Interpreting and Applying GI360™ Test Data:
The Three Stages of GI Dysfunction

Presented by

Dan Kalish, DC

and Julia Malkowski, ND, DC

Skill Acquisition and Overview

1. Show You…

- How to interpret stool test results and…
- assign patients to one of the three stages.

2. Your Turn…

Practice interpreting the results of a stool test (using the handouts provided).

3. Explain how…

To implement lifestyle and supplement modalities based on lab test results.

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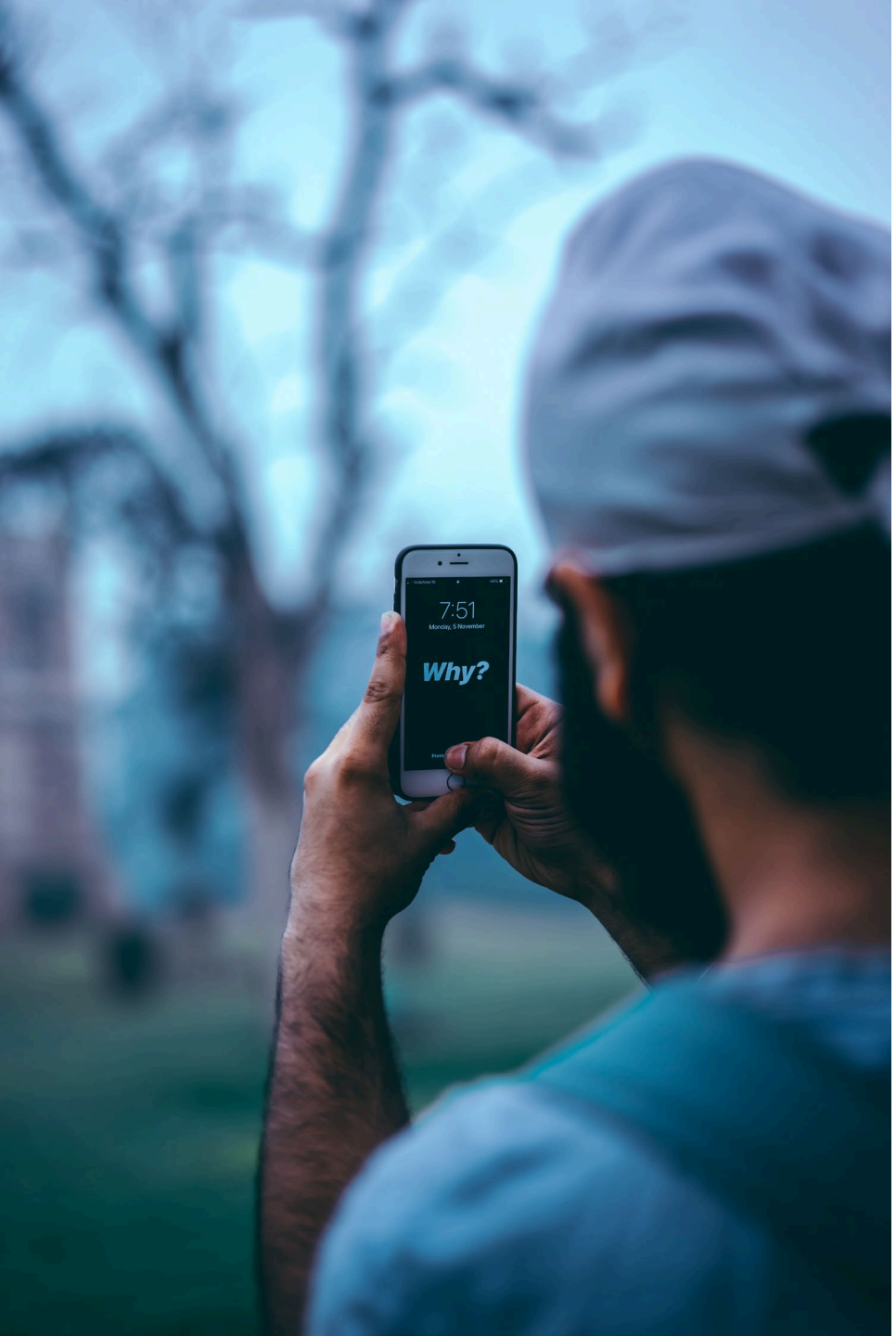
But first, a quick

Preface



Why perform GI testing in the first place?

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- GI dysfunction occurs with or without GI symptoms
- If we are treating the “underlying cause” then why do we all only run GI tests on GI symptomatic patients?
- We should run GI test on every new patient as part of a basic functional medicine workup

3 Stages of GI Dysfunction

How it Happens:
The 3 Stages of GI Dysfunction

Stage 1

- Stress and poor diet cumulative effect, weakening of the adrenals and microbiome diversity

Stage 2

- GI organ function compromised, less HCl production, less enzyme and bile production, leaky gut starts with damage to gut lining and lowering of gut immunity (SIgA)

Stage 3

- Pathogens acquired, parasites, bacteria or yeast overgrowth

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How to Identify Stage 1

A Disturbed Microbiome

- Low SCFA
- Commensal bacteria imbalance

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How to Identify Stage 1

Low short chain fatty acids (esp. butyrate)

Short Chain Fatty Acids	Result	Unit	L	WRI	H	Reference Interval
% Acetate‡	66					50 – 72
% Propionate‡	16					11 – 25
% Butyrate‡	15					11 – 32
% Valerate‡	4.2					0.8 – 5.0
Butyrate‡	0.62	mg/mL				0.8 – 4.0
Total SCFA's‡	4.3	mg/mL				5.0 – 16.0

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Microbiome Assessment Summary

How to Identify Stage 1

Microbiome Abundance and Diversity Summary

The abundance and diversity of gastrointestinal bacteria provide an indication of gastrointestinal health, and gut microbial imbalances can contribute to dysbiosis and other chronic disease states. The GI360™ Microbiome Profile is a gut microbiota DNA analysis tool that identifies and characterizes more than 45 targeted analytes across six Phyla using PCR and compares the patient results to a characterized normobiotic reference population. The web chart illustrates the degree to which an individual's microbiome profile deviates from normobiosis.

