Danone Nutricia Campus

For Healthcare Professionals Only

November 2023

EAACI PAAM Paediatric Allergy and Asthma Meeting

Symposium **Speaker**

Prof.
Jan Knol
(The Netherlands)

Watch the symposium here

The Importance of the Gut Microbiota in Early Life and Beyond

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Introduction

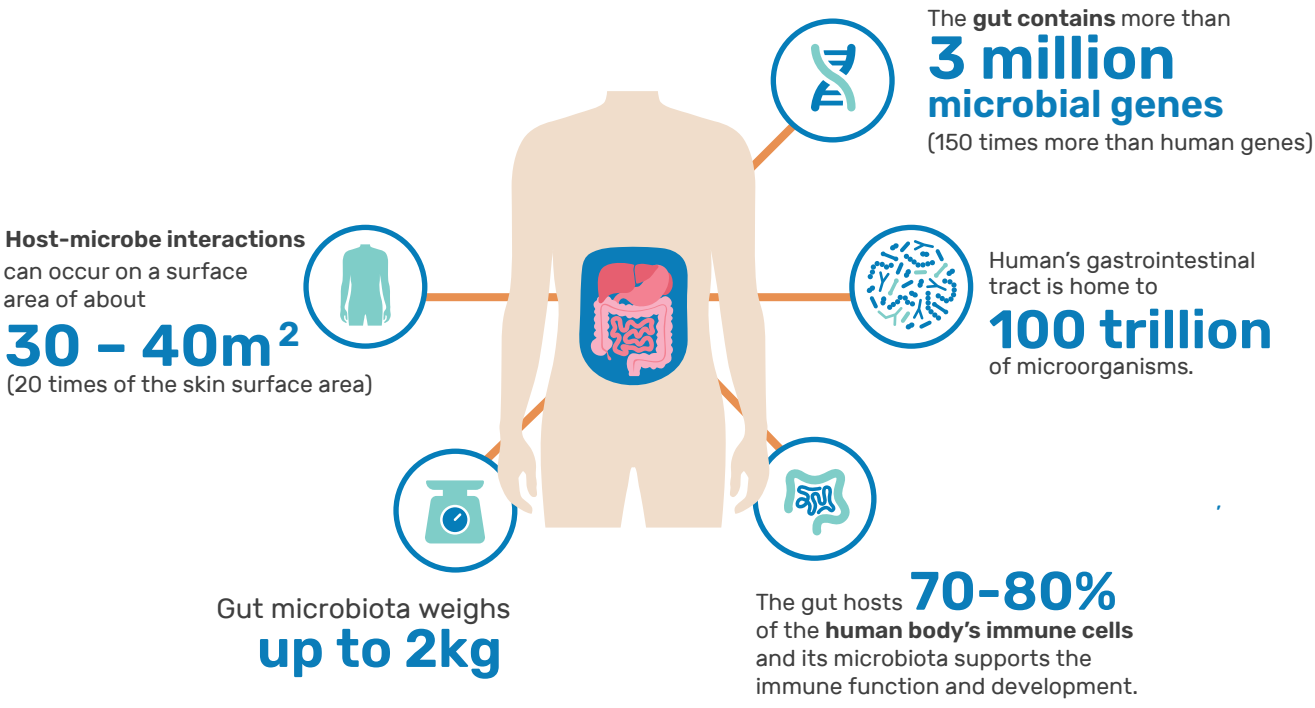
The European Academy of Allergy and Clinical Immunology (EAACI) Paediatric Allergy and Asthma Meeting brings together leading experts and emerging professionals in paediatric allergy and asthma. In November 2023, important topics including research on environment and immunomodulation, food allergy, and the epigenetics of allergy in children were discussed. In this summary booklet, we provide you with a summary of the scientific discussion presented by Professor Jan Knol.

The Importance of **the Gut Microbiota In Early Life and Beyond**

Professor Knol highlighted the importance and complexity of the gut microbiome. He explained that recent advancements in technology, such as next-generation sequencing and metabolomics, had allowed researchers to study the gut microbiome in greater depth.

The gut microbiome is not simply a random accumulation of microbes, but rather an important health organ that has a symbiotic role with our bodies.

