gut health Personal Report

Prepared for: John Doe

genetic DIRECTION

Welcome to Your GxGutHealth Personal Report

GxGutHealth Personal Report
October 27, 2021

Congratulations!

You are about to receive innovative insights about your body that, up until now, have never been available. The science of the human body only recently evolved enough to allow scientists to identify and analyze a person's gut microbiome. Your report not only provides you with a road map of your gut bacteria and other microorganisms, but gives direction on how you can potentially use this information to shift the microbiome composition from unhealthy to healthy.

We spend a lifetime trying to learn more about ourselves, especially how our body works and how our health is affected by our habits and behaviors. Traditionally, we have learned what works and what doesn't through trial and error. But experience alone doesn't always give us the information we need. Your report will help you to better understand the factors that can affect how your body ticks.

This report will provide you with the complete picture of your gut microbiome by assessing the metabolic pathways and physiological properties that rely on the gut microbiome to thrive. You will get the information that you need to understand the health of your microbiome and which specific nutrients are needed to optimize your gut microbiome on a very personal and individual level.

What Is Microbiome Testing?

Microbiome testing uses a physical specimen from the body (i.e. stool for the gut microbiome) to reveal information about the bacteria and other microorganisms present in the microbiome of interest. Current technologies allow us to identify microbial communities in various body sites that have important physiological functions. We can then analyze and compare multiple microbiome samples to identify health/disease-associated patterns. Testing enables us to distinguish a healthy from unhealthy microbiome, and subsequently informs us on how to support a healthy microbiome or how to correct an unhealthy microbiome.

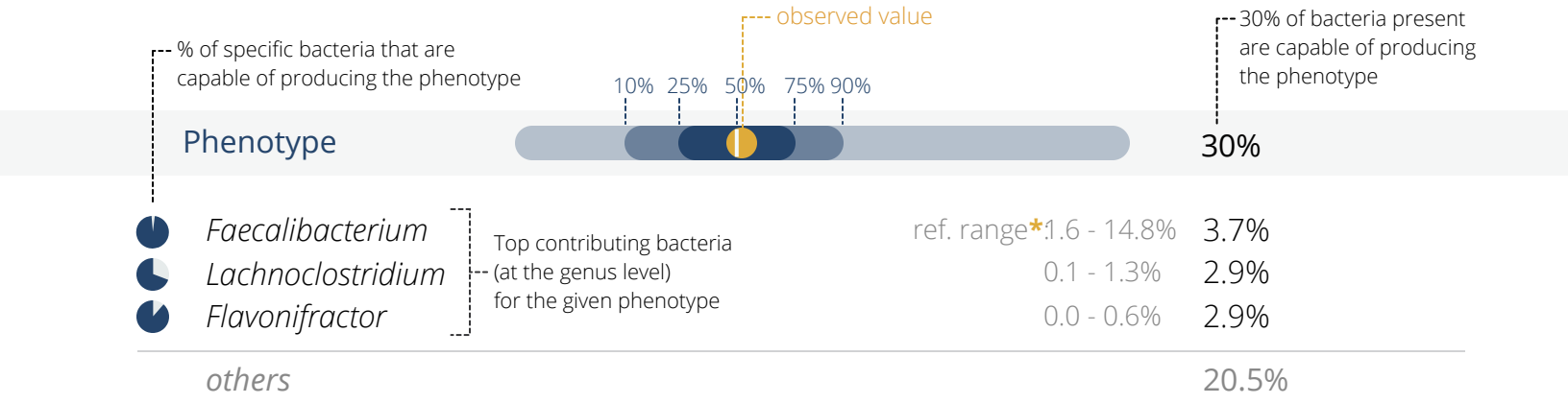
Why Is Your Microbiome Important?

The microbiome plays a vital role in human nutrition, digestion, immunity, and disease. Your body is full of trillions of microbes, including bacteria, viruses, and fungi, mostly inside your intestines and on your skin. In fact, in a healthy human adult, microbes outnumber human cells by a ratio of 10:1. These microbes have been working with our bodies to keep us healthy since we were born, and are inextricably linked to our health. In fact, in many disease states, the microbial composition is found to be altered, which likely exacerbates the disease.

