# Microbiome and health

## 3 questions to Dr Petra LOUIS…

*She has a diploma in biology and a PhD in microbiology.*

*She currently is an Senior Research Fellow at the University of Aberdeen Rowett Institute (Scotland, UK) and has worked in the field of gut microbiology, human nutrition and health since 2002. She uses a multidisciplinary approach to study the role of fibres in maintaining human health via their effect on the intestinal microbiota. More precisely, she studies the* ***microbial metabolism of non-digestible carbohydrates in the diet****, with a particular interest on short-chain fatty acid production.*

*She is a member of the* ***scientific advisory board*** *led by Véronique Braesco to support Limagrain Ingredients in its knowledge of dietary fibres.*

### Dr Petra Louis, what is the microbiota?

The human intestine is inhabited by a diverse community of microbes, collectively called the gut microbiota. The microbiota contains organisms from the three domains of life, archaea, bacteria (collectively called prokaryotes) and eukaryotes (which include yeasts) as well as viruses (including bacteriophages that specifically target bacteria). Most of the research on the gut microbiota to date has been carried out on the bacterial component of the gut microbiota, whereas the activity of the other types of microbes is less well understood. Hundreds of different microbes are present within each individual, and different people have their unique collection of gut microbes. Some microbes are present in almost everyone, but others are more individual-specific. The gut microbiota develops from birth onwards and its composition is influenced by many different factors, including exposures to microbes from the environment, diet, and medication. It interacts with its human host in many different ways and plays an important role in contributing to host health as detailed below.

### What are the links between microbiota and health?

The microbes in the gut perform a barrier function against microbes that make us ill (‘pathogens’), therefore lowering our risk of getting sick, for example from food that has gone off. The microbiota also interacts with our immune system. It has been shown that a healthy microbiota is important for the proper development of the immune system in infancy, and this is believed to help reduce the risk of developing immune-related diseases later in life, such as eczema or allergies. Throughout life the microbes continue to interact with the immune system and influence the delicate balance of the immune system to effectively combat incoming pathogens while not overreacting to harmless agents or our own body tissues (inflammation).

The microbes in the gut also convert many compounds that enter the gut, either with the diet, from medicines or environmental compounds that enter the body or from human body

secretions such as the bile that enters the gut to aid in the digestive processes. The resulting compounds can have numerous effects on the host, such as modulate inflammatory processes or dampen the risk of developing cancer. Gut microbes also produce some compounds that the host can make use of, such as vitamins.

## What role do fibres, including resistant starch, play in these relationships?

Dietary fibre are mostly carbohydrates originating from plant-based foods present in the diet that are not broken down by our own digestive system in the upper gut and reach the large intestine. Here they are a major nutrient and energy source for the gut microbes. Therefore an appropriate intake of fibre is important for the maintenance of an active, thriving microbiota so that it can carry out the numerous health-promoting activities discussed above. The microbiota ferments the dietary fibre to a range of molecules called short-chain fatty acids, and these molecules have many health effects. They make the gut content more acidic, which helps to guard against pathogens and also improves the ability of the gut wall to absorb minerals. Some of the molecules lower the risk of developing colorectal cancer and also dampen down inflammation in the gut, which helps combat diseases such as Ulcerative Colitis. The short-chain fatty acids don’t only act in the colon, but are also taken up from the gut and reach other tissues and organs in the human body. Here they provide extra energy and influence a range of different host processes, such as how the body regulates its glucose and lipid metabolism, important in preventing diabetes, or how hungry we feel. The different short-chain acids act in slightly different ways, and it is therefore important that each is produced by the gut microbiota at the right level to obtain a healthy short-chain fatty acid profile. Provision of a diverse range of different fibre types, including resistant starch, stimulates many different gut microbes with their unique abilities to break down carbohydrates and generate different fermentation products. This helps to obtain a healthy balanced short-chain fatty acid profile.

***Want to know more? Check out how we've build a solid scientific basis around fibres thanks to our expert associates: https://lifywheat.com/en/home/#resistant-starch***