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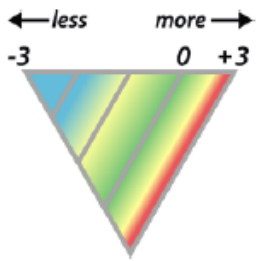

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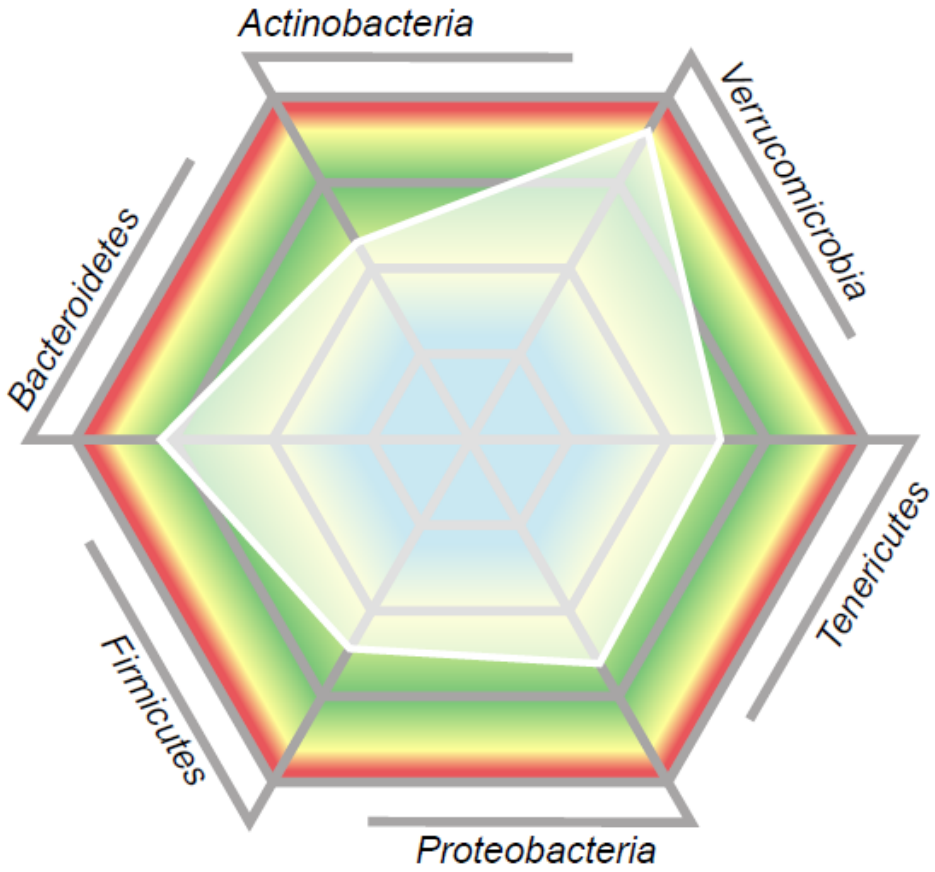

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How to Identify Stage 2

GI Organs Impacted

- Evidence of poor digestion/absorption
- Degradation of immune response

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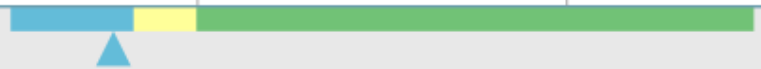
How to Identify Stage 2

Markers of Digestion

Digestion Absorption	Result	Unit	L WRI H	Reference Interval
Elastase	83	µg/mL		> 200
Fat Stain	Few			None – Few
Carbohydrates†	Negative			Negative

How to Identify Stage 2

Markers of Immune Function

Inflammation	Result	Units	L WRI H	Reference Interval
Lactoferrin	8.1	µg/mL		< 7.3
Calprotectin*	59	µg/g		≤ 50
Lysozyme*	452	ng/mL		≤ 600
Immunology	**Result**	**Units**	**L WRI H**	**Reference Interval**
Secretory IgA*	48	mg/dL		51 – 204

How to Identify Stage 3

GI Pathogens

- Infection
  - Weakened microbiome and organ dysfunction
  - Pre-existing infection but flare up occurred due to stress
  - New infection acquired due to stress physiology and weakened immune response
- Bacterial, parasitic or yeast dominate, requires killing of bugs

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Markers of Dysbiosis and Infection

How to Identify Stage 3

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

Viruses, pathogenic bacteria, parasites, protozoa, worms, yeast, etc.

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A Summary of the 3 Stages – What to look for

1 Stage	• Evidence of disturbed commensal microbiota • Low short chain fatty acids
2 Stage	• Evidence of poor digestion/absorption - Elastase, Fat stain, Carbohydrates • Degradation of immune response - Lactoferrin, Calprotectin, Lysozyme, sIgA
3 Stage	• Evidence of parasites, dysbiotic bacteria and/or yeast

