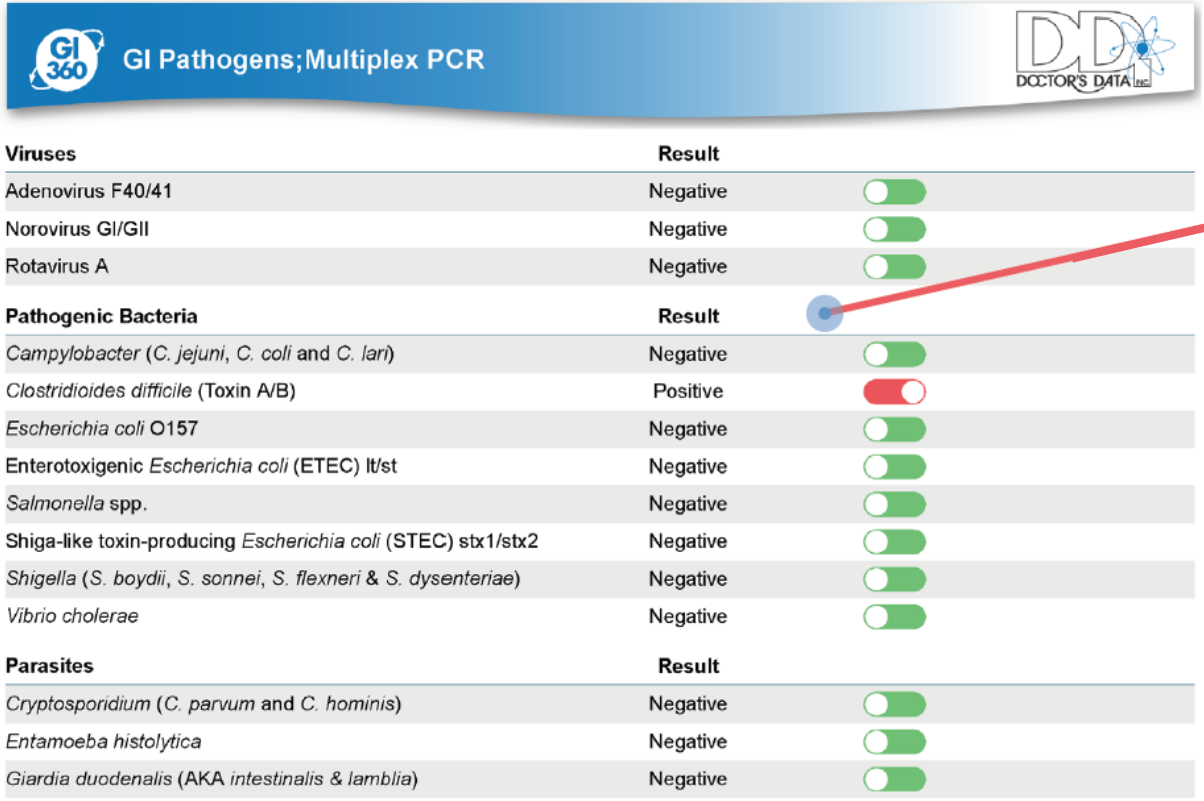
- **Natural antibacterial** agents may be useful for treatment of patients when organisms display in-vitro sensitivity to these agents. The test is performed by using standardized techniques and filter paper disks impregnated with the listed agent. Relative sensitivity is reported for each natural agent 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.
- **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.

Inhibition Results: Natural Agents & Rx

*Not included on the GI360™ Select

SCIENCE+INSIGHT

GI Pathogens Report: PCR detection



PCR testing is very sensitive and allows for the detection of extremely low levels of pathogens. Decisions regarding clinical intervention should take the patient's complete clinical history and presentation into account.