Historically, the microbiome has been a poorly understood part of human health, but that has changed in the last couple of decades. And as more studies come out, we are learning more and more about the role of microbes in metabolic disease, infectious disease, cancers, gastrointestinal and digestive disorders, autoimmune disease, and psychological or mental health.

The microbiota contain an incredible amount of versatile metabolic genes that contribute to unique enzymes and biochemical pathways. In this report, we assess these pathways and categorize them into physiological properties or phenotypes. In this way, you are able to gain a greater understanding of how your gut microbes are working together and with your body to optimize your health, and, where appropriate, see specifically where you could improve your nutrition to optimize the health of your microbes, thereby improving the health of your body.

How To Read This Report



* Observed Community Phenotype Index, taxonomic abundance and diversity values are plotted against a corresponding distribution from reference dataset consisting of 1,252 samples of healthy individuals collected from American Gut Project (AGP) study.

What You'll Learn About Your Gut

On the following pages you will see a summary of your results. You'll learn which physiological functions or phenotypes in your body are within normal range or need attention, and you'll gain an understanding of how your gut bacteria are contributing to the function (whether optimally or not optimally) of each phenotype. You'll also gain insight into the diversity of your gut bacteria, and traditional markers of gut microbiome health, including important ratios and commensal bacteria.

- REPORT SUMMARY
- BACTERIAL BALANCE
- NUTRIENT MAP
- SHORT CHAIN FATTY ACID PRODUCTION
- SUGAR UTILIZATION
- VITAMIN PRODUCTION
- AMINO ACID PRODUCTION

REPORT SUMMARY

MICROBIOME CHARACTERISTICS

Alpha diversity

7.4 LOW

Alpha diversity is a measure of intra-sample diversity. It shows how phylogenetically broad the bacterial community is.

0 35.1

** calculated using Faith PD metric (reference dataset: AGP)*

Your Top 5 Taxa

1. *Blautia*
2. *Bacteroides*
3. *Lachnoclostridium*
4. *Faecalibacterium*
5. *Bifidobacterium*

Ratios

		ref. range	
Firmicutes/Bacteroidetes	HIGH	0.5 - 3.9	7.0
Prevotella/Bacteroides	NORMAL	0.0 - 6.7	0.1

SHORT CHAIN FATTY ACID PRODUCTION

Butyrate producers	NORMAL	*Faecalibacterium, Lachnoclostridium, Gemmiger*
Propionate producers	NORMAL	*Blautia, Bacteroides, Lachnoclostridium*
Acetate producers	ABOVE AVERAGE	*Blautia, Bacteroides, Faecalibacterium*

SUGAR UTILIZATION

FOS utilisers	NORMAL	*Blautia, Bacteroides, Bifidobacterium*
Arabinose utilizers	ABOVE AVERAGE	*Blautia, Bacteroides, Lachnoclostridium*
Inositol utilizers	ABOVE AVERAGE	*Flavonifractor, Blautia, Lachnoclostridium*
Lactose utilizers	ABOVE AVERAGE	*Blautia, Bifidobacterium, Faecalibacterium*

REPORT SUMMARY

VITAMIN PRODUCTION

Thiamine (B1) producers	NORMAL	*Blautia, Bacteroides, Bifidobacterium*
Riboflavin (B2) producers	LOW	*Blautia, Bacteroides, Lachnoclostridium*
Niacin (B3) producers	BELOW AVERAGE	*Blautia, Bacteroides, Bifidobacterium*
Pantothenate (B5) producers	LOW	*Bacteroides, Roseburia, Eubacterium*
Pyridoxine (B6) producers	LOW	*Bacteroides, Bifidobacterium, Fusicatenibacter*
Biotin (B7) producers	BELOW AVERAGE	*Bacteroides, Blautia/Ruminococcus, Dialister*
Folate (B9) producers	BELOW AVERAGE	*Blautia, Bacteroides, Bifidobacterium*
Cobalamin (B12) producers	ABOVE AVERAGE	*Blautia, Lachnoclostridium, Faecalibacterium*

