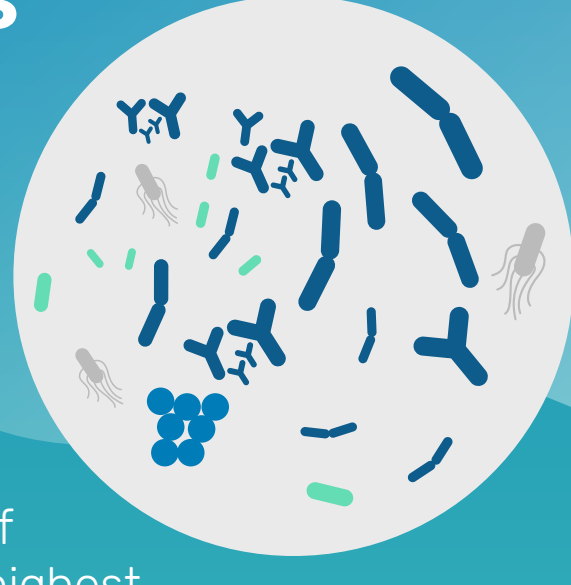


# The gut microbiome: influencing infants' future health

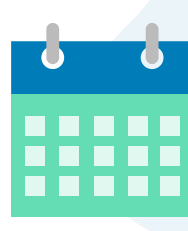
## What is the gut microbiome?

As well as containing human cells, our bodies are made up of thousands of microbial cells, including bacteria. The highest number of these microbes are found within the gastrointestinal tract, and are more commonly referred to as the gut microbiome.<sup>1</sup>



## How does the gut microbiome develop?

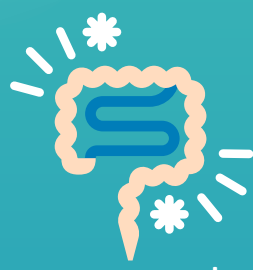
The early years of life are a crucial period to support the development of a healthy gut microbiome.<sup>2</sup> Developing rapidly from birth, our gut microbiome reaches a more diverse, adult-like composition by 3 years of age.<sup>2</sup> This can be influenced by environmental factors including mode of delivery at birth, gestational age and nutrition.<sup>3</sup>



**The first 1000 days of life are key for supporting a healthy gut microbiome.<sup>2,4</sup>**

## Why is the gut microbiome important?

The gut microbiome is an essential element for our overall health,<sup>1,2,5</sup> playing a key role in:



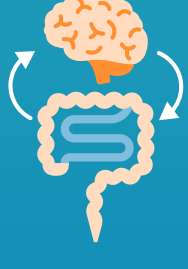
### Digestion and absorption:

A healthy gut microbiome is key to proper digestive functioning. It helps the body to digest certain foods that the stomach and small intestine are not able to.<sup>6</sup>



### Immune function:

As 70-80% of our body's immune cells are found in the gut,<sup>7</sup> the gut microbiome is essential for optimal immune system development, and has the potential to lower the risk of disease in infancy and beyond.<sup>2</sup>



### Gut-brain axis:

The microbes in the gut can influence brain function,<sup>5</sup> affecting mood, anxiety, sociability and cognition.<sup>8</sup>

## Nutrition: A key influencer for a healthy gut microbiome

### Breast milk and the gut microbiome



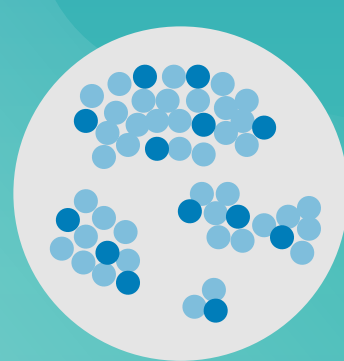
**Breast milk is the gold standard nutrition to support infant health<sup>12</sup>**

Breast milk provides bioactive components such as oligosaccharides, live bacteria and their metabolites, which all help to **support a healthy gut microbiome.**<sup>2,13,14</sup>

**Human milk oligosaccharides (HMOS)** are a complex pool of carbohydrates that exist in high levels in human milk, with prebiotic and other important benefits.<sup>15</sup>

### Prebiotics

are substrates that pass to the gut where they stimulate the growth or activity of beneficial bacteria.<sup>9</sup>



### Postbiotics

are bioactive compounds produced by beneficial bacteria, which have biological activity in the host.<sup>11</sup>

### Probiotics

are beneficial bacteria that affect the host microbiota when ingested in adequate amounts.<sup>10</sup>



### Synbiotics

are a mixture comprising live microorganisms and substrate(s) selectively utilized by host microorganisms that confers a health benefit on the host.<sup>9</sup>

**BIOTICS:** Specific nutritional components can support a healthy gut microbiome

#### Reference:

- Gerritsen J, et al. Genes Nutr. 2011;6(3):209-240.
- Wopereis H, et al. Pediatr Allergy Immunol. 2014;25(5):428-438.
- Penders J, et al. Pediatrics. 2006;118(2):511-521.
- Why Thousand days. Available at: <https://thousanddays.org/why-1000-days/>. [Accessed August 2019].
- Lee KN & Lee OY. World J Gastroenterol. 2014;20(27):8886-8897.
- Valdes AM, et al. BMJ. 2018;361:k2179.
- Furness JB, et al. Am J Physiol. 1999;277(5):G922-G928.
- Yang L, et al. Nurs Res. 2016;65(1):76-88.
- Swanson KS, et al. Nat Rev Gastroenterol Hepatol 17: 687-701, 2020.
- Schrezenmeir J & de Vrese M. Am J Clin Nutr. 2001; 73(2 Suppl):361S-364S.
- Patel RM & Dennin PW. Clin Perinatol. 2013;40(1):11-25.
- CDC. Available at: <https://www.cdc.gov/breastfeeding/about-breastfeeding/why-it-matters.html>. [Accessed March 2023].
- Chirico G, et al. J Nutr. 2008;138(9):1801S-1806S.
- Pannaraj PS, et al. JAMA Pediatr. 2017;171(7):647-654.
- Bode L. Glycobiology. 2012;22(9):1147-1162.