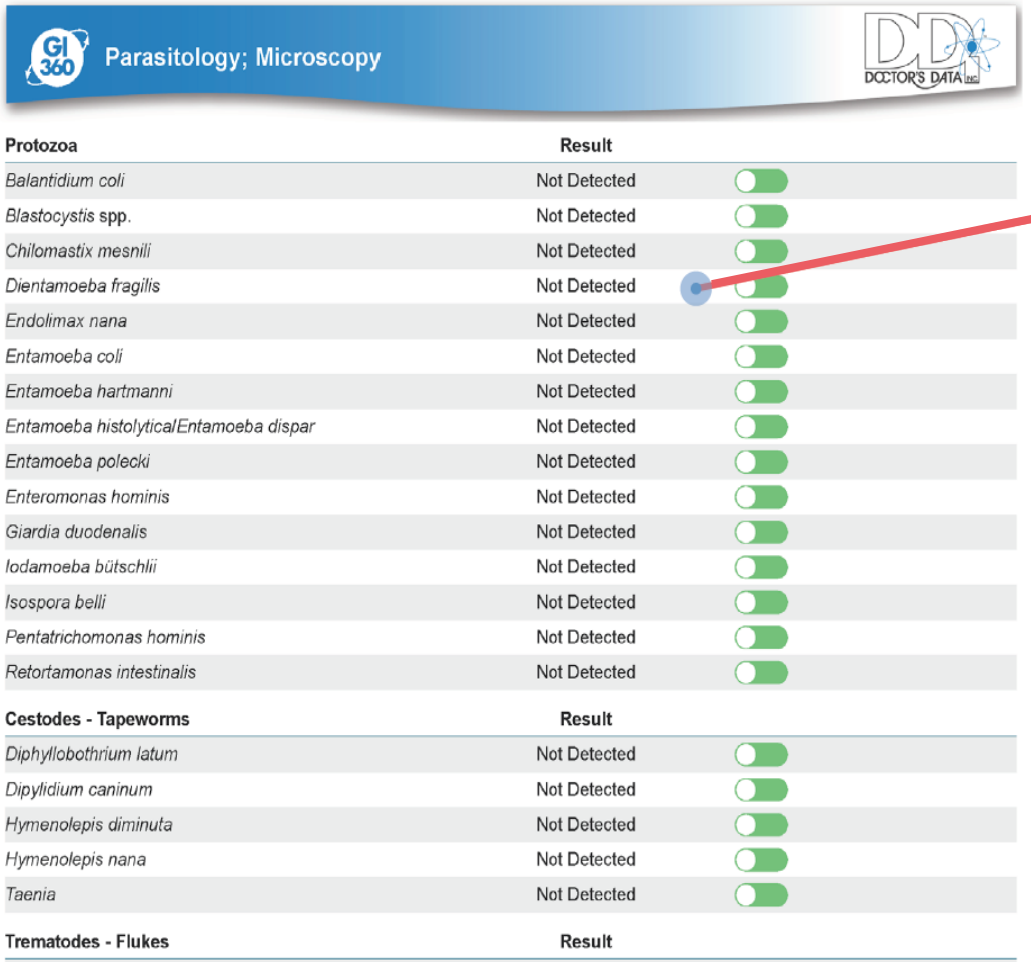
DOCTOR'S DATA INC
SCIENCE+INSIGHT

Parasitology via Microscopy

Clinical Indications include:

- International Travel
- Pet exposures
- Raw fish/meat
- GI Symptoms

Parasitology by Microscopy (O&P)



Parasitology; Microscopy

Protozoa	Result
Balantidium coli	Not Detected
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 histolyticalEntamoeba dispar	Not Detected
Entamoeba polecki	Not Detected
Enteromonas hominis	Not Detected
Giardia duodenalis	Not Detected
Iodamoeba bütschlii	Not Detected
Isospora belli	Not Detected
Pentatrichomonas hominis	Not Detected
Retortamonas intestinalis	Not Detected

Cestodes - Tapeworms	Result
Diphyllobothrium latum	Not Detected
Dipylidium caninum	Not Detected
Hymenolepis diminuta	Not Detected
Hymenolepis nana	Not Detected
Taenia	Not Detected

Trematodes - Flukes	Result

Microscopy (O&P) permits detection of many additional parasites not detected using PCR.

