

Gut Microbiome: An Overview

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Gut Microbiota

Gut microbiota, sometimes called gut flora, is the name given to the microbe populations living in our intestines (1). Our gut microbiota contains tens of trillions of microorganisms, which includes at least 1,000 different species of bacteria containing over three million genes. Our gut microbiota can weigh up to 4.5 pounds. One-third of our gut microbiota is shared among most people, while two-thirds of our gut microbiota are unique to each of us, just like fingerprints (1). See Table 1 for beneficial and harmful bacteria (2).

Table 1. Beneficial and Harmful Bacteria (2)		
Species	Beneficial	Harmful
<i>Bifidobacterium</i>	+	
<i>Eubacterium</i>	+	
<i>Lactobacillus</i>	+	
<i>Clostridium</i>		+
<i>Shigella</i>		+
<i>Veillonella</i>		+

Gut Microbiome

The microbiome is the combined genetic material of all the microorganisms that live inside and on the human body. We have about 10 times as many microbial cells as human cells (3).

What is the role of the gut microbiome?

The gut microbiome plays many roles in the body (1):

- It helps the body to digest certain foods that the stomach and small intestine have not been able to digest.
- It helps with the production of some vitamins (B and K).
- It plays an important role in the immune system, performing a barrier effect.
- A healthy and balanced gut microbiota is key to ensuring proper digestive functioning.

How does the gut microbiome develop?

The development of the gut microbiota starts at birth. The newborn's digestive tract is quickly colonized by microorganisms from the mother (vaginal, fecal, skin, breast, etc.), the environment in which the delivery takes place, the air, etc. From the third day, the composition of the intestinal flora is directly dependent on how the infant is fed: breastfed babies' gut microbiota, for example, is mainly dominated by Bifidobacteria, compared to babies nourished with infant formulas. Scientists consider that by the age of three, microbiota becomes stable and similar to that of adults, continuing its evolution at a steadier rate throughout life (1).

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How does the gut microbiome evolve?

The composition of our microbiota evolves throughout our entire life, from birth to old age, and is the result of different environmental influences (1), such as our diet.

How does the food we eat influence the gut microbiome?

The food we eat plays an essential role in maintaining the diversity and proper functioning of our gut microbiota. When talking about gut microbiota, it could be said that “we are what we eat,” as what we consume also feeds the hundreds of trillions of bacteria living in our digestive system. For this reason, a varied and balanced diet is essential. Prebiotics and probiotics are two of the most widely studied elements in the field of gut microbiota. Both have effects that are considered beneficial for the gut microbiota (1). How long does it take for your diet to change your gut microbiome? A recent study suggests that it only takes three to four days (4)!

Why is the gut microbiome important?

The gut microbiome is associated with both health and disease, and research has found links between the bacterial population in our gut and the following diseases: asthma, autism, cancer, celiac disease, colitis, diabetes, eczema, heart disease, malnutrition, multiple sclerosis and obesity. However, more research is needed to define the exact role the gut microbiome plays in the development or prevention of these diseases.

What kind of foods are linked to a healthy gut?

There are two types of foods that are linked to a healthy gut: probiotics and prebiotics. Probiotics are live microorganisms that are intended to have health benefits. Products that are sold as probiotics include foods such as yogurt. Prebiotics are not the same as

probiotics. Prebiotics are natural, nondigestible foods that promote the growth of beneficial or ‘good’ bacteria over harmful ones in your gut. Prebiotics include fructooligosaccharides, such as inulin, and galactooligosaccharides, which are found in fruits and vegetables. Table 2 has a list of foods that contain prebiotics and probiotics. It is estimated that around 4 million U.S. adults (approximately 1.6 percent of the U.S. population) have used probiotics or prebiotics in the last 30 days (5).

Table 2: Foods containing prebiotics and probiotics

Prebiotics	Probiotics
Bananas	Yogurt
Onions	Kefir
Garlic	Aged cheeses
Asparagus	Miso soup
Artichokes	Pickled fruit or vegetables
Soybeans	Tempeh (fermented soybeans)
Whole-grain foods	Kimchi (Korean pickled cabbage)
Leeks	Sourdough bread
Peas	Sauerkraut
Chicory	Beer
Berries	
Kiwifruit	
Honey	

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