



This Food Science Fact Sheet is one of a series compiled by Institute of Food Science and Technology, providing clear, concise and scientifically reliable information on key food science topics for consumers.

Gut Health and the Microbiome

What is the gut microbiome?

It is the genetic material associated with all the organisms present in the human digestive system. This collection of organisms, mostly bacteria but also other organisms (e.g. yeasts, fungi, archaea, viruses), is called the gut microbiota, but often referred to as the microbiome. It is beginning to be understood how important these are to our health generally. The gut microbiota (approximately 40 trillion cells) is considered by some to be a 'hidden' organ, influencing metabolism, immune function and general wellbeing with implications, not only on digestive problems, but many others including diabetes, obesity and colorectal cancer.

Why is the human microbiome important?

We are used to the concept that there are harmful bacteria that can cause infections, or food poisoning, but there are also organisms that help us and are good for us. The organisms present in our gut form a complex ecosystem which have grown with us, and as such are important in giving us a healthy body and mind. These beneficial organisms in the gut not only help the digestion of foods, breaking down some complex food molecules, but they also help us take in nutrients and are good for physical and mental health. In the gut microbiome, some organisms keep other organisms in check. They multiply so often that the unhealthy kind do not have space to grow. The healthy balance of organisms in the gut is called equilibrium and studies have found that if disturbed, it increases the likelihood of having such issues as Crohn's disease, ulcerative colitis and irritable bowel syndrome (IBS). There are many studies now showing the links between human health and that of the gut

microbiota. In 2007 the Human Microbiome Project published several of these studies at a time when the impact of gut health was less understood.

How does food play a part?

Having a diverse and good gut microbiome is now accepted as being very important for health. It needs to have 'good nutrition' to feed on and keep in balance. The food the gut microbiota feed on depends on our diet, and studies have shown that fibre, found in most fruits and vegetables, is important in providing a varied and healthy balance. This has led to the introduction of specially designed **prebiotic** products (comprising mainly dietary fibre) that are intended to improve the health of the gut microbiota and maintain a balance between them. For good gut microbiota health beneficial foods include pulses, fruits and vegetables, especially those high in plant bio-actives, such as berries (high in polyphenols) and onions, garlic and broccoli (high in sulphur metabolites).

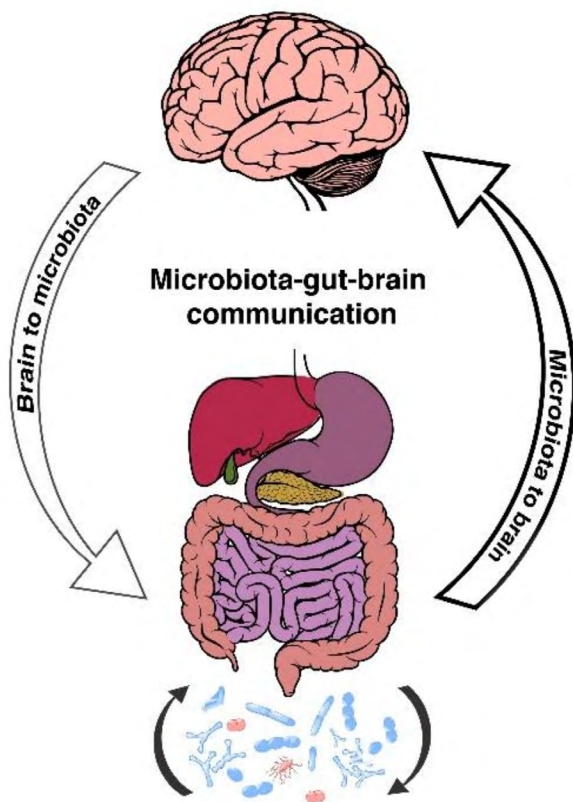


Gut Health and the Microbiome

Probiotic products are those containing live microorganisms known to be good for gut health. They include fortified dairy products, supplements and increasingly natural fermented products, such as kimchi, sauerkraut, pickled vegetables (e.g. onions and gherkins). Kefir, a mixture of bacteria and yeast, is also increasingly seen as active in promoting good gut health. As the role of specific species of bacteria become well understood, these probiotics will extend to include extra species.

Postbiotics are seen as potentially new products for improving health and cover inactivated microorganisms and microbial molecular components that can confer health benefits to consumers.

What is the relationship between gut health and other organs?



Toribio-Mateas, M. *Harnessing the Power of Microbiome Assessment Tools*, *Microorganisms* 2018, 6(2), 35.

The gut microbiome can interact with other organs in the body and some of these have been studied in detail. These are: gut-lung axis and effects of the gut microbiome on respiratory problems; gut-liver axis important in metabolism; gut-brain axis where signals between the two affect health and mood. Studies show that the balance of bacteria in the gut microbiome may affect people's emotions and the way their brain processes information from senses, like sights, sounds, flavours or textures. Scientists suspect that changes in that balance may play a role in conditions like autism spectrum disorder, anxiety and depression, as well as chronic pain.

What's the importance of nutrition for a healthy gut?

Although there are basic facts known about the gut microbiome, it has been found that the makeup and balance vary between individuals, and their metabolism of food also varies. The concept that diet and nutrition affects everyone in the same way has been challenged by studies on the gut microbiome and how it varies from person to person. This has led to the idea of personalised nutrition based on identified gut microbiome. As the food industry progresses in this area, the importance of a healthy gut microbiome is important to us all.

References

- Professor Tim Spector's Top 5 Tips for a Healthier Gut Microbiome <https://joinzoe.com/post/tim-spector-gut-tips>
- Human Microbiome Project <https://hmpdacc.org/>
- Human Gut Microbiome: Hopes, Threats and Promises. *Gut* 2018, 67(9): 1716-1725.