AMINO ACID PRODUCTION

Cysteine producers	NORMAL	*Blautia, Bacteroides, Lachnoclostridium*
Trytophan producers	NORMAL	*Blautia, Bacteroides, Bifidobacterium*
Histidine producers	NORMAL	*Blautia, Bacteroides, Bifidobacterium*

BACTERIAL BALANCES

OVERREPRESENTED BACTERIA		ref. range	
Blautia	HIGH	1.0 - 5.7%	24.0%
Lachnoclostridium	HIGH	0.5 - 5.5%	7.4%
Bifidobacterium	HIGH	0.0 - 3.6%	5.8%

IN-RANGE BACTERIA		ref. range	
Faecalibacterium	NORMAL	2.1 - 18.1%	6.0%
Eubacterium	NORMAL	0.6 - 4.9%	2.8%
Roseburia	NORMAL	0.7 - 11.9%	2.7%
Ruminococcus	NORMAL	0.7 - 8.8%	1.9%
Dialister	NORMAL	0.0 - 3.7%	1.2%

UNDERREPRESENTED BACTERIA		ref. range	
Bacteroides	BELOW AVERAGE	3.8 - 41.9%	8.5%
Alistipes	BELOW AVERAGE	0.4 - 13.5%	1.5%

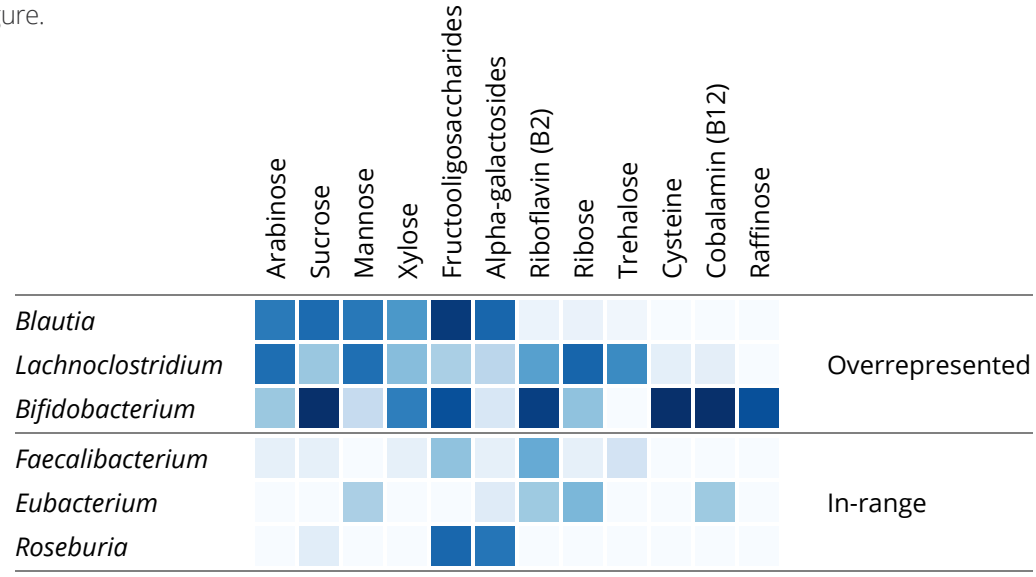
COMMENSAL BACTERIA		ref. range	
Roseburia	NORMAL	0.7 - 11.9%	2.7%
Bacteroides	BELOW AVERAGE	3.8 - 41.9%	8.5%
Prevotella	BELOW AVERAGE	0.0 - 33.4%	0.9%
*Campylobacter**	NORMAL	0.0 - 0.1%	0.0%

