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Press release
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Probiotics and breast milk promote newborn health
Effective prevention of life-threatening NEC

Graz, 28 March 2023: Nearly eleven percent of all newborns worldwide are born too early—before the 37th week of pregnancy. If preterm infants have a particularly low birth weight of less than 1,500 grams, they are extremely susceptible to acute and long-term health complications. One particular threat is the development of necrotizing enterocolitis (NEC). Affecting seven to eleven percent of preterm infants whose birth weight is less than 1,500 grams, this disease is associated with a death rate of 30 percent. Med Uni Graz researchers and their colleagues at TU München and the Quadram Institute (United Kingdom) have published research findings in the high-impact journal *Nature Communications* that indicate how preventive measures can keep the NEC rate below three percent. Breast milk and *Bifidobacterium* are essential.

Prevention programs significantly lower the NEC rate in preterm infants

Premature babies with a very low birth weight (VLBW) have several challenges to surmount at the start of their lives. NEC is one of these health threats. "Given the rapid onset of NEC, several neonatal intensive care units (NICUs) have developed special NEC prevention programs that include the use of probiotics, enteral antibiotics and individual feeding protocols, which has recently resulted in a significant decline in NEC rates in preterm infants," reports Bernhard Resch of the Medical University of Graz, a member of the study team. Neonatal units in southern Austria have implemented different combinations of these preventive measures with great success, which has led to an extraordinarily low average NEC rate of 2.9 percent in VLBW infants.

Probiotics promote the early maturation of the digestive tract

The goal of these prevention programs is to promote the gut microbiome of preterm infants early on. In their recently published paper, the scientists investigated the mechanisms behind the different therapeutic options at the level of the gut microbiome and metabolome. A total of 55 VLBW infants were included in the study at three centers in close proximity (University Hospital Graz, Klinikum Klagenfurt and LKH Hochsteiermark State Hospital in Leoben). The following NEC preventive measures are applied at the three centers: antibiotic treatment, antifungal treatment, use of probiotics (either *Lactobacillus rhamnosus*, a combination of *Bifidobacterium longum* subsp. *infantis* and *Lactobacillus acidophilus*, or no probiotics) and breastfeeding or preterm infant formula.

"Using a multiomics approach, we examined the composition and function of the microbiome and its metabolites in the first weeks of life in order to understand the interactions between dietary components, antibiotics and probiotics," explains Christine Moissl-Eichinger, Med Uni Graz. The scientists were able to show that therapies that administer the probiotic *Bifidobacterium longum* subsp. *infantis* substantially influence the development of the microbiome early on. This is due to its ability to metabolize the milk oligosaccharides contained in breast milk that cannot be broken down by the body's enzymes. Early maturation of the digestive tract is associated with this function. The probiotic *Lactobacillus rhamnosus* also had a positive yet clearly lesser influence.

Combination of breast milk and Bifidobacterium as a game changer

The positive effects of administering *Bifidobacterium longum* subsp. *infantis* are only obtained if infants receive natural breast milk at the same time. "We show that preventive measures have the greatest impact on the development and maturation of the gastrointestinal microbiome and permit the establishment of a microbial ecosystem that reduces pathogenic threats in at-risk preterm infants," concludes first author Charlotte Neumann.

"We hope that our findings will lead to widespread application of these measures so that we can help extremely at-risk babies ward off these deadly infections while guaranteeing that they get off to the best possible start in life," says Lindsay Hall of Quadram Institute, University of East Anglia and TU München.

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To the publication

Clinical NEC prevention practices drive different microbiome profiles and functional responses in the preterm intestine

<https://www.nature.com/articles/s41467-023-36825-1>