

IBS, SIBO & Histamine Intolerance

Insights with GI-MAP[®]

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Hydrogen Producers

The majority of hydrogen in the gastrointestinal tract is produced by bacteria in the colon, especially bacteria within the Bacteroidetes and Firmicutes phyla (primarily by species within the Clostridia class).

H₂ metabolism is widespread and diverse among human colonic microbes

PMC ID: 4939926

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4939926/>

Hydrogen cross-feeders of the human gastrointestinal tract

PMC ID: 6546324

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6546324/>


Intestinal gases- influence on gut disorders and the role of dietary manipulations

PubMed ID: 31520080

<https://pubmed.ncbi.nlm.nih.gov/31520080/>

Hydrogen Producers: Example GI-MAP Screenshot

Normal Bacterial Flora

	Result		Normal
<i>Bacteroides fragilis</i>	1.68e10		1.60e9 - 2.50e11
<i>Bifidobacterium spp.</i>	1.99e10		>6.70e7
<i>Enterococcus spp.</i>	6.39e6		1.9e5 - 2.00e8
<i>Escherichia spp.</i>	4.36e6		3.70e6 - 3.80e9
<i>Lactobacillus spp.</i>	9.25e7		8.6e5 - 6.20e8
<i>Clostridia (class)</i>	 2.03e8	High	5.00e6 - 5.00e7
<i>Enterobacter spp.</i>	2.73e8	High	1.00e6 - 5.00e7
<i>Akkermansia muciniphila</i>	2.61e5	High	1.00e1 - 5.00e4
<i>Faecalibacterium prausnitzii</i>	1.40e6		1.00e3 - 5.00e8

Phyla Microbiota

	Result		Normal
<i>Bacteroidetes</i>	 8.66e12	High	8.61e11 - 3.31e12
<i>Firmicutes</i>	 4.46e11	High	5.70e10 - 3.04e11
<i>Firmicutes:Bacteroidetes Ratio</i>	0.05		<1.00

Methane Producers

The majority of methane in the gastrointestinal tract is produced by archaea (Methanobacteriaceae) in the colon, with significant methane also produced by oral archaea. Production of methane elsewhere along the GI tract (e.g., the small intestine) has not been well-studied.

Back to the Source: Molecular Identification of Methanogenic Archaea as Markers of Colonic Methane Production

PubMed ID: 33469805

<https://pubmed.ncbi.nlm.nih.gov/33469805/>

Exploring the Archaeome: Detection of Archaeal Signatures in the Human Body

PMC ID: 6906140

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6906140/>

Intestinal gases- influence on gut disorders and the role of dietary manipulations


PubMed ID: 31520080

<https://pubmed.ncbi.nlm.nih.gov/31520080/>

Methane Producers: Example GI-MAP Screenshot

Opportunistic Bacteria

Additional Dysbiotic/Overgrowth Bacteria

	Result		Normal
<i>Bacillus spp.</i>	6.47e4		<1.50e5
<i>Enterococcus faecalis</i>	<dl		<1.00e4
<i>Enterococcus faecium</i>	1.13e3		<1.00e4
<i>Morganella spp.</i>	<dl		<1.00e3
<i>Pseudomonas spp.</i>	2.45e5	High	<1.00e4
<i>Pseudomonas aeruginosa</i>	3.00e3	High	<5.00e2
<i>Staphylococcus spp.</i>	<dl		<1.00e4
<i>Staphylococcus aureus</i>	2.52e3	High	<5.00e2
<i>Streptococcus spp.</i>	2.17e4	High	<1.00e3
<i>Methanobacteriaceae</i> (family)	 5.47e9	High	<5.00e9

Hydrogen Sulfide Producers

Generally speaking, there are two categories of H₂S producers in the GI tract: those that produce H₂S from sulfur amino acids, and those that produce H₂S from sulfate or sulfite. The H₂S producers currently included on GI-MAP are those that fall into the first category, which are often associated with inflammation and inflammatory conditions.

Hydrogen Sulfide Producers on GI-MAP:

- *Fusobacterium* spp.
- *Escherichia* spp.
- *Enterobacter* spp.
- *Klebsiella* spp.
- *Citrobacter* spp.
- *Staphylococcus* spp.