* Campylobacter is a pathogen

NUTRIENT MAP

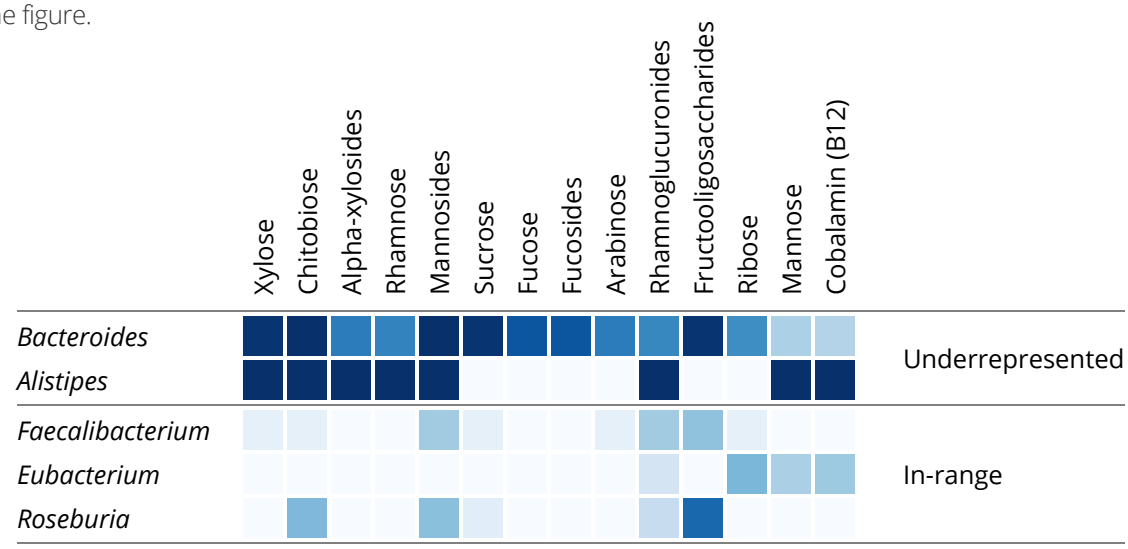
SUPPRESS OVERREPRESENTED BACTERIA

The map below shows the nutrients that have the capacity to suppress overrepresented bacteria in your microbiome. The darker the square, the more potential impact each individual nutrient could have on the corresponding bacteria. Practically, to suppress a given bacteria listed on the left, you could withhold or decrease the most impactful nutrients listed along the top of the figure.



INCREASE UNDERREPRESENTED BACTERIA

The map below shows the nutrients that have the capacity to increase underrepresented bacteria in your microbiome. The darker the square, the more potential impact each individual nutrient could have on the corresponding bacteria. Practically, to increase a given bacteria listed on the left, you could supplement or increase the most impactful nutrients listed along the top of the figure.



SHORT CHAIN FATTY ACID PRODUCTION

Short chain fatty acids (SCFA) are the beneficial products of carbohydrate fermentation that are associated with a diverse microbiome and overall health. The percentage (on the scale from 0 to 100) of SCFAs producers is shown along with top contributors.

Butyrate producers

28.8%

Butyrate is produced by microbial fermentation and plays an integral role in maintaining digestive health by regulating gene expression, cell differentiation, gut tissue development, immune modulation, oxidative stress reduction, and more.

Faecalibacterium	ref. range:	2.0 - 18.1%	6.0%
Lachnoclostridium		0.3 - 3.8%	5.4%
Gemmiger		0.0 - 2.8%	2.9%
others			14.4%

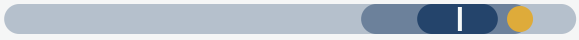
Propionate producers

40.9%

Propionate is known to have a significantly positive impact on the immune system, including improving lung health and increasing resistance to infection. It is typically converted to glucose in the liver and may prevent some lipogenic effects of acetate.

Blautia	ref. range:	0.6 - 4.2%	18.5%
Bacteroides		3.8 - 41.9%	8.5%
Lachnoclostridium		0.1 - 1.1%	1.9%
others			11.9%

Acetate producers



89.3%

Acetate production is tightly regulated within the microbiome. It is largely utilized for cholesterol synthesis and lipogenesis, and excessive production combined with insufficient butyrate production can lead to fat gain, particularly around the liver.

Blautia	ref. range:	0.9 - 5.5%	24.0%
Bacteroides		3.8 - 41.9%	8.5%
Faecalibacterium		2.0 - 18.1%	6.0%
others			50.8%

SUGAR UTILIZATION

Polysaccharides and mono/oligosaccharides are utilized for biosynthesis and energy metabolismin gut colonizing bacteria. These phenotypes display the potential of present bacteria to utilize the following sugars. The percentage (on the scale from 0 to 100) of sugars utilizers is shown along with top contributors.