Gut microbiome and gut microbiota describe either the collective genomes of the microorganisms that resides in the gut, or the microorganisms themselves.



The Importance of **the Gut Microbiota In Early Life and Beyond** continued

The gut microbiome has diverse functions, including its role in aiding digestion and interacting with the immune system. Given its extensive surface area, the gut houses immune cells that circulate within it. Moreover, the gut plays a crucial role in nutrient absorption and supporting growth, particularly in infants.

In the context of investigating the interplay between gastrointestinal and neurological domains, evidence primarily drawn from animal models, but also extending to human studies, supports the notion that the gut microbiome possesses the capacity to influence cerebral processes and behavioural outcomes.

Professor Knol explained the significance of the first 1000 days of life in the maturation of the gut microbiome and the immune system. He described how, during this period, the gut microbes are exposed to a broad range of environmental influences, enabling them to discern between beneficial and harmful nutrients and microorganisms. This dynamic complex recognition process initiates the maturation of the gut microbiome to foster the development of a healthy metabolic state. He also emphasised how nutrition plays a significant role in this process, with microbes such as bifidobacteria interacting with human milk oligosaccharides (HMOs) naturally occurring in human breastmilk to shape the gut environment and support microbial growth.

Professor Knol acknowledged the challenges that modern society posed to the development of a healthy microbiome. He discussed factors such as C-section births, preterm infants, and the use of antibiotics, even in healthy infants, which could have a significant impact. He highlighted the delicate balance between the benefits of antibiotics for treating infections and the potential harm they may have caused to the establishment of a healthy microbiome during this sensitive period.

Professor Knol explored the interactions between the microbiome and the immune system. He explained that the mucosal immune system played a crucial role in training the immune system and that communication between microbes and the host was essential for healthy development. He focused on the role of short-chain fatty acids, which were produced by gut microbes during the fermentation of sugars and had been linked to the development of allergies and the production of regulatory T cells. The discussion emphasised the complexity of the gut microbiome, including the colonisation, succession of species, and dynamic nature of gut physiology influenced by microbes. Professor Knol suggested that a healthy microbiome can produce specific metabolites important for human health, particularly in the context of degrading human milk oligosaccharides and maintaining gut health.

“From a microbiological perspective, we believe that bifidobacteria along with others, are a keystone species in establishing a healthy and stable microbiome.”

Impact of **C-Sections And Human Breast Milk On The Gut Microbiome**

Professor Knol provided detailed insight into the importance of the gut microbiome in infants and how it can be disrupted in C-section born infants. He explained that C-section infants acquire different microbes from the operating theatre environment instead of from their mothers, which can have negative effects on their immune system and increase the risk of immune-related disorders, such as asthma and inflammatory bowel disease. He also emphasised the benefits of human milk in guiding the process of gut colonisation in infants. Human milk contains a complex matrix of nutritional and bioactive compounds that promote the growth of beneficial bacteria and help establish a healthy gut microbiome.

Professor Knol presented and discussed the results of clinical studies comparing the effects of synbiotics on gut microbiome development in C-section born infants. Overall, the results showed that a combination of beneficial microbes (bifidobacteria) and their substrates (prebiotics) restored the colonisation of beneficial bacteria in C-section born infants and reduced the incidence of immune-related disorders, such as atopic dermatitis.

In another study that examined the effects of synbiotics in infants with cow's milk allergy who were given an amino-acid formula, synbiotics increased the levels of bifidobacteria and suppressed other types of bacteria normally suppressed by breast milk. The effects of synbiotics were also found to persist even after the intervention period and were associated with lower rates of infections and infestations, as well as reduced use of antibiotics. The use of synbiotics may, therefore, be a beneficial strategy to support the gut health and overall health of infants with cow's milk allergy.

