At Nutricia we have 40 years of experience in human milk research. Our dedicated research team continues to unravel the benefits of breastfeeding and the complex composition of human milk with state of the art analytical equipment and knowhow. We work in partnership with multiple research organizations over the world.

AT NUTRICIA WE ARE PIONEERS IN HUMAN MILK RESEARCH

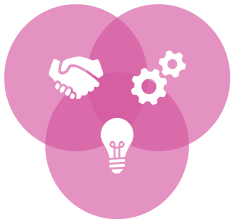
40 YEARS OF EXPERIENCE IN HUMAN MILK RESEARCH

Since our first publication after more than 1 year study with our research labs involved in 1977 [1], the Human Milk Research Team has published numerous papers on fields including analytical methods, human milk oligosaccharides (HMOS), proteins, lipids, beneficial bacteria and general breastfeeding knowledge.

With 40 years of experience, Nutricia Research strives to further investigate the benefits of breastfeeding to be able to support mums and infants with innovative nutrition and services in the first 1000 days. We aim for a better understanding of how maternal factors, social and psychological factors may influence human milk composition and breastfeeding behaviour and impact the health of the breastfed infant now and in later life.

We actively study the composition of human milk with its full spectrum of macro-, micro-nutrients and beneficial bacteria. We have a broad understanding of pre-, pro- and symbiotics and look at absorption and digestion of these compounds in early life. In addition, we study the role of gut microbiota in stimulating the immune system and gastrointestinal system. In the future, we will continue our journey to unravel the complexity of human milk and the benefits of human milk and breastfeeding.

CONNECTED TO EXTERNAL PARTNERS



At Nutricia Research, we collaborate with multiple national and partners and stakeholders, including universities, NGOs and institutions in the field of human milk and breastfeeding research. We have extensive partnerships with scientists all over the world, such as universities, research institutes and clinics to move on in the area of developing the knowhow, developing new tools and insights to better understand the complex interplay between a breastfeeding mum and her developing infant.

KEY ANALYTICAL EXPERTISE AND EQUIPMENT

The Human Milk Research team within Nutricia Research has multiple experts in the area of immunity, microbiology, metabolism, digestion & absorption, analytics, psychology and many other functions. We use an internal integrative approach to ensure our current pioneering role into this area.

We apply the advanced technological and analytical methods in our laboratories. We make use of state of the art equipment, including advanced high end liquid chromatography, mass-spectrometry (proteomics, glycomics, lipidomics), immunological and microbiological methods. Our set of analytical capabilities together in depth understanding of digestion and absorption with systems biology and

complex data management internally and together with external partners allows us to progress in understanding the complexity of human milk and breastfeeding benefits.

Dr. Bernd Stahl
Director Human Milk Research

As Director of the Human Milk Research team at Nutricia Research, Dr. Bernd Stahl is leading a multidisciplinary team of experts working in Europe and Asia. He has a strong background of more than 20 years in human milk and breastfeeding research with a significant contribution to research on and implementation of the specific prebiotic principle for early life nutrition. Dr. Stahl is author and co-author of more than 100 scientific publications, reviews and book chapters and (co) inventor of more than 30 patents. Currently, his work is focused on scientific understanding of factors influencing and being influenced by breastfeeding and human milk beyond just nutrition. Dr. Stahl is member of various scientific societies in the area of analytics, nutrition, prebiotics and especially on human milk and lactation.

HUMAN MILK RESEARCH SCIENTIFIC DISCOVERIES AND INNOVATIONS

2017+

Education and Support
Via healthcare professionals, we provide knowhow on the composition of human milk and related benefits breastfeeding. We are convinced that this expertise can be helpful to educate mothers on the complexity of human milk and support their breastfeeding behaviour and understanding of feeding cues.

2016

Proteins
We discovered around 600 new proteins, making it up to more than 3500 different proteins in human milk. Herewith, we extended significantly the knowledge regarding the human milk protein composition [5].

2003

Bacteria *Microbiota development*
We discovered in 2003 [2] beneficial bacteria such as lactobacilli and bifidobacteria in human milk. Human milk is delivering living beneficial bacteria to the baby to ensure a safe start of its journey through life and to have the best microbial imprinting and gut ecosystem. Specific bacteria such as lactobacili and bifidobacteria either alone or together with specific Prebiotics (i.e. symbiotics) are beneficial for lactating mums and infants in the first 1000 days.

1994

Prebiotics *Gut, Immunity*
Using high end analytical tools, we were the first to describe the complex spectrum of genetic determined human milk oligosaccharides (HMOS) including newly detected long chain HMOS in 1994 [3]. Inspired by the beneficial effects of HMOS on the gut and immunity, we developed a unique mixture of prebiotic oligosaccharides. This unique mixture of prebiotics scGOS/lcFOS (9:1) was introduced to our products in the 2000s.

1983

Fat/Lipid *Lipid form*
We started to analyse the lipids of human milk and specific long-chain-poly-unsaturated-fatty-acids (LCPUFAs), which are essential for brain and immune functions. In 1983, we found that LCPUFAs are specifically distributed in form of polar and non-polar lipids, which are part of the very complex three-dimensional architecture of milk fat globules [4]. We could prove that the lipid form is important for the functional benefits of LCPUFAs. After these discoveries, Nutricia was known as a pioneer in this area and introduced LCPUFAs into infant and even maternal nutrition started in the early 1990s.

1977

Protein *Preterm*
In 1977, we were the first to implement scientific know-ledge to improve the casein-whey ratio in our products according to the findings of human milk composition [1]. These adapted formulas were at an early stage also proven to be suitable for preterm infants. In the late 2000s we could further adapt the protein quality as using postprandial amino acid profiles of breastfed infants as our reference.

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