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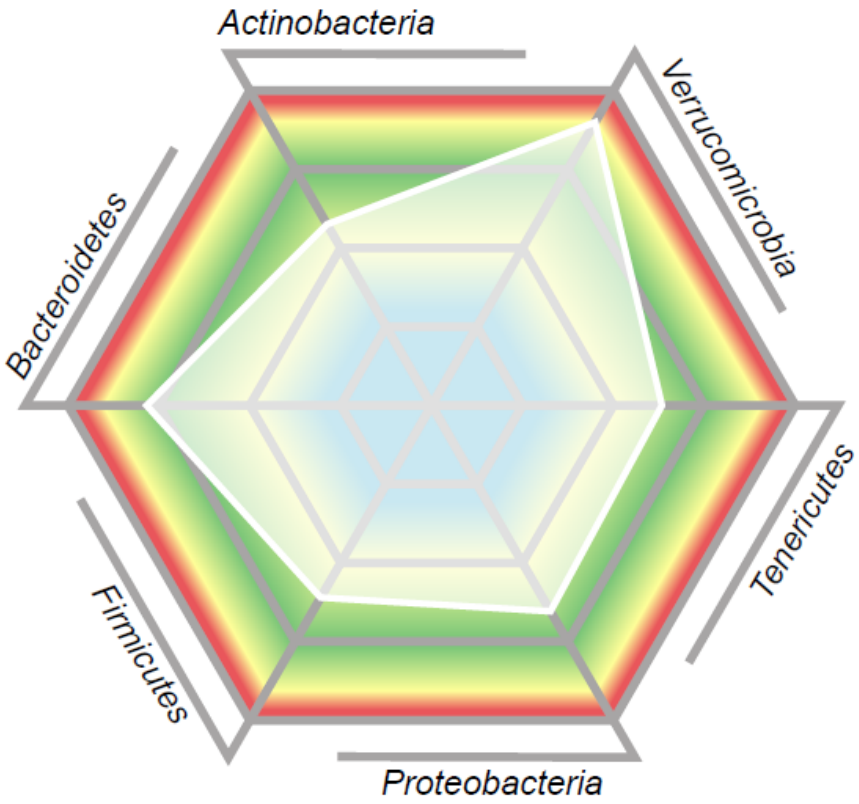

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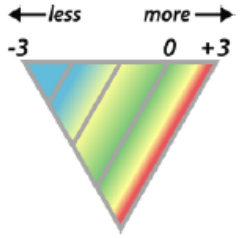

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Dysbiosis Index

The Dysbiosis Index (DI) is a calculation with scores from 1 to 5 based on the overall bacterial abundance and profile within the patient's sample as compared to a reference population. Values above 2 indicate a microbiota profile that differs from the defined normobiotic reference population (i.e., dysbiosis). The higher the DI above 2, the more the sample is considered to deviate from normobiosis.

DI Score

4

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Key Findings

Bifidobacterium spp.,	↑	*Cryptosporidium* (*C. parvum* and *C. hominis*), Detected	Butyrate, Low
Clostridia Class, Very Low	↓	*Giardia duodenalis* (AKA *intestinalis & lamblia*), Detected	Total SCFA's, Very Low
Lactobacillus spp.,	↑	WBC, Abnormal	
		Color, Abnormal	
		Consistency, Abnormal	
		Lactoferrin, High	
		Calprotectin, High	
		% Propionate, High	
		% Butyrate, Low	
		% Valerate, High	

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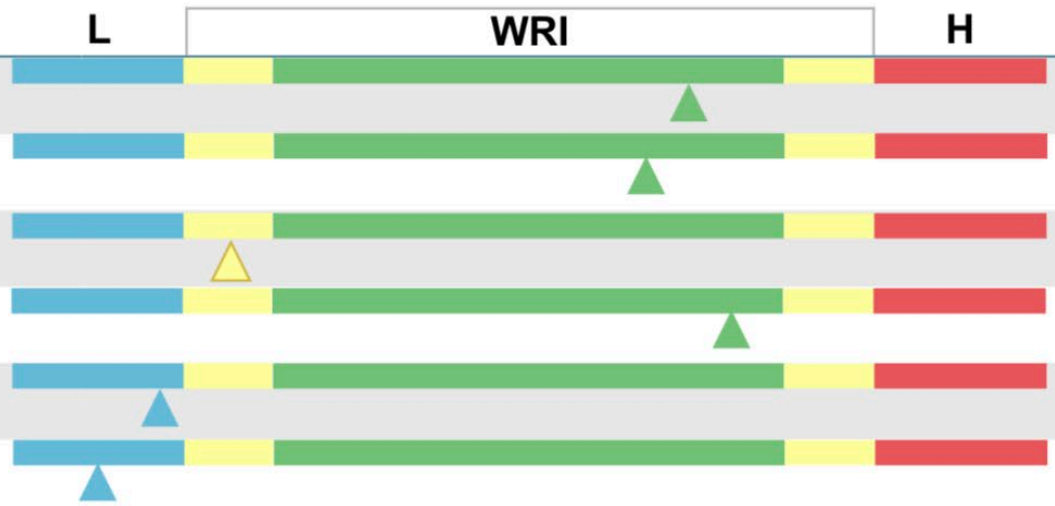
Key Findings // Practice Test // Stage 1

Short Chain Fatty Acids‡	Result	Units	L	WRI	H	Reference Interval
% Acetate	59.7	%				40 – 75
% Propionate	26.5	%				9 – 29
% Butyrate	10.2	%				9 – 37
% Valerate	6.5	%				0.5 – 7
Butyrate	0.74	mg/mL				0.8 – 4.8
Total SCFA's	3	mg/mL				4 – 18



Key Findings // Practice Test // Stage 2

Inflammation	Result	Units	L WRI H	Reference Interval
Lactoferrin	8.1	µg/mL		< 7.3
Calprotectin*	59	µg/g		≤ 50
Lysozyme*	452	ng/mL		≤ 600
Immunology	**Result**	**Units**	**L WRI H**	**Reference Interval**
Secretory IgA*	48	mg/dL		51 – 204

*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 approve 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.

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Key Findings // Practice Test // Stage 3

Parasites	Result	
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Giardia duodenalis (AKA *intestinalis & lamblia*)	Positive	

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Summary of Key Findings

1 Stage	• Low butyrate • Low short chain fatty acids
2 Stage	• High Lactoferrin • High Calprotectin • Low sIgA
3 Stage	• *Giardia duodenalis* (AKA *intestinalis & lamblia*) • *Cryptosporidum* (*C. parvum* and *C. hominis*)

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Stage-Specific Recommendations

Stage 1 – Microbiome

Eat to encourage commensal bacterial growth and SCFA production (fiber, polyphenols, fermented foods).

- Prebiotics capsules or powders
  - Polyphenol and prebiotics on their own or in combinations to boost bifidobacteria and microbiome diversity‡
- Probiotics
  - To promote GI and immune health across all ages‡
- Butyrate
  - Short chain fatty acid liquid that promotes gut barrier integrity, cytokine balance, bowel motility, and abdominal comfort‡

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Stage 2 – Organ Function

Eat to stimulate normal digestive processes: chew food properly, avoid liquid with meals and relax before and after meals.