Hydrogen Sulfide Producers: References

Recent Advances in Metabolic Pathways of Sulfate Reduction in Intestinal Bacteria

PMC ID: 7140700

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7140700/>

Microbial Pathways in Colonic Sulfur Metabolism and Links with Health and Disease

PMC ID: 3508456

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3508456/>

Intestinal gases- influence on gut disorders and the role of dietary manipulations

PubMed ID: 31520080

<https://pubmed.ncbi.nlm.nih.gov/31520080/>

Histamine Producers



There are a number of gastrointestinal bacteria that are capable of converting histidine to histamine. Microbial production of histamine may contribute to the overall histamine load in the gut, potentially contributing to histamine intolerance, and other histamine-related conditions.

Histamine Producers on GI-MAP:

- Morganella spp.
- Pseudomonas spp.
- Klebsiella spp and Klebsiella pneumoniae
- Escherichia spp.
- Enterobacter spp.
- Citrobacter spp.
- Proteus spp. and Proteus mirabilis

Histamine Producers: Example GI-MAP Screenshot

Normal Bacterial Flora



	Result		Normal
<i>Bacteroides fragilis</i>	1.68e10		1.60e9 - 2.50e11
<i>Bifidobacterium spp.</i>	1.99e10		>6.70e7
<i>Enterococcus spp.</i>	6.39e6		1.9e5 - 2.00e8
<i>Escherichia spp.</i>	 4.36e6		3.70e6 - 3.80e9
<i>Lactobacillus spp.</i>	9.25e7		8.6e5 - 6.20e8
<i>Clostridia (class)</i>	2.03e8	High	5.00e6 - 5.00e7
<i>Enterobacter spp.</i>	 2.73e8	High	1.00e6 - 5.00e7
<i>Akkermansia muciniphila</i>	2.61e5	High	1.00e1 - 5.00e4
<i>Faecalibacterium prausnitzii</i>	1.40e6		1.00e3 - 5.00e8

Phyla Microbiota






	Result		Normal
<i>Bacteroidetes</i>	8.66e12	High	8.61e11 - 3.31e12
<i>Firmicutes</i>	4.46e11	High	5.70e10 - 3.04e11
<i>Firmicutes:Bacteroidetes Ratio</i>	0.05		<1.00

Histamine Producers: Example GI-MAP Screenshot

Opportunistic Bacteria

Additional Dysbiotic/Overgrowth Bacteria	Result		Normal
<i>Bacillus spp.</i>	5.86e5	High	<1.50e5
<i>Enterococcus faecalis</i>	<dl		<1.00e4
<i>Enterococcus faecium</i>	<dl		<1.00e4
<i>Morganella spp.</i>	 1.69e5	High	<1.00e3
<i>Pseudomonas spp.</i>	 3.35e6	High	<1.00e4
<i>Pseudomonas aeruginosa</i>	4.71e3	High	<5.00e2
<i>Staphylococcus spp.</i>	<dl		<1.00e4
<i>Staphylococcus aureus</i>	<dl		<5.00e2
<i>Streptococcus spp.</i>	3.22e3	High	<1.00e3
<i>Methanobacteriaceae</i> (family)	3.02e8		<5.00e9

Histamine Producers: Example GI-MAP Screenshot

Potential Autoimmune Triggers	Result		Normal
<i>Citrobacter spp.</i>	<dl		<5.00e6
<i>Citrobacter freundii</i>	 <dl		<5.00e5
<i>Klebsiella spp.</i>	 2.95e4	High	<5.00e3
<i>Klebsiella pneumoniae</i>	 4.84e5	High	<5.00e4
<i>Mycobacterium tuberculosis (avium)</i>	<dl		<5.00e3
<i>Prevotella copri</i>	<dl		<1.00e7
<i>Proteus spp.</i>	 <dl		<5.00e4
<i>Proteus mirabilis</i>	 1.02e4	High	<1.00e3

Histamine Producers: References

Histamine Intolerance: The Current State of the Art

PMC ID: 7463562

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7463562/>

Immune regulation by histamine and histamine-secreting bacteria

PubMed ID: 28923468

<https://pubmed.ncbi.nlm.nih.gov/28923468/>

Bacterial secretion of histamine within the gut influences immune responses within the lung

PubMed ID: 30589936

<https://pubmed.ncbi.nlm.nih.gov/30589936/>