- CDC standard of care for parasitology
- Three stool collections on three separate days
- Identification of O&P (>30 common parasites);
- Macroscopy ID profile can be ordered separately
- Not included on Gi360™ Select

SCIENCE+INSIGHT

Other Markers; Microscopy

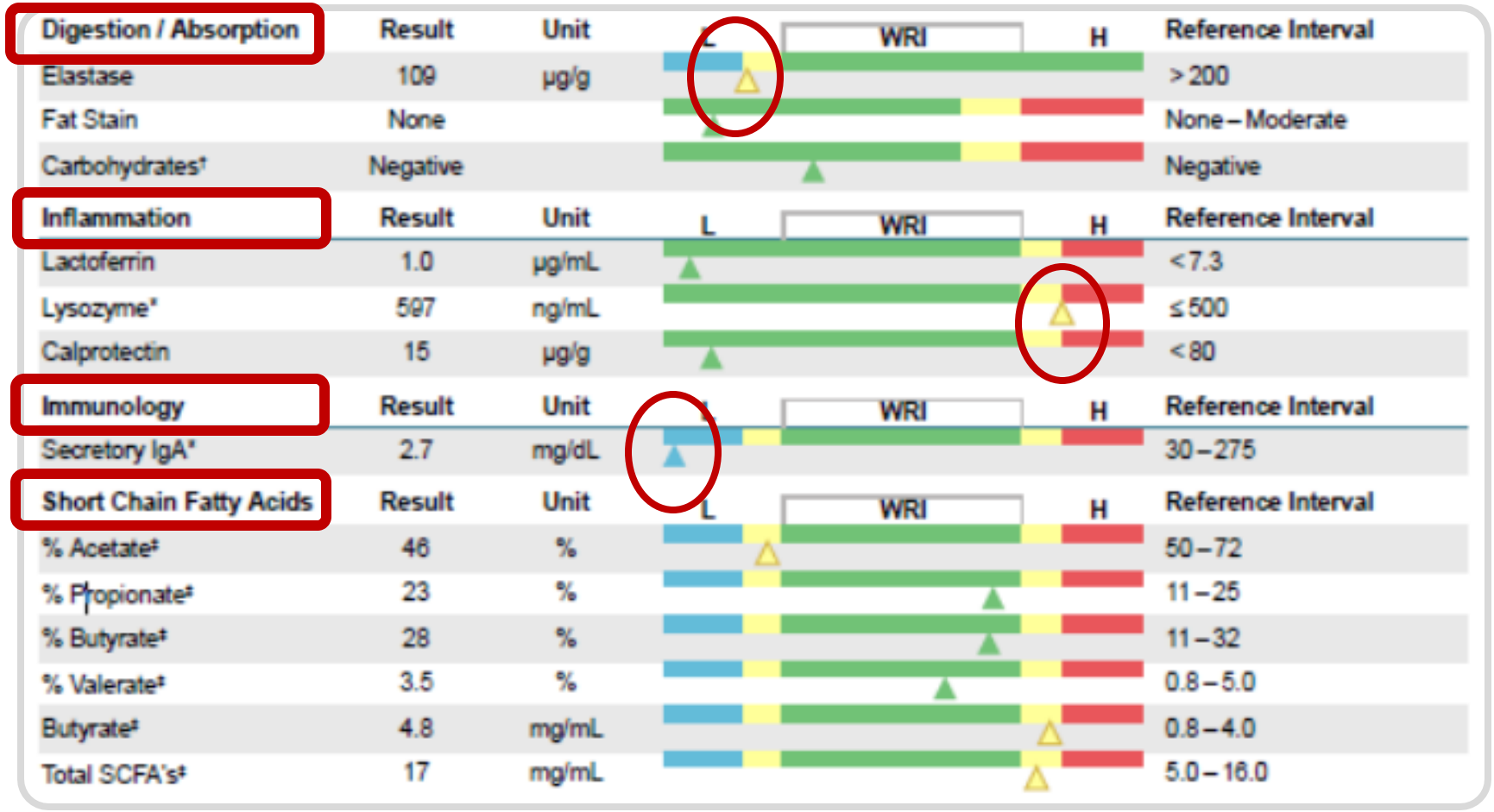
Other Markers	Result		Reference Interval
Yeast	Few		Not Detected – Rare
RBC	Not Detected		Not Detected – Rare
WBC	Not Detected		Not Detected – Rare
Muscle fibers	Not Detected		Not Detected – Rare
Vegetable fibers	Moderate		Not Detected – Few
Charcot-Leyden Crystals	Not Detected		Not Detected
Pollen	Not Detected		Not Detected
Macroscopic Appearance	**Result**		**Reference Interval**
Color	Brown		Brown
Consistency	Soft		Soft
Mucus	Negative		Negative

Visualization of moderate to many yeast microsopically in the absence of cultured yeast may be consistent with small intestinal fungal overgrowth. Consider symptomology for the patient.