- Betaine HCl Pepsin
  - Promotes healthy digestive function and may help stimulate digestive function and absorb nutrients‡
- Digestive Enzymes
  - Digestive enzymes to support protein, carbohydrate, fat, fiber digestion‡

- GI Repair powders
  - Glutamine based powders to enhance immune cell function and support GI barrier integrity‡
- GB Support
  - Promote healthy gallbladder function and lipid utilization in addition to general digestive function‡

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Stage 3 – Microbial balance

Consider introducing a low FODMAP or gluten-free diet.

- Anti-Microbial Combination Products
  - Combination of phytonutrients designed to support healthy gastrointestinal tract function and microbial balance
- Anti-Microbial Single Ingredient products
  - Options include oregano, artemisia, berberine, grapefruit seed extract, morinda, black walnut

So what Protocol should you use?

Protocol 1 // Protocol 2 // Protocol 3

It depends…

- Practitioners experience
- Severity of patient symptoms
- Cost
- Patient preference
- Time

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Thank You

Daniel Kalish, DC

Founder of The Kalish Institute

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Cases

Case #1

- Previously overweight depressed in the care of a psychiatrist
- Within last 3 months switched to less processed diet and lost 20lbs.
- Treated with three rounds of antibiotics for H. pylori

Case #1

Microbiome Abundance and Diversity Summary

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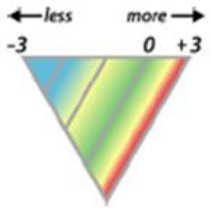

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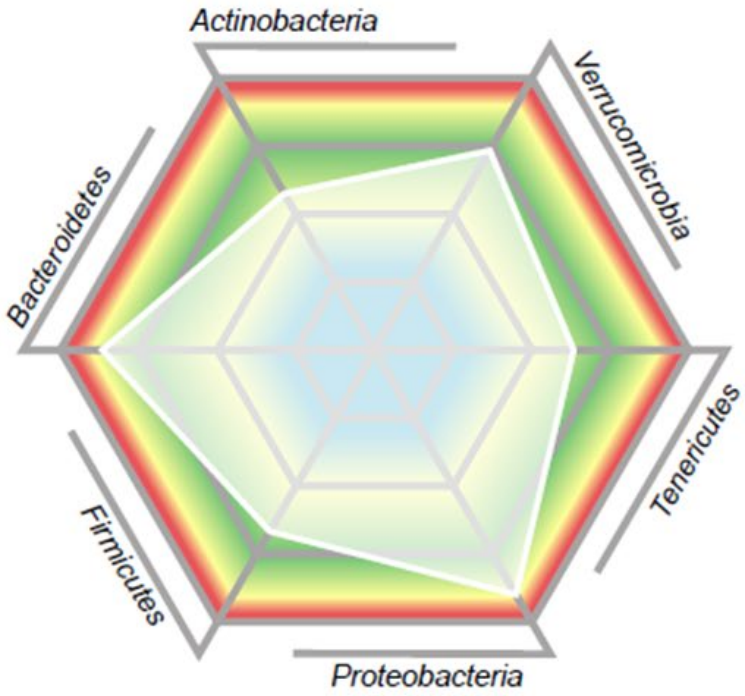

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DI Score

5

Case #1

Key Findings

Dialister invisus & Megasphaera micronuciformis, Very High	↑	Fat Stain, High
Parabacteroides spp., Very High	↑	% Propionate, High
Eubacterium siraeum, Very Low	↓	% Valerate, Very Low
Faecalibacterium prausnitzii, Very Low	↓	Secretory IgA, High
Actinobacteria, Low	↓	
Alistipes spp., Low	↓	
Proteobacteria, High	↑	
Alistipes onderdonkii, Low	↓	
Bacteroides fragilis, High	↑	
Escherichia spp., High	↑	

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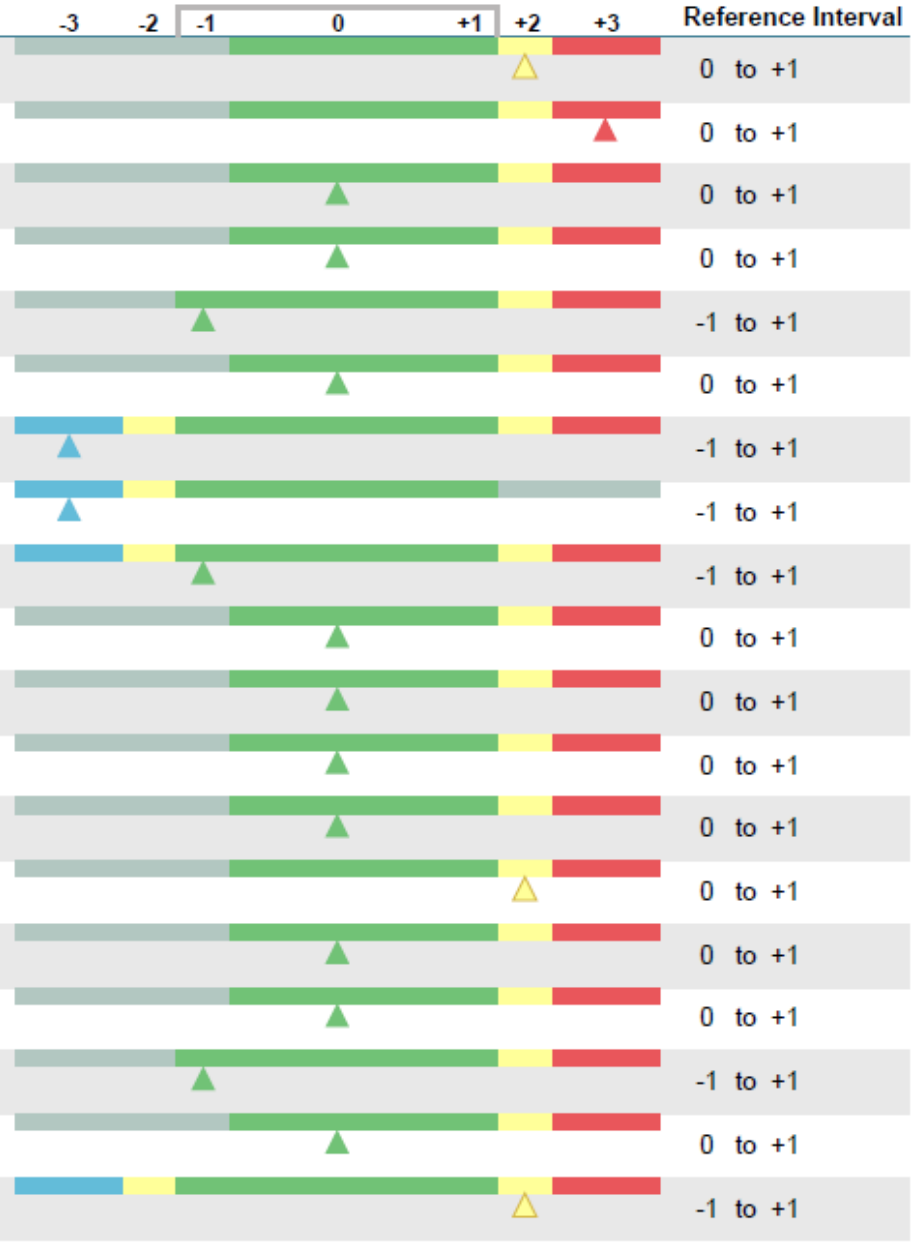
Case #1

