

# Press release

## **GNUBiotics Sciences introduces next generation HMOs composed of up to 130 diverse microbiota accessible carbohydrates (MACs) structures**

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Gnubiotics Sciences is a Swiss-based biotech developing next generation human milk oligosaccharides (HMOs), composed of up to 130 different microbiota-accessible carbohydrates (MACs) for the global infant formula market. At the 51<sup>st</sup> annual conference of the European Society of Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN), Gnubiotics presented the first structural and functional data about their product, the naturally-occurring MACs. These MACs, of superior diversity relative to the recently launched synthetic HMOs, 2-fucosyllactose (2FL) and lacto-N-neotetraose (LNnT), can be selectively utilized by specific bacteria present in the infant's microbiome. The Gnubiotics' team also presented their state-of-the-art analytical capabilities by showing at the strain level, changes to the infant's *Bifidobacterial* composition as well as a high-resolution profiling of *Bacteroides* species and strains in caesarean and vaginally born infants.

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Among bioactive components of human milk, HMOs and conjugated glycans have attracted recent attention. A majority of infant formula producers present at the ESPGHAN conference in Geneva either highlighted HMOs at their booth or presented HMOs related research in talks or on posters. It is a fascinating area of research which recently led to new product launches in different countries globally.

HMOs are synthesized in the mammary glands and have important biological functions including a prebiotic, immune and anti-infectious function. The diversity of HMOs is of the utmost importance for the development of a balanced and diversified microbiota. So far only two abundant HMOs, 2FL and LNnT, have been commercialized and studied in infants, whereas human milk contains hundreds of HMOs of which 162 are structurally characterized. The majority of HMOs and glycans are metabolized by the infant's gut microbiota.

For the first time, Gnubiotics presented the next generation HMOs: MAC formulations that are highly diverse, structural and functional HMO mimics. Gnubiotics produced formulations containing 130 different, 100% naturally-sourced, oligosaccharide structures as HMO mimics instead of just one or two synthetically made. As the biological function of HMOs depend not only on the structural diversity, but also on the specific amount, Gnubiotics MAC formulations also contain the HMO signature epitopes in similar amounts as the ones present in HMOs, such as the fucose blood group H and the 3- and 6-linked sialic acid. These fucose- and sialic acid containing epitopes are biologically highly important as they can act as a receptor analogue for pathogenic bacteria.

Functionally, the Gnubiotics MACs were shown to induce the growth of essential commensal bacteria present in the infant's gut like *Akkermansia muciniphila* and *Bacteroides thetaiotaomicron*. *Bacteroides* have been shown to be important for infant health. Absence of specific *Bacteroides* species, like *Bacteroides thetaiotaomicron*, is associated with gastrointestinal symptoms in infants, whereas *Akkermansia* type bacteria may have anti-inflammatory potential and enhance intestinal barrier function. Therefore, MACs may serve as selective agents, altering the composition of the infant's gut microbiota thereby potentially impacting health.

At ESPGHAN, Gnubiotics expertise was also in the spotlight. Gnubiotics presented two abstracts about their state-of-the-art analytical capabilities. Using a novel, high-resolution sequence method, they presented the first strain level analysis of Bifidobacteria in the infant's microbiome in the first 12 months of life and the high-resolution profiling of *Bacteroides* species and strains in caesarean and vaginally born infants. This new methodology permits for deeper look at specific strains of Bifidobacteria and *Bacteroides* in the infant's gut. Given the importance of these bacteria in human health, and their direct link with the HMOs, this could serve as an important tool for dissecting the dynamics of Bifidobacteria and *Bacteroides* in relation to infant nutrition and metabolism. This high-resolution tool will also be used to further evaluate the effects of the Gnubiotics MACs formulations that contain over 130 HMO structural mimics.

A current global challenge remains the ability to produce diverse HMOs at industrial quantities to enrich infant formula; Gnubiotics' innovative manufacturing approach may finally enable the broad availability of diverse HMOs to infants worldwide.

### **About Gnubiotics**

Gnubiotics Sciences is a biotech start-up founded in Switzerland to develop a PLATFORM to commercialize microbiota-accessible carbohydrate products for the functional nutrition and the therapeutics markets. These MAC formulations aim to reproduce the natural diversity and complexity of unique structures found in mothers' milk that may be beneficial in preventing infections and onset of diet induced obesity.

"GUT NATURALLY UNDERSTOOD" (GNU) became Gnubiotics raison-d'être with a goal to accelerate metabolic health in animals and humans. Building on exclusive rights from issued patents on the therapeutic use of specific Microbiota accessible carbohydrates (MACs), the company is developing a novel platform for microbiota modulation via natural mechanism of action with a rich pipeline in nutrition (Pet and Infant) and later for medical food solutions.

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