



# Gut health

## A closer look: influencing the microbiome with prebiotics<sup>1</sup>

With digestive health problems and discomfort becoming more prevalent around the world, gut health has gained attention over recent years, and consumers are now looking for more holistic approaches to address their well-being.

In response, there is a growing emphasis on the human microbiota for its role as an important modulator of gut health. Now that the significance of microbiota has been widely established, research has turned to the role diet can play in influencing the microbiota, alongside other key lifestyle factors such as exercise and stress.

### Delving deeper into prebiotics<sup>1</sup>

Although for many consumers, awareness of that dietary influence began with probiotics - strains of live bacteria often added to fermented products - their focus has now expanded to include prebiotics. With a growing bank of scientific evidence behind them, prebiotics are becoming widely known for their ability to influence gut microbiota composition and activity. According to a 2016 expert panel, the updated definition of a prebiotic is 'a substrate that is selectively utilized by host microorganisms conferring a health benefit'<sup>1</sup>. In essence, this means that prebiotics are considered a food source for the gut microbiota. Since prebiotics are indigestible by humans, they can reach the colon and are fermented there by the gut microbiota. Thereby, they selectively stimulate the growth of healthy gut microbiota and help maintain optimal composition and activity.

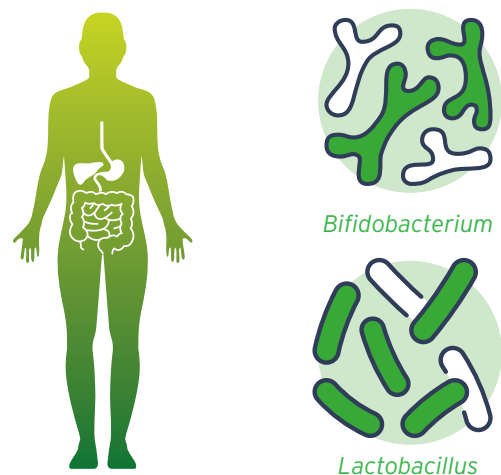


Figure 1: Bifidobacterium and Lactobacillus are major players in gut health.

The gut microbiota consists of many different species of microorganisms, of which *Lactobacillus* and *Bifidobacterium* are two of the species that have been shown to be important for gut health and to grow well on prebiotics - these are the so-called 'good bacteria'<sup>2,3</sup>. Prebiotics, including galacto-oligosaccharides (GOS) that are enzymatically produced, are used as a carbon source for the growth and metabolism of beneficial colonic members of the genera like *Lactobacillus* and *Bifidobacterium*<sup>4</sup>.



A study in older adults **indicates** that Biotis™ GOS intervention **substantially elevates** bifidobacterial numbers *in vivo*, **positively affecting** gut bacterial composition<sup>5</sup>

Through their ability to modulate the microbiota, prebiotics can exert multiple effects!:

- Reduction of luminal pH, which suppresses the growth of pathogenic bacteria
- Production of short-chain fatty acids (SCFA), which can regulate the luminal pH and mucus production, provide fuel for epithelial cells, affect mucosal immune function and can directly modulate host metabolic health<sup>6</sup>
- Strengthening of the barrier function