Firmicutes	Result	Reference Interval
Dialister invisus	+2	0 to +1
Dialister invisus & Megasphaera micronuciformis	+3	0 to +1
Dorea spp.	0	0 to +1
Eubacterium biforme	0	0 to +1
Eubacterium hallii	-1	-1 to +1
Eubacterium rectale	0	0 to +1
Eubacterium siraeum	-3	-1 to +1
Faecalibacterium prausnitzii	-3	-1 to +1
Lachnospiraceae	-1	-1 to +1
Lactobacillus ruminis & Pediococcus acidilactici	0	0 to +1
Lactobacillus spp.	0	0 to +1
Phascolarctobacterium spp.	0	0 to +1
Ruminococcus albus & R. bromii	0	0 to +1
Ruminococcus gnavus	+2	0 to +1
Streptococcus agalactiae & Eubacterium rectale	0	0 to +1
Streptococcus salivarius ssp. *thermophilus & S. sanguinis*	0	0 to +1
Streptococcus salivarius ssp. *thermophilus*	-1	-1 to +1
Streptococcus spp.	0	0 to +1
Veillonella spp.	+2	-1 to +1



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Case #1

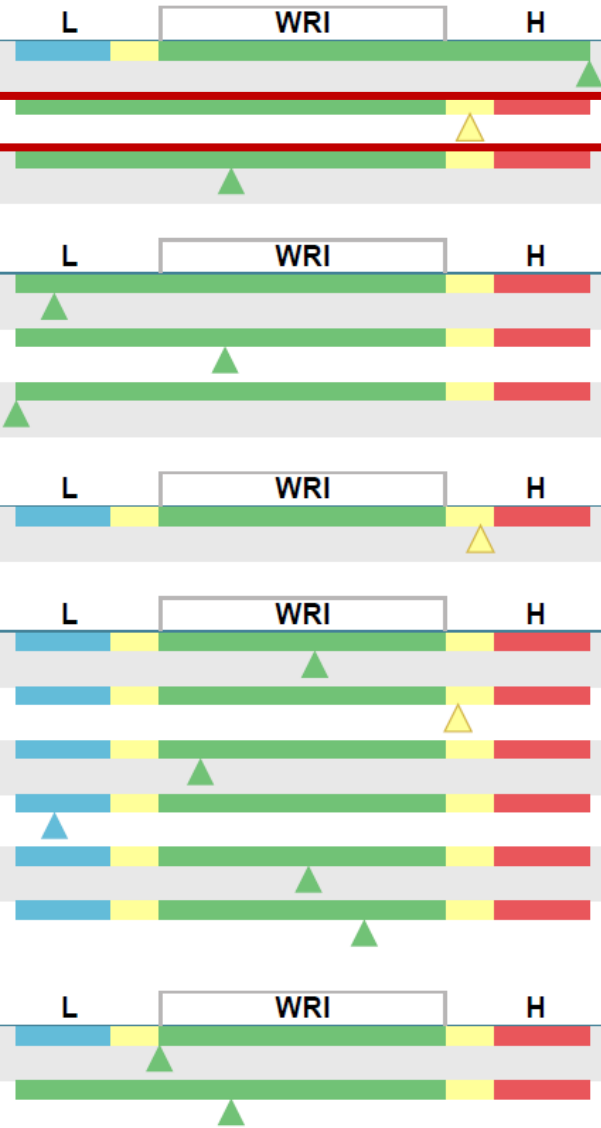
Digestion Absorption	Result	Unit	Reference Interval
Elastase	>500	µg/mL	> 200
Fat Stain	Moderate		None – Few
Carbohydrates†	Negative		Negative

Inflammation	Result	Unit	Reference Interval
Lactoferrin	1.1	µg/mL	< 7.3
Lysozyme*	248	ng/mL	< 500
Calprotectin*	<10	µg/g	< 50

Immunology	Result	Unit	Reference Interval
Secretory IgA*	329	mg/dL	30 – 275

Short Chain Fatty Acids‡	Result	Unit	Reference Interval
% Acetate	61	%	50 – 72
% Propionate	26	%	11 – 25
% Butyrate	13	%	11 – 32
% Valerate	0.2	%	0.8 – 5.0
Butyrate	1.6	mg/mL	0.8 – 4.0
Total SCFA's	12	mg/mL	5.0 – 16.0

Intestinal Health Markers	Result	Unit	Reference Interval
pH	5.8		5.8 – 7.0
Occult Blood	Negative		Negative



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Case #2

- Client presents with ongoing arthralgia, underactive thyroid and alternating IBS symptoms, which has worsened considerably since a trip to Hong Kong in Oct 2019.