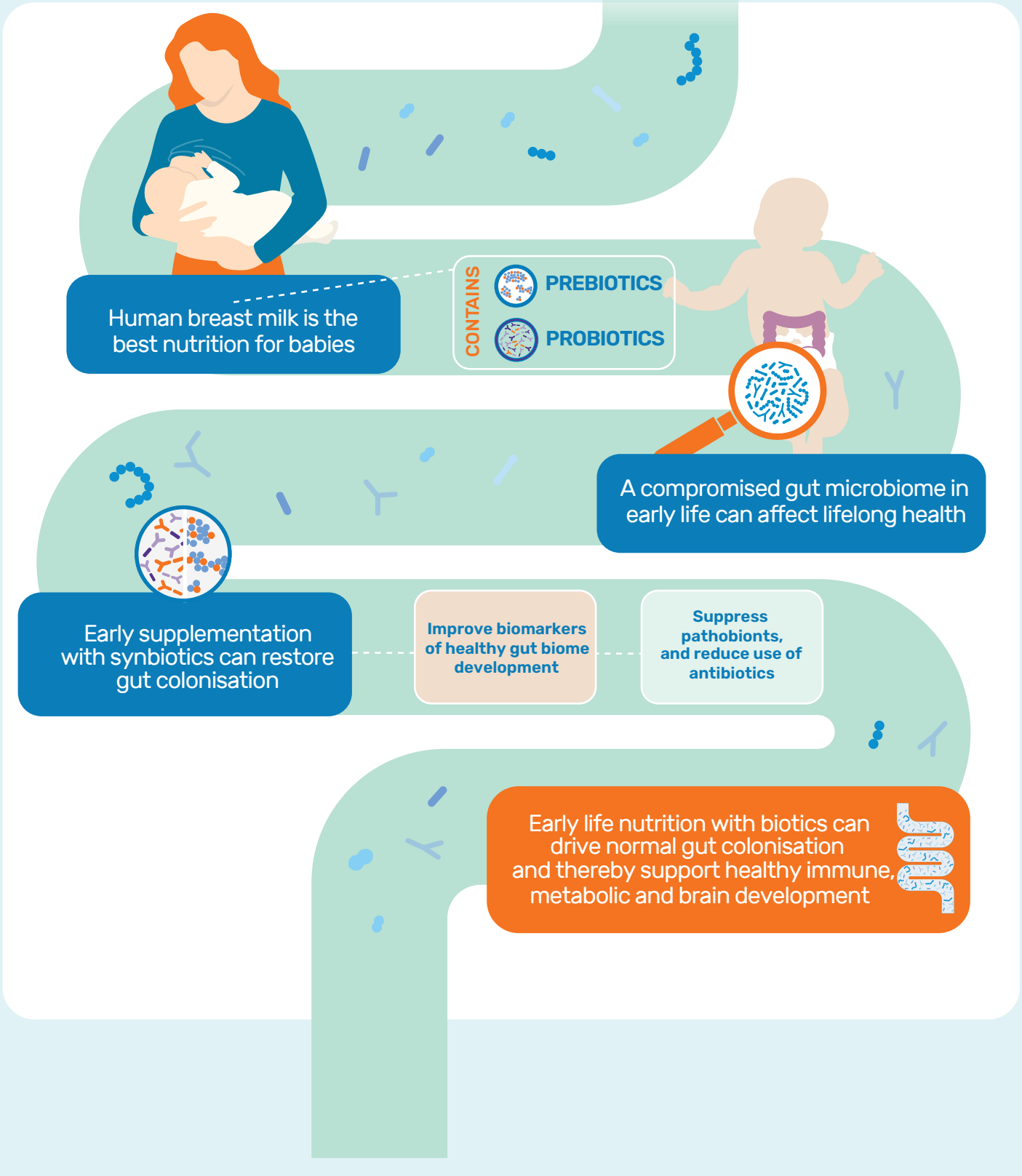
"When you establish your microbiome, it's a kind of microbiome programming that persists for life."

Professor Knol explained how creating a healthy gut lumen environment involves optimising both the composition and functionality of the microbiome.

This includes promoting the production of shortchain fatty acids, lowering pH levels, and removing oxygen from the gut system. These factors create an environment that is beneficial for the growth of healthy bacteria while preventing the colonisation of harmful bacteria which do not thrive in this kind of environment. By optimising the gut microbiome in this way, the growth and development of beneficial bacteria that are typically found in healthy breastfed infants can be supported.

Overall, Professor Knol emphasised the importance of human milk in supporting the gut microbiome and its role in lifelong health. He concluded his presentation by expressing his gratitude to the individuals involved in the studies for their contribution to understanding the biology and potential benefits of these concepts.

Key **Messages**



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