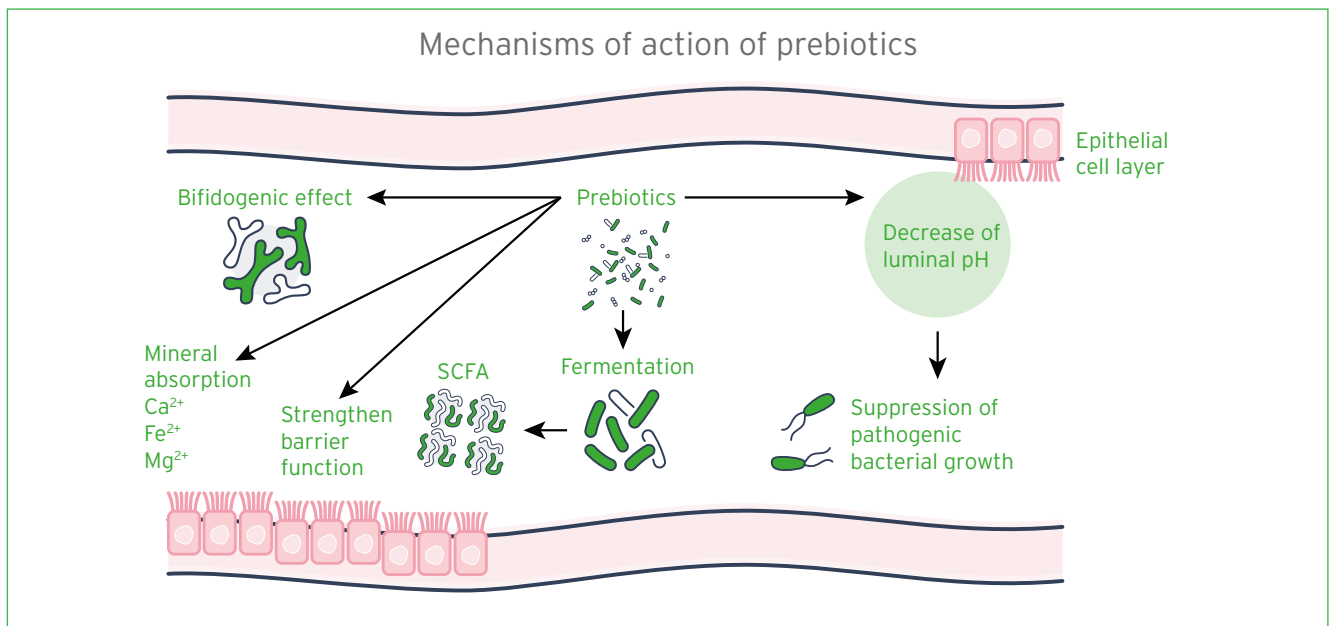


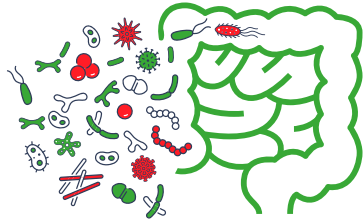
Figure 2: Mechanisms of action of prebiotics. Adapted from: Cerdo et al., 2019<sup>7</sup>.

## Exploring the effects of GOS

Research has helped further the understanding of prebiotics by showing how their mechanisms of action can modulate the microbiota. GOS has been widely studied over many years and have shown positive results. The bifidogenic effect of prebiotics, in particular, has received attention for its potential benefits across a range of

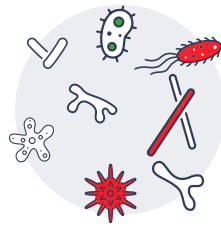
demographics. For instance, humans have been found to exhibit reduced bifidobacterial numbers as they age - starting from 50 years old<sup>8</sup>. A study in older adults indicates that Biotis™ GOS intervention substantially elevates bifidobacterial numbers *in vivo*, positively affecting gut bacterial composition<sup>5</sup>.

The gut microbiota is a **dynamic collection** of bacteria and other microorganisms



In order to perform its functions properly, the microbiota must be **diverse, balanced and stable**

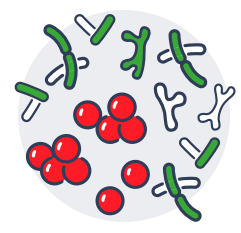
**Dysbiosis** is a disruption of the gut microbiota  
This can be displayed as:



A **decline** in bacterial species that benefit health



An **increase** in disease-causing bacteria



An **impoverishment** of the bacterial species diversity

Figure 3: The importance of a balanced microbiota. Adapted from: "Gut Microbiota for health".

Similarly, in obese individuals where dysbiosis is common, prebiotics have been shown to increase bifidobacterial numbers. A recent randomised, double-blind, placebo-controlled, parallel-arm clinical trial in obese individuals found that Biotis™ GOS could help improve barrier function - one of the causes of a 'leaky gut' - and exhibited a clear bifidogenic effect<sup>9</sup>.

Alongside the potential benefits of prebiotics on healthy aging and obesity, researchers have explored the link between GOS and increased iron absorption, again considering the modulation of the microbiota in iron-deficient women. Research published in 2020 found that Biotis™ GOS could significantly increase fractional iron absorption in iron-deficient women who are taking an iron supplement<sup>10</sup>.

In addition, emerging evidence highlights the effect of Biotis™ GOS supplementation on recovery of bifidobacterial species in healthy adults treated with the antibiotic amoxicillin<sup>11</sup>. Meanwhile, a number of recent studies have indicated a link between gut microbial composition and brain function and behaviour, via the gut-brain axis<sup>12</sup>. Although more research is needed in this area, this growing bank of evidence is indicative of the exciting potential for prebiotics in modulating microbiota and the resulting positive effects on both physical and mental well-being.

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## Paving the way for prebiotics

As consumers become more aware of the benefits of diet on their digestive health, functional foods and beverages that help to balance the gut microbiota offer significant potential. Prebiotics provide an effective and proven way of establishing and maintaining the optimal balance of microbiota and improving the health and well-being of consumers worldwide.

Interested in learning more about the role of prebiotics in influencing the microbiota or the Biotis™ GOS digestive health solutions offered by FrieslandCampina Ingredients? Get in touch with our team today via email at [info@biotis.com](mailto:info@biotis.com).

*Biotis™ GOS is FrieslandCampina's recently launched food grade galacto-oligosaccharide (GOS) ingredient. Until recently, clinical studies in adults were performed with the infant nutrition grade ingredient Vivinal® GOS. The galacto-oligosaccharide composition and fingerprint of Vivinal® GOS and Biotis™ GOS is the same.*

## References

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