- She's taking pain medications (morphine x 2, gabapentin, NSAIDs, paracetamol) having had a bike accident June 2019

Case #2

Microbiome Abundance and Diversity Summary

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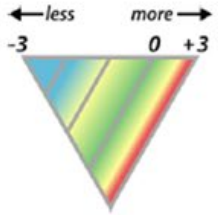

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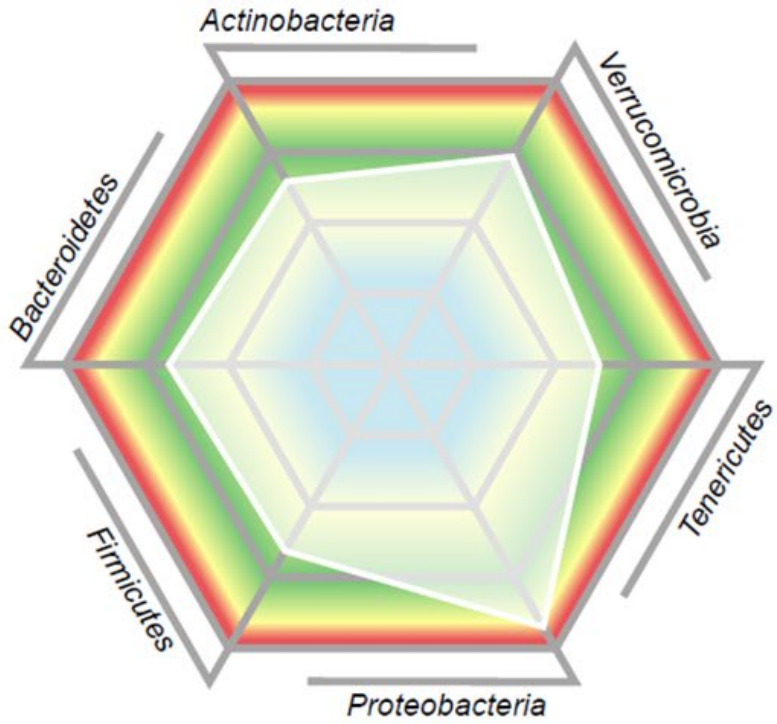

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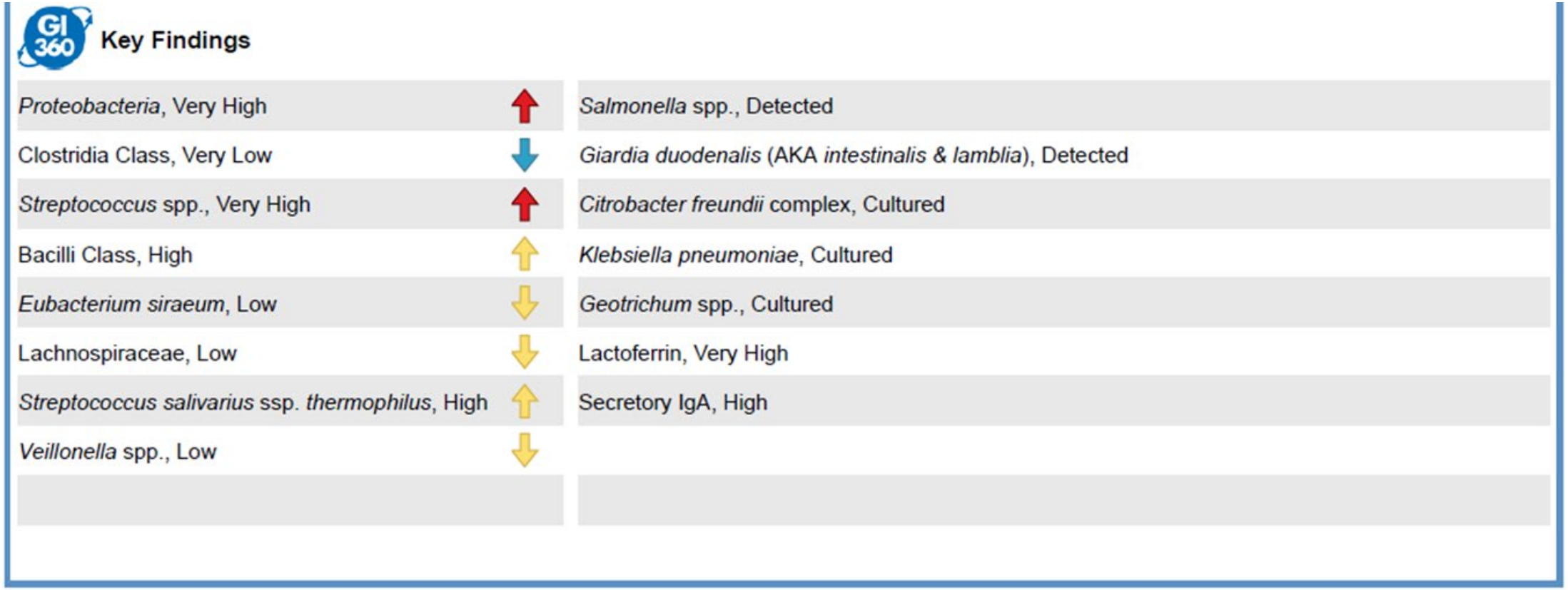
DI Score

5

Case #2



Key Findings

Proteobacteria, Very High	↑	*Salmonella* spp., Detected
Clostridia Class, Very Low	↓	*Giardia duodenalis* (AKA *intestinalis & lamblia*), Detected
Streptococcus spp., Very High	↑	*Citrobacter freundii* complex, Cultured
Bacilli Class, High	↑	*Klebsiella pneumoniae*, Cultured
Eubacterium siraeum, Low	↓	*Geotrichum* spp., Cultured
Lachnospiraceae, Low	↓	Lactoferrin, Very High
Streptococcus salivarius ssp. *thermophilus*, High	↑	Secretory IgA, High
Veillonella spp., Low	↓	