*Not included on the GI360™ Select

Stool Chemistry Markers

- Low Elastase
- High Lysozyme
- Low Secretory IgA
  - chronic immune exposure
  - Consider vitamin A, vitamin D and zinc status, L-glutamine
- Elevated Butyrate, SCFAs



Digestion / Absorption	Result	Unit	L WRI H	Reference Interval
Elastase	109	µg/g		> 200
Fat Stain	None			None – Moderate
Carbohydrates†	Negative			Negative
Inflammation	**Result**	**Unit**	**L WRI H**	**Reference Interval**
Lactoferrin	1.0	µg/mL		< 7.3
Lysozyme*	597	ng/mL		≤ 500
Calprotectin	15	µg/g		< 80
Immunology	**Result**	**Unit**	**L WRI H**	**Reference Interval**
Secretory IgA*	2.7	mg/dL		30 – 275
Short Chain Fatty Acids	**Result**	**Unit**	**L WRI H**	**Reference Interval**
% Acetate‡	46	%		50 – 72
% Propionate‡	23	%		11 – 25
% Butyrate‡	28	%		11 – 32
% Valerate‡	3.5	%		0.8 – 5.0
Butyrate‡	4.8	mg/mL		0.8 – 4.0
Total SCFA's‡	17	mg/mL		5.0 – 16.0

*Lactoferrin not included on the GI360™ Select

DDI DOCTOR'S DATA INC SCIENCE + INSIGHT

Short Chain Fatty Acids (SCFAs)

Non-negotiable for Gut Health

Butyrate serves as the primary energy source for colonocytes and supports gut barrier integrity, immune regulation, and intrinsic GLP-1 secretion.

Propionate is largely involved in hepatic metabolism, satiety signaling, and glucose regulation,

Acetate, the most abundant SCFA, functions as a systemic energy substrate and signaling molecule.

Valerate is a less abundant SCFA that may contribute to epithelial health and immune modulation.

Total SCFAs reflect microbial fermentation activity and are increasingly linked to gastrointestinal, metabolic, and immune health.

Butyrate, SCFAS and Fibre Types

Key to Gut Barrier Integrity and Systemic Health

- **<u>Soluble fiber</u> (fermentable): primary driver of SCFA and butyrate production**
  - Dosing: 8-15g QD
  - Sources:
    - Foods: legumes/starchy beans, Jerusalem artichoke, chia seeds, banana, etc.
    - Supplements: resistant potato starch, inulin, psyllium husk

- **<u>Insoluble fiber</u> (non-fermentable):** supports stool bulk and transit; indirect gut health benefits
  - Dosing: 15g-20g+ QD
  - Sources:
    - Foods: vegetables, fruit, flax, bran

Canfora, E. E., van der Beek, C. M., Jocken, J. W. E., Goossens, G. H., Holst, J. J., Olde Damink, S. W. M., … Blaak, E. E. (2017). *Colonic infusion of short-chain fatty acids affects systemic insulin sensitivity and energy metabolism in humans.* Gastroenterology, 152(6), 1577–1587.e6. https://doi.org/10.1053/j.gastro.2017.01.005