FOS utilizers

53.6%

Fructo-oligosaccharides (FOS) is a prebiotic with positive impact on the diversity and abundance of the microbiome. Dietary sources of FOS are onions, garlic, chicory and artichokes. Bacteria who utilize FOS can be helpful in weight loss and correcting constipation.

Blautia	ref. range:	0.7 - 4.9%	23.0%
Bacteroides		3.8 - 40.8%	8.4%
Bifidobacterium		0.0 - 3.5%	5.1%
others			17.1%

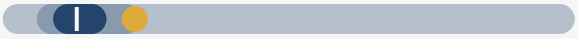
Arabinose utilizers

39.2%

Arabinose is a prebiotic that promotes diversity within the microbiome. Dietary sources of arabinose are whole grains, apples and citrus fruits and fermented foods. Bacteria who utilize arabinose can be helpful with blood sugar balancing, metabolic syndrome.

Blautia	ref. range:	0.4 - 3.2%	17.1%
Bacteroides		3.1 - 35.1%	6.0%
Lachnoclostridium		0.3 - 4.1%	5.7%
others			10.5%

Inositol utilizers



10.5%

Inositol is important for microbiome adaptation and diversity. Dietary sources are fiber rich foods, such as beans, nuts and seeds, citrus and melons. Inositol can be beneficial for metabolic syndrome, lipid imbalances, insulin resistance.

Flavonifractor	ref. range:	0.0 - 1.0%	1.9%
Blautia		0.2 - 1.8%	1.5%
Lachnoclostridium		0.1 - 1.1%	1.3%
others			5.8%

Lactose utilizers

52.0%

Lactose intolerance is a common medical problem marked by bloating, diarrhea, abdminal pain, or cramping, resulting from a reduction in the lactase enzyme. Colonic bacterial adaptation can significantly improve symptoms of intolerance.

Blautia	ref. range:	0.3 - 2.9%	17.0%
Bifidobacterium		0.0 - 3.5%	5.8%
Faecalibacterium		2.0 - 18.1%	5.5%
others			23.6%

VITAMIN PRODUCTION

B Vitamins are precursors of nearly all metabolic coenzymes universally essential in all lifeforms. With the exception of B12, which is dispensable for some bacterial species, all B vitamins that are not able to be produced, must be retrieved through exogenous sources. The percentage (on the scale from 0 to 100) of vitamins producers is shown along with top contributors.

Thiamine (B1) producers

51.0%

Thiamin is a water-soluble B vitamin that plays a critical role in energy metabolism, particularly in the brain and nervous system, as well as in the growth and function of cells. Some bacteria are able to produce thiamin, while others are not.

Blautia	ref. range:	0.6 - 4.2%	22.1%
Bacteroides		3.8 - 41.9%	8.5%
Bifidobacterium		0.0 - 3.4%	3.8%
others			16.6%

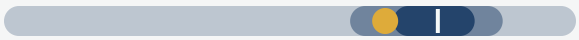
Riboflavin (B2) producers

59.3% L

Riboflavin is a B-vitamin that is a component of two important coenzymes required for energy production and fatty acid metabolism, as well as metabolism of drugs and steroids. Some bacteria are able to produce riboflavin, while others are not.

Blautia	ref. range:	0.7 - 4.5%	22.6%
Bacteroides		3.8 - 41.9%	8.5%
Lachnoclostridium		0.1 - 1.7%	3.3%
others			25.0%

Niacin (B3) producers



63.8%

Niacin is a B-vitamin required for the coenzyme NAD, which is involved in more than 400 enzymatic reactions in the body. Noteably, NAD works to convert food into energy for our cells. Some bacteria are able to produce niacin, while others are not.

Blautia	ref. range:	0.9 - 5.6%	19.5%
Bacteroides		3.8 - 41.9%	8.5%
Bifidobacterium		0.0 - 3.1%	3.4%
others			32.4%

Pantothenate (B5) producers

23.4% L

Pantothenate is a B-vitamin that plays a major role in energy production, particularly the breakdown of fatty acids. It may play a role in reducing lipid production in certain individuals. Some bacteria are able to produce pantothenate, while others are not.