Case #2

Viruses	Result
Adenovirus F40/41	Negative
Norovirus GI/GII	Negative
Rotavirus A	Negative

Pathogenic Bacteria	Result
Campylobacter (*C. jejuni*, *C. coli* and *C. lari*)	Negative
Clostridium difficile (Toxin A/B)	Negative
Escherichia coli O157	Negative
Enterotoxigenic *Escherichia coli* (ETEC) lt/st	Negative
Salmonella spp.	Positive
Shiga-like toxin-producing *Escherichia coli* (STEC) stx1/stx2	Negative
Shigella (*S. boydii*, *S. sonnei*, *S. flexneri* & *S. dysenteriae*)	Negative
Vibrio cholerae	Negative

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

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Case #2

Pathogenic Bacteria	Result	Reference Interval
Aeromonas spp.	NG	No Growth
Edwardsiella tarda	NG	No Growth
Plesiomonas shigelloides	NG	No Growth
Salmonella group	NG	No Growth
Shigella group	NG	No Growth
Vibrio cholerae	NG	No Growth
Vibrio spp.	NG	No Growth
Yersinia spp.	NG	No Growth

Imbalance Bacteria	Result	Reference Interval
Hafnia alvei	4+	No Growth
Proteus vulgaris group	2+	No Growth

Dysbiotic Bacteria	Result	Reference Interval
Citrobacter freundii complex	4+	No Growth
Klebsiella pneumoniae	3+	No Growth

Yeast	Result	Reference Interval
Geotrichum spp.	4+	0+ – 1+

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Case #2

Citrobacter freundii complex

Natural Agents	Low Susceptibility	High Susceptibility
Berberine		
Black Walnut		
Caprylic Acid		
Grapefruit Seed Extract		
Oregano		
Silver		
Uva Ursi		

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

Klebsiella pneumoniae

Natural Agents	Low Susceptibility	High Susceptibility
Berberine		
Black Walnut		
Caprylic Acid		
Grapefruit Seed Extract		
Oregano		
Silver		
Uva Ursi		

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

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Case #3

- Pt on Ketogenic diet
- Pt is WNL weight prior to gestation
- No GI history
- Develops gestational Type II DM

- Avoiding all carbs in an effort to destroy dyslglycemia

Case #3

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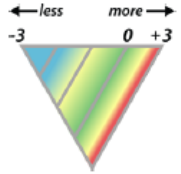

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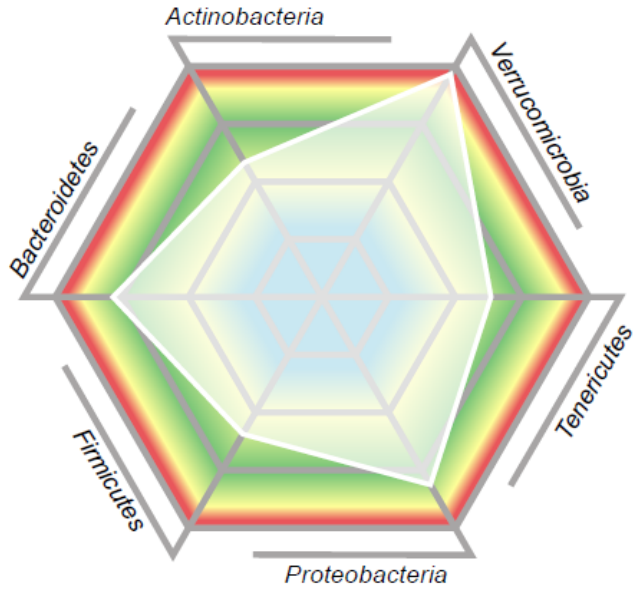

Dysbiosis Index

The Dysbiosis Index (DI) is a calculation with scores from 1 to 5 based on the overall bacterial abundance and profile within the patient's sample as compared to a reference population. Values above 2 indicate a microbiota profile that differs from the defined normobiotic reference population (i.e., dysbiosis). The higher the DI above 2, the more the sample is considered to deviate from normobiosis.

DI Score

5

Key Findings

Akkermansia muciniphila, Very High	↑	*Candida albicans*, Cultured
Faecalibacterium prausnitzii, Very Low	↓	pH, High
Actinobacteria, Low	↓	% Propionate, High
Bacilli Class, Low	↓	Butyrate, Low
Lachnospiraceae, Low	↓	Total SCFA's, Very Low
Veillonella spp., Low	↓	Secretory IgA, Low

Case #3

Digestion Absorption	Result	Unit	L WRI H	Reference Interval
Elastase	286	µg/mL		> 200
Fat Stain	None			None – Few
Carbohydrates†	Negative			Negative
Inflammation	**Result**	**Unit**	**L WRI H**	**Reference Interval**
Lactoferrin	2.3	µg/mL		< 7.3
Lysozyme*	113	ng/mL		≤ 500
Calprotectin	<10	µg/g		≤ 50
Immunology	**Result**	**Unit**	**L WRI H**	**Reference Interval**
Secretory IgA*	28.2	mg/dL		30 – 275
Short Chain Fatty Acids‡	**Result**	**Unit**	**L WRI H**	**Reference Interval**
% Acetate	53	%		50 – 72
% Propionate	26	%		11 – 25
% Butyrate	17	%		11 – 32
% Valerate	4.1	%		0.8 – 5.0
Butyrate	0.59	mg/mL		0.8 – 4.0
Total SCFA's	3.4	mg/mL		5.0 – 16.0
Intestinal Health Markers	**Result**	**Unit**	**L WRI H**	**Reference Interval**
pH	7.1			5.8 – 7.0
β-glucuronidase	298	U/L		100 – 1200
Occult Blood	Negative			Negative

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Case #4

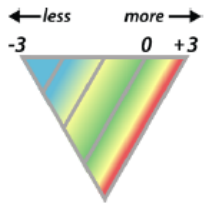
- Client presents with GI distress
- Pt is on self prescribed carnivore diet to avoid plant reactions

