

WHITEPAPER

HUMAN MILK OLIGOSACCHARIDES - 2'-FL

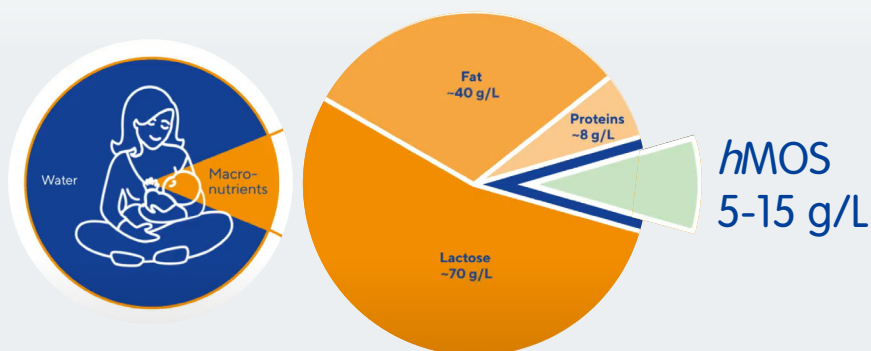


Figure 1 The composition of human milk including *h*MOS

Human milk oligosaccharides (*h*MOS) are complex carbohydrates, which are indigestible by infants. *h*MOS are the **third largest solid component** of human milk after lactose and fat (see figure 1) 1, 2. The levels of *h*MOS vary between women, stage of lactation and geography, but in mature human milk *h*MOS levels vary from 5 to 15 g/L 3-5. Around 160 different oligosaccharide structures have been characterized in detail in human milk.

2'-FL

Of these 160 different *h*MOS, 2'-fucosyllactose (2'-FL) is the most abundant oligosaccharide found in human milk (see figure 2). 65-98% of women produce 2'-FL in their breast milk and are called 'secretor mothers' 7. 2'-FL comprises nearly 30% of all *h*MOS 6 and is a fucosylated neutral trisaccharide composed of a L-fucose, D-galactose and D-glucose unit (see figure 3). Moreover, 2'-FL is the most thoroughly studied *h*MOS, although more studies are still very warranted.

To offer formula-fed infants the benefits of *h*MOS, an infant formula should preferably contain one or more *h*MOS. For this reason, nowadays more infant formulas are supplemented with *h*MOS. However, infant formulas are still commonly supplemented with other prebiotics such as galacto-oligosaccharides (GOS) or fructo-oligosaccharides (FOS). These oligosaccharides have been proven in infant studies to promote the growth of bifidobacteria and lactobacilli, but are not *h*MOS because GOS and FOS are not found in human milk. GOS and FOS might hence miss some beneficial functions of *h*MOS 9.

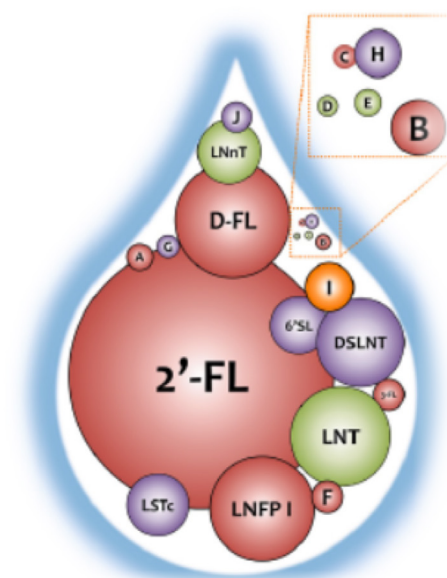


Figure 2 Schematic representation of human milk oligosaccharides (*h*MOS) in the human milk of secretor mothers. Secretor human milk contains large amounts of 2'-FL. The diameter of each circle depicts the level of *h*MOS. Figure adapted from Walsh et al. 2020 8

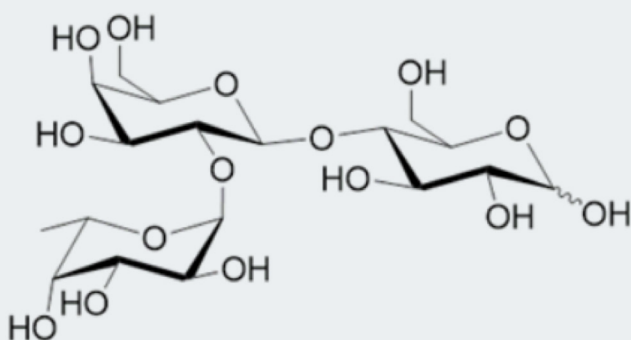


Figure 3 Structure of 2'-FL

The re-synthesis of the diversity of oligosaccharides in human milk is extremely difficult. Nowadays, the first *h*MOS as ingredient for infant formula are available and more will follow in the near future.

2'-FL recommended range (0.2g/L – 1.0g/L) is now available as infant formula ingredient and is proven to be safe and well-tolerated by infants when given in combination with GOS and/or FOS 10-12.

Preclinical research suggests that 2'-FL may have specific functional benefits (see figure 4):

- 2'-FL may support gut maturation and intestinal barrier function 13, by supporting the intestinal integrity 13, by stimulating the growth of beneficial bacteria 4, 14 and by preventing the adhesion of harmful pathogenic bacteria to the gut wall 15.
- 2'-FL has shown to modulate immune function by reducing the risk of infections, by the inhibition of inflammations, allergies, cytokine levels and asthma 11, 16-18.
- 2'-FL can support brain development and cognition 19-24.

To simulate the levels and diversity of oligosaccharides found in human milk, we recommend to combine the *h*MOS 2'-FL with GOS and/or FOS in infant formulas.

- With this combination, the formula simulates better the diversity of oligosaccharides in human milk.
- The different functionalities of GOS, FOS and 2'-FL are combined and offer infants both the health benefits of GOS, FOS and 2'-FL.

2'-FL can now be added to your infant formula

Ausnutria has 2'-FL *h*MOS as an ingredient available in the ingredient portfolio. We will **broaden** our portfolio with more *h*MOS in the near future.

Please be aware that 2'-FL is not approved worldwide yet. A regulatory check is therefore recommended.

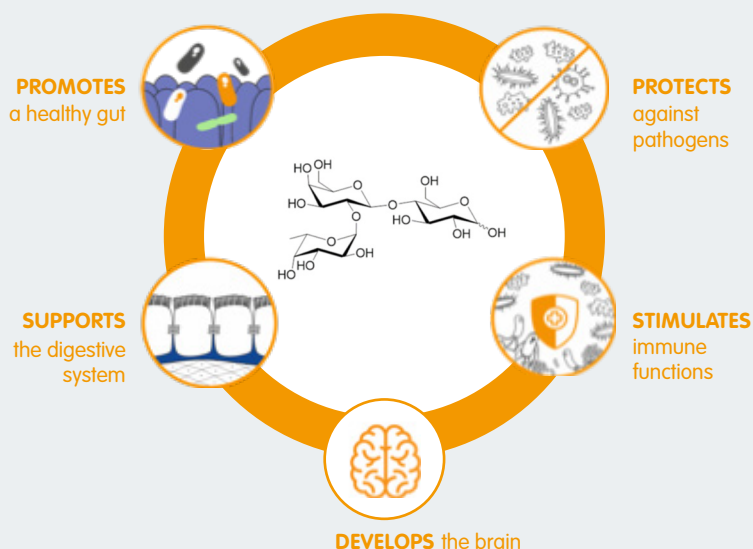


Figure 4 The potential health benefits of the *h*MOS 2'-FL

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