Bacteroides	ref. range:	3.8 - 41.9%	8.5%
Roseburia		0.7 - 11.9%	2.7%
Eubacterium		0.2 - 2.4%	1.6%
others			10.5%

VITAMIN PRODUCTION

Pyridoxine (B6) producers

40.1% L

Pyridoxine is a B-vitamin required for coenzymes that play a role in enzymatic reactions mostly concerning protein metabolism, immune function, and brain development during pregnancy. Some bacteria are able to produce pyridoxine, while others are not.

	ref. range:	
Bacteroides	3.8 - 41.9%	8.5%
Bifidobacterium	0.0 - 3.6%	5.8%
Fusicatenibacter	0.1 - 1.5%	3.0%
others		22.8%

Biotin (B7) producers

14.7%

Biotin is a B-vitamin that plays a critical role in energy production, histone modification, gene regulation, and cell signaling. Signs of deficiency include skin rashes, hair loss, and brittle nails. Some bacteria are able to produce biotin, while others are not.

	ref. range:	
Bacteroides	3.8 - 41.9%	8.5%
Blautia/Ruminococcus	0.0 - 0.0%	1.4%
Dialister	0.0 - 3.7%	1.2%
others		3.5%

Folate (B9) producers

58.2%

Folate is a B-vitamin that is required to synthesize DNA, metabolize amino acids, enable methylation, and prevent anemia, as well as protect against neural tube defects in pregnancy. Some bacteria are able to produce folate, while others are not.

	ref. range:	
Blautia	0.9 - 5.4%	18.5%
Bacteroides	3.8 - 41.9%	8.5%
Bifidobacterium	0.0 - 3.5%	5.8%
others		25.4%

Cobalamin (B12) producers

72.8%

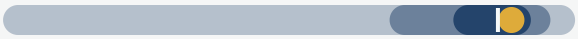
Cobalamin is a B-vitamin that is important in synthesizing DNA and red blood cells, brain and nervous system function, and metabolism. It is required to prevent magaloblastic anemia. Some bacteria are able to produce cobalamin, while others are not.

	ref. range:	
Blautia	1.0 - 5.7%	24.0%
Lachnoclostridium	0.5 - 5.0%	6.7%
Faecalibacterium	2.0 - 18.1%	6.0%
others		36.1%

AMINO ACID PRODUCTION

Amino acids are indispensable for the microbiome health. Bacteria that are not capable of producing amino acids require exogenous sources from diet or other bacteria. The percentage (on the scale from 0 to 100) of amino acids producers is shown along with top contributors.

Cysteine producers



92.1%

Cysteine is a nonessential sulfur containing amino acid in the methionine -> homocysteine pathway and one of three amino acids that build glutathione. Cysteine is beneficial as an antioxidant, assists with collagen formation and immune system regulation.

Blautia	ref. range:	1.0 - 5.7%	24.0%
Bacteroides		3.8 - 41.9%	8.5%
Lachnoclostridium		0.5 - 5.3%	6.8%
others			52.8%

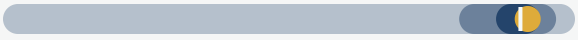
Trytophan producers

69.6%

Tryptophan is an essential amino acid with an important role in the gut-brain axis (GBS). Tryptophan is important in the production of neurotransmitters that regulate mood, particularly depression, and intestinal barrier integrity.

Blautia	ref. range:	0.9 - 5.5%	24.0%
Bacteroides		3.8 - 41.6%	8.4%
Bifidobacterium		0.0 - 3.6%	5.8%
others			31.4%

Histidine producers



90.0%

Histadine is an essential amino acid and precursor to histamine. Histadine and its derivatives have important roles in the immune response, blood clotting pathways, and detoxification.

Blautia	ref. range:	0.9 - 5.5%	24.0%
Bacteroides		3.8 - 41.9%	8.5%
Bifidobacterium		0.0 - 3.6%	5.8%
others			51.7%