Case #4

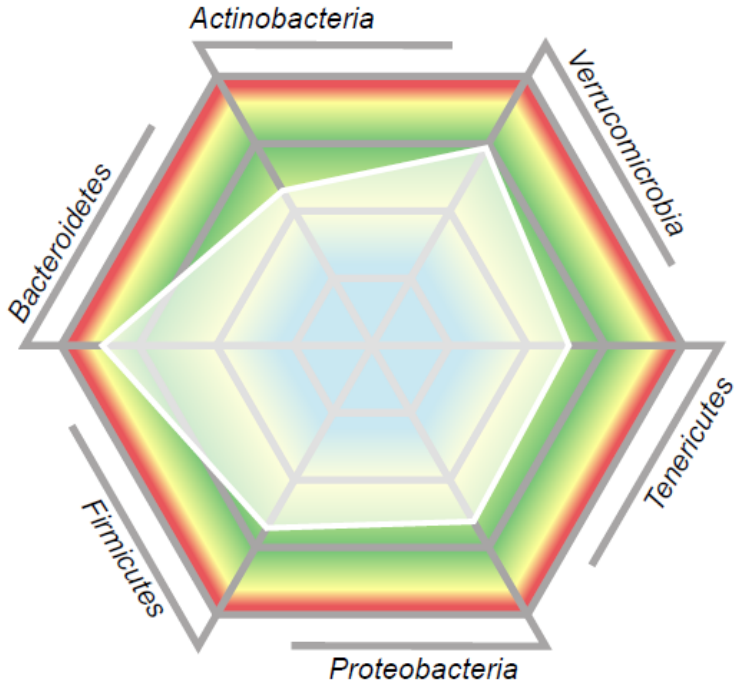
Microbiome Abundance and Diversity Summary

The abundance and diversity of gastrointestinal bacteria provide an indication of gastrointestinal health, and gut microbial imbalances can contribute to dysbiosis and other chronic disease states. The GI360™ Microbiome Profile is a gut microbiota DNA analysis tool that identifies and characterizes more than 45 targeted analytes across six Phyla using PCR and compares the patient results to a characterized normobiotic reference population. The web chart illustrates the degree to which an individual's microbiome profile deviates from normobiosis.

LEGEND



The web image shows the relative diversity and balance among bacteria belonging to the six primary Phyla. The white shaded area represents the patient's results compared to a normobiotic reference population. The center of the web represents less abundance while the outer edges represent more than normobiotic.



Dysbiosis Index

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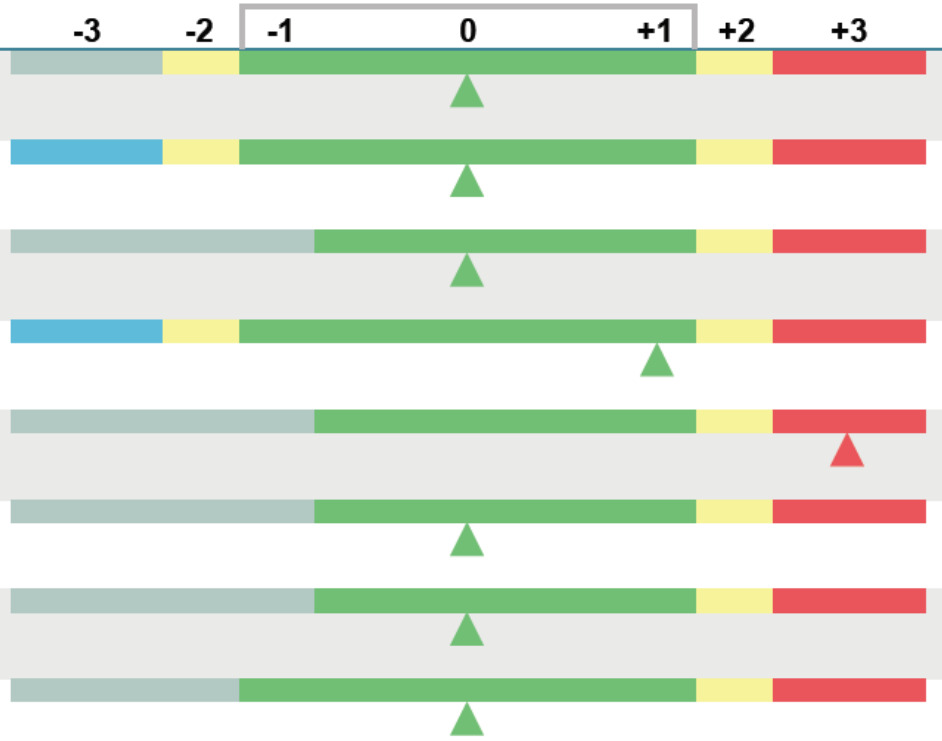
DI Score

4

Case #4
Bacteroides stercoris

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



Case #4

Digestion Absorption	Result	Unit	L WRI H	Reference Interval
Elastase	239	µg/mL		> 200
Fat Stain	None			None – Few
Carbohydrates†	Negative			Negative
Inflammation	**Result**	**Unit**	**L WRI H**	**Reference Interval**
Lactoferrin	5.3	µg/mL		< 7.3
Lysozyme*	368	ng/mL		≤ 500
Calprotectin	<10	µg/g		≤ 50
Immunology	**Result**	**Unit**	**L WRI H**	**Reference Interval**
Secretory IgA*	80.0	mg/dL		30 – 275
Short Chain Fatty Acids	**Result**	**Unit**	**L WRI H**	**Reference Interval**
% Acetate‡	66	%		50 – 72
% Propionate‡	16	%		11 – 25
% Butyrate‡	15	%		11 – 32
% Valerate‡	4.2	%		0.8 – 5.0
Butyrate‡	0.62	mg/mL		0.8 – 4.0
Total SCFA's‡	4.3	mg/mL		5.0 – 16.0
Intestinal Health Markers	**Result**	**Unit**	**L WRI H**	**Reference Interval**
pH	7.0			5.8 – 7.0
β-glucuronidase*	424	U/L		100 – 1200
Occult Blood	Positive			Negative

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Thank you for watching

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