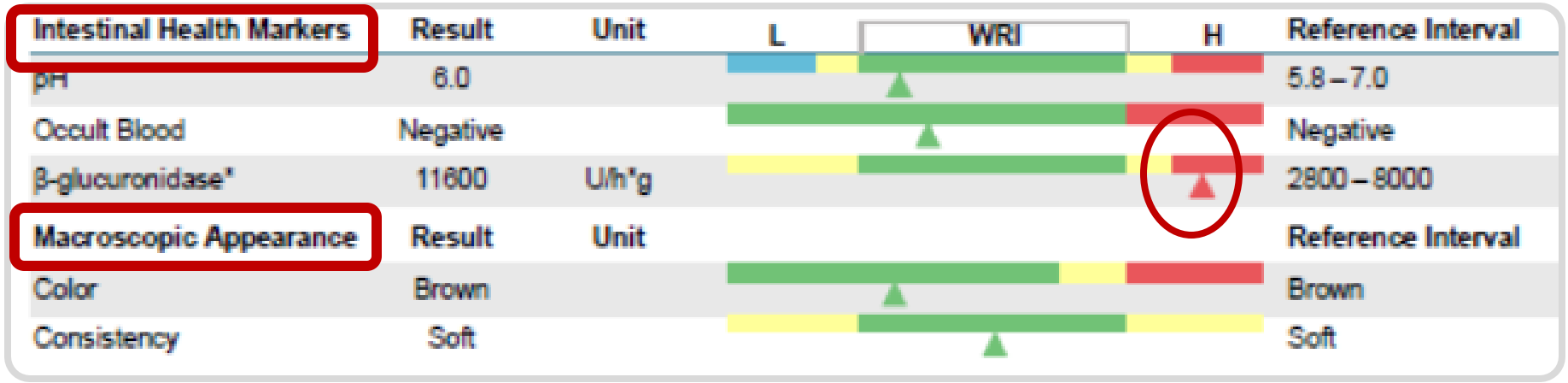
Precision Fibre Clinical Applications

When to Use Resistant Starch, Inulin, and Psyllium

Fibre	GI360™ Indicators
• Resistant Potato Starch	Low butyrate, low SCFAs, elevated pH, low diversity, reduced butyrate producers
• Inulin	Low Actinobacteria/*Bifidobacterium spp.*; supports cross-feeding and butyrate production
• Psyllium	Constipation, irregular stools, elevated pH, or post-inflammatory gut support as a gentler fibre option

Therapeutic Dose: 8-15g QD

Stool Chemistry Markers



Intestinal Health Markers	Result	Unit	L WRI H	Reference Interval
pH	6.0			5.8 – 7.0
Occult Blood	Negative			Negative
β-glucuronidase*	11600	U/h*g		2800 – 8000
Macroscopic Appearance	**Result**	**Unit**		**Reference Interval**
Color	Brown			Brown
Consistency	Soft			Soft

- Intestinal Health Markers
- Macroscopic Appearance

Commentary

Order: 999999-9999
Client #: 999999
Doctor: Sample Doctor, MD
Doctors Data Inc
123 Main St.
St. Charles, IL 60174 USA

Patient: Sample Patient
Id: 999999
Age: 64 **DOB:** 00/00/1959
Sex: Female

Sample Collection	Date/Time
Date Collected	08/19/2023
Date Received	08/21/2023
Date Reported	08/31/2023
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.

Microbiome Abundance Information

Actinobacteria (phylum)

Actinobacteria is one of the largest bacterial phyla, comprised of Gram-positive bacteria. This phylum includes a wide range of species, with different morphological and physiological characteristics. Significant groups in the human colon include Actinomycetales and Bifidobacteriales. Actinomycetales were inversely associated with clinically significant depression in IBS patients, suggesting these bacteria may be depleted in depressed IBS patients. A strict vegetarian diet may increase the total count of *Actinomyces* spp. compared to following a Western diet.

Actinomycetales (order)

Actinomycetales are considered low abundance colonizers of the gastrointestinal tract with primary residence on the skin. Intake of proton-pump inhibitor drugs has been shown to increase the abundance of Actinomycetales in the gut, possibly by reducing gastric acidity and enabling intestinal colonization by oral microbes. Actinomycetales may be depleted in depressed irritable bowel syndrome patients. The abundance of *Actinomyces* spp. was shown to be higher with a strict vegetarian diet compared to a common Western diet.

