

THE GUT MICROBIOME AND ITS ROLE IN HEALTH

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Your gut microbiome could cause disease or make a disease get worse. The gut microbiome is a combination of bacteria, viruses, protists, and other microorganisms that live in your gut.

- Bacteria is a species of single-celled organisms. They can be good or bad and are found everywhere.
- Viruses are infectious particles that can infect a host. They have a variety of hosts, like humans, animals, and can even infect bacteria.
- Protists are microorganisms that are neither plant nor animal but can be found inside the human body.

There is a vast variety of all these microorganisms and more inside the human gut.

The gut consists of your digestive organs and includes the mouth and esophagus, the stomach, the small intestine, and the colon. This is established at birth and continues to develop throughout your lifetime. More microbial exposure leads to more diversity and a healthier immune system. No two people have the exact same microbiota since no two people have ever had the exact same life experience. The microbiome is greatly influenced by any sicknesses you caught as a child, your use of antibiotics, your diet, age, genetics, and more. The microbiome is heavily influenced by its environment and is diverse among individuals, but there are some microbes that are expected to be seen and assumed to play a role in health. There are ongoing efforts looking into the core microbiota, or the “normal” microbes present. Everyone’s microbiome is slightly different; however, too much deviation from normal has been linked to an increased risk of chronic disease development.

The gut microbiome has many functions. This includes the development and refinement of the immune system, protection against pathogens, help with digestion, and playing a vital role in nutrient metabolism. If the gut microbiome is not strong enough, it can take a hit that leads to a decrease in the number and diversity of microbes present. A great decrease can lead to the onset or progression of some diseases, including:

Autoimmune Diseases

- Autoimmune diseases occur when the immune system mistakenly attacks healthy cells. This can lead to increased inflammation in different areas of the body and diminished immune tolerance.
- The microbiome can be affected as the body is more prone to illnesses, which can change the function of the microbiome and further advance symptoms or disease presentation.

Type I Diabetes

- Type 1 diabetes occurs when the pancreas does not produce insulin (or produces very little insulin). Insulin is a hormone that helps regulate sugar uptake in the body.
- A decrease in microbial diversity is commonly seen prior to the onset of diabetes symptoms.

Irritable Bowel Syndrome (IBS)

- IBS is a chronic condition with two main symptoms: abdominal pain and irregularity of bowel movements.
- Recent research has proven that changes in the gut microbiome can lead to higher amounts of inflammation and worsen the condition.

Heart Disease

- There are many different types of heart diseases. All heart diseases affect the heart or the blood vessels that pump blood to the heart.
- Hypertension, more commonly called high blood pressure, is caused when the blood vessels pump too much blood to more parts of the body than they should.
- People with hypertension have been proven to have much different microbial composition than their healthier peers.
- Patients with heart disease have been given probiotics and have seen an improvement in symptoms. Probiotics are good bacteria that can live in your body and help to improve the gut microbiome.

Type II Diabetes (TIID)

- Type II diabetes is when cells don't respond normally to insulin, so the pancreas must overproduce to keep up with demand. The pancreas gets worn out, and then there is a persistent increase in blood glucose. This leads to the development of type II diabetes.
- There is a distinct deviation in the gut microbiome in individuals with TIID. This is currently an area of research, as it is unknown whether the microbes drive TIID or change because of this disease.

Cancer

- - Studies have shown that up to 20% of all cancer cases can be linked to the gut microbiome! (Barka)
 - There are certain microbiomes that are vital for immune response and protection against cancer.
 - There are other microbes that, if present, can increase your risk of certain cancers.
 - *Helicobacter pylori* in the stomach is a major risk factor for stomach cancer! (Barka)

Since our microbiome is affected by our diet, it is important to eat right. A diet that is high in fat or carbohydrates will alter the composition of the gut microbiome and can lead to obesity. Obesity is a major risk factor for many chronic diseases, as well as cancer.

Foods That Can Contribute to an Unhealthy Microbiome

High fat foods:

- Fatty meat, heavy cream, butter, bacon, etc.

High sugar foods:

- Look out for added sugar in candies and sweets, as well as overly sweetened cereals and granola bars

Alcohol

Fried foods

Too much red meat:

Red meat is beneficial in moderation, but too much can contribute to heart disease and diabetes.

There are many things you can do to strengthen and restore your gut microbiome, including eating the following foods:

- High fiber foods
 - Leafy greens, almonds, flax seeds
- Fermented foods
- Pickled foods
- Yogurts with active cultures. Active cultures are live bacteria that convert milk to yogurt during fermentation.
- Leafy green veggies
- Whole grains



Bread and Butter Pickles are an example of a pickled food that can be beneficial to gut health.
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Leafy greens and whole wheat crackers can be added to many dishes to help strengthen gut microbiome.
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Another great way to improve your gut microbiome is by taking a daily probiotic or eating foods rich in probiotics. Probiotics could increase microbial diversity and introduce new beneficial functions in the microbial community (Hemarajata).

Another way to improve gut health is to avoid unnecessary antibiotics. Antibiotics are antimicrobials, meaning they work against bacteria, so they can have a detrimental effect on the gut. Broad-spectrum antibiotics (antibiotics that act against a wide range of bacteria) can wipe out entire species of microorganisms, including the ones that are good for gut health. Even highly specific antibiotics can be detrimental, as the gut microbiome has lots of interaction between microbes. The loss of even one microbe can affect other species. One source of unnecessary antibiotics is the meat of animals treated with antibiotics. While antibiotic treatment of animals is necessary to prevent bacterial infections (many of which are transmissible to humans), these antibiotics can thrive in humans and lead to decreased microbial diversity as well as antibiotic resistance (Arsène).

Over time, doing these things will improve your immunity and overall health! The gut microbiome is an integral part of our health. It is easy to strengthen our gut microbiome to stay healthy, promote immunity, and prevent the onset of disease.

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