***Bifidobacterium* (genus)**

Considered amongst the most beneficial commensal bacteria in the human gut, *Bifidobacterium* spp. are able to degrade monosaccharides, galacto-, manno-, and fructo-oligosaccharides, as well as some complex carbohydrates. Many of the non-digestible oligosaccharides, found as natural components in mother's milk, select for colonization of these species which dominate the infant gut shortly after birth. Bifidobacteria may provide health benefits directly through interactions with the host, and indirectly through interactions with other microorganisms. *Bifidobacterium* spp. take part in production and adsorption of vitamins, such as vitamins K and B12, biotin, folate, thiamine, riboflavin, and pyridoxine. They are also involved in lipid absorption and metabolism, glucose and energy homeostasis, and regulating intestinal barrier function. Although *Bifidobacterium* produce acetate over butyrate, healthy levels of *Bifidobacterium* spp. facilitate colonization of *Faecalibacterium. prausnitzii*. Polyphenols derived from chocolate, green tea, blackcurrant, red wine and grape seed extracts have been shown to increase *Bifidobacterium* species. The increased abundance of *Bifidobacterium* species has been associated with amelioration of inflammation. Multiple published studies have suggested that there is an association between obesity and a lower abundance of bifidobacteria. They may also be less abundant in elderly populations, patients with rheumatoid arthritis, and in individuals diagnosed with Alzheimer's disease. Patients with active inflammatory bowel disease (IBD) have a lower abundance of *Bifidobacterium* spp. than patients whose IBD is in remission. Taking a probiotic containing bifidobacteria, lactobacilli, and streptococci might help in controlling ulcerative colitis symptoms and preventing their recurrence. Some *Bifidobacterium* strains have been shown to have beneficial effects in irritable bowel syndrome (IBS). *Bifidobacterium* spp. abundance has been shown to be diminished with IBD and with long term use of macrolide antibiotics. Luminal bifidobacteria is reduced with restriction of fermentable carbohydrates, i.e. a low FODMAP diet. High fat dietary feeding is also associated with reduced abundance of bifidobacteria. Consumption of maize and barley-based whole grain products and red berries, which are comprised of anthocyans, are known to increase levels of bifidobacteria.

Commentary Section

SCIENCE+INSIGHT

DDI Retesting Stool Profiles
Post GI Therapy

- **GI360™ Microbiome**
- **GI Pathogens Profile**
- **Stool Chemistries Profile**
- ***H. pylori* Antigen Profile**
- **Separate Stool Chemistry markers:**
  - Elastase
  - Calprotectin
  - Lysozyme
  - Secretory IgA
  - β-glucuronidase

DDI Complementary Profiles

Gastrointestinal Health testing

Celiac & Gluten Sensitivity, bloodspot, serum

Zonulin Family Protein, stool, serum

Endocrinology testing

HuMap, urine

Neurotransmitters, urine

Cortisol, saliva, urine

Environmental Exposure & Detox testing

Hepatic Detox, blood

Nutritional Status testing

Vitamin D, blood spot, serum

Amino Acids, blood, urine

Iodine/Halides, urine

Toxic and Essential Elements testing

Toxic and Essential Elements, hair, urine

Oxidative Stress, urine

Methylation Testing

Buccal swab, plasma


HOME
ABOUT
COMPARE PROFILES
REQUEST INFORMATION
Extensive Assessment of the
GI MICROBIOME
LEARN MORE
WWW.GI360.COM


GI360™
Resource Guide
SCIENCE + INSIGHT
doctorsdata.com

THANK YOU!

References

- Everard A, Belzer C, Geurts L, et al. Cross-talk between *Akkermansia muciniphila* and intestinal epithelium controls diet-induced obesity. Proc Natl Acad Sci U S A. 2013;110(22):9066-9071. doi:10.1073/pnas.1219451110
- Dao MC, Everard A, Aron-Wisnewsky J, et al. *Akkermansia muciniphila* abundance correlates with improved metabolic status in obesity. Gut. 2016;65(3):426-436. doi:10.1136/gutjnl-2014-308778
- Plovier H, Everard A, Druart C, et al. A purified membrane protein from *Akkermansia muciniphila* improves glucose homeostasis and metabolic syndrome in mice. Nat Med. 2017;23(1):107-113. doi:10.1038/nm.4236
- Gérard C, Vidal H. Impact of Gut Microbiota on Host Glycemic Control. Front Endocrinol (Lausanne). 2019 Jan 30;10:29. doi: 10.3389/fendo.2019.00029. PMID: 30761090; PMCID: PMC6363653.
- Canfora, E. E., van der Beek, C. M., Jocken, J. W. E., Goossens, G. H., Holst, J. J., Olde Damink, S. W. M., … Blaak, E. E. (2017). *Colonic infusion of short-chain fatty acids affects systemic insulin sensitivity and energy metabolism in humans*. Gastroenterology, 152(6), 1577–1587.e6. https://doi.org/10.1053/j.gastro.2017.01.005
- Gorman, J. Pharmacomicrobiomics: The Intersection of Gut Microbiome and Pharmacology, https://www.doctorsdata.com/Newsletter, July 2025,

References (cont'd)

- Torres-Carrillo, N., Martínez-López, E., Torres-Carrillo, N. M., López-Quintero, A., Moreno-Ortiz, J. M., González-Mercado, A., & Gutiérrez-Hurtado, I. A. (2023). Pharmacomicrobiomics and Drug–Infection Interactions: The Impact of Commensal, Symbiotic and Pathogenic Microorganisms on a Host Response to Drug Therapy. International Journal of Molecular Sciences, 24(23), 17100. https://doi.org/10.3390/ijms242317100
- Maier, L. et al. (2018). Extensive impact of non-antibiotic drugs on human gut bacteria. Nature, 555(7698), 623–628. https://doi.org/10.1038/nature25979
- Imhann, F. et al. (2016). Proton pump inhibitors affect the gut microbiome. Gut, 65(5), 740–748. https://doi.org/10.1136/gutjnl-2015-310376
- Gao, Y., Zhao, T., Lv, N. et al. Metformin-induced changes of the gut microbiota in patients with type 2 diabetes mellitus: results from a prospective cohort study. Endocrine 85, 1178–1192 (2024). https://doi.org/10.1007/s12020-024-03828-x
- Wang, C.-Y., Wen, Q.-F., Wang, Q.-Q., Kuang, X., Dong, C., Deng, Z.-X., & Guo, F.-B. (2022). Discovery of drug candidates for specific human disease based on natural products of gut microbes. *Frontiers in Microbiology, 13*, 896740. https://doi.org/10.3389/fmicb.2022.896740
- Rivière A, Moens F, Selak M, Maes D, Weckx S, De Vuyst L. Cross-feeding between bifidobacteria and butyrate-producing colon bacteria explains bifidobacterial competitiveness and butyrate production. *Int J Food Microbiol*. 2011;149(1):73-80. doi:10.1016/j.ijfoodmicro.2011.03.003.

References (cont'd)

- Rogers, M.A.M., & Aronoff, D.M. (2016). The influence of non-steroidal anti-inflammatory drugs on the gut microbiome. Clinical Microbiology and Infection, 22(2), 178.e1–178.e9. https://doi.org/10.1016/j.cmi.2015.10.003
- Yang, Y., Long, Y., Kang, D. et al. Effect of Bifidobacterium on olanzapine-induced body weight and appetite changes in patients with psychosis. Psychopharmacology 238, 2449–2457 (2021). https://doi.org/10.1007/s00213-021-05866-z
- Tomizawa, Y., Yoshida, T., Nagai, K., Watanabe, K., & Kaneko, S., Effect of psychotropic medication on gut microbiota in patients with depression and anxiety: A prospective study, International Journal of Neuropsychopharmacology, 24(2), 97–105 DOI: 10.1093/ijnp/pyaa099
- Liu, D. (Ed.). (2023). Statins - From Lipid-Lowering Benefits to Pleiotropic Effects. IntechOpen. doi: 10.5772/intechopen.1001540
- Zimmermann, M. et al. (2019). Mapping human microbiome drug metabolism by gut bacteria and their genes. Nature, 570(7762), 462–467. https://doi.org/10.1038/s41586-019-1291-3
- Wu GD et al. (2020). The gut microbiome in cardiometabolic disease: The potential of prebiotic and probiotic therapy. Cell Host & Microbe, 27(3): 339–350.https://doi.org/10.1016/j.chom.2020.02.009
- Farup, P. G., Aasbrenn, M., & Valeur, J. (2018). Separating "good" from "bad" faecal dysbiosis – evidence from two cross-sectional studies. *BMC Obesity*, 5, Article 30
- Noronha, A., Modamio, J., Jarosz, Y., Guerard, E., Sompairac, N., Preciat, G., Dröfn Daníelsdóttir, A., Krecke, M., Merten, D., Haraldsdóttir, H., Heinken, A., Heirendt, L., Magnúsdóttir, S., Ravcheev, D., Sahoo, S., Gawron, P., Friscioni, L., Garcia, B., Prendergast, M., Puente, A., Rodrigues, M., Roy, A., Rouquaya, M., Wiltgen, Žagare, A., John, E., Krueger, M., Kuperstein, I., Zinovyev, A., Schneider, R., Fleming, R.M.T., Thiele, I., The Virtual Metabolic Human database: integrating human and gut microbiome metabolism with nutrition and disease, *Nucleic Acids Research*, Volume 47, Issue D1, 08 January 2019, Pages D614–D624, https://doi.org/10.1093/nar/gky992