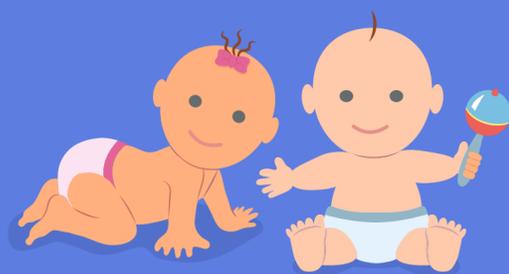
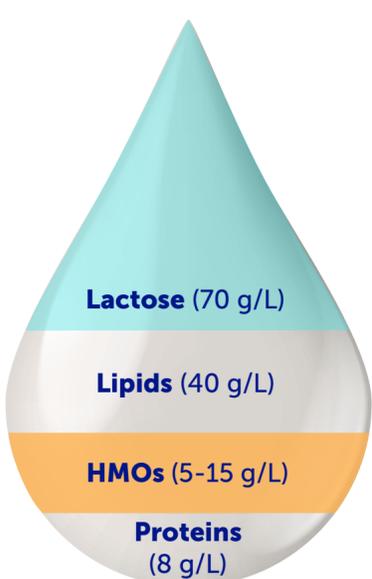


# HMOs and gut development: What is the current evidence?

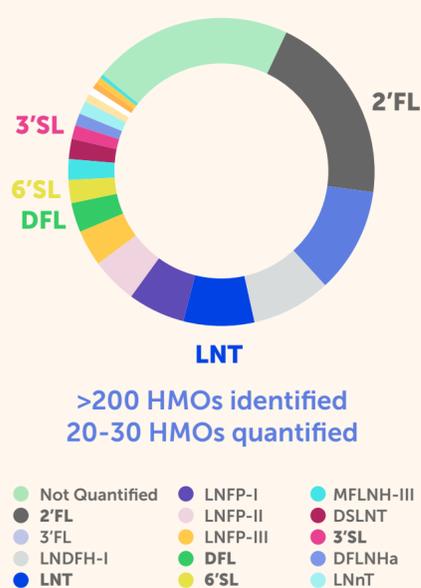


## What are human milk oligosaccharides (HMOs)?

**HMOs are the 3rd largest solid component in human milk<sup>1</sup>**



**HMOs are a group of diverse and structurally complex bioactive components, unique to human milk<sup>2-9</sup>**



**Based on their building blocks, HMOs can be classified into 3 main categories<sup>2-9</sup>**

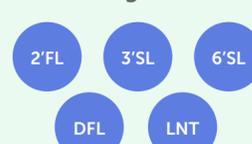


- **Non-fucosylated neutral (core) HMOs**
  - These HMOs are the foundations upon which other HMOs are built
  - LNT is the most abundant representative in this category
- **Fucosylated neutral HMOs**
  - 2'FL is the most abundant fucosylated HMO
  - DFL (LDFT) is among the 10 most abundant representatives in this group
- **Sialylated acidic HMOs**
  - 6'SL is the leading representative of this group
  - 3'SL is an important representative as well

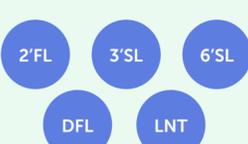
## HMOs promote gut development in early life, including gut microbiota, gut immunity and gut barrier function<sup>3,11-31</sup>

**The unique structure of each HMO contributes to its function, resulting in diverse roles supporting gut development<sup>4,10</sup>**

Support the growth of beneficial gut bacteria<sup>11-17</sup>

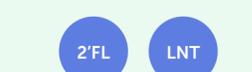


Inhibition of pathogen growth and adhesion<sup>12,13,18-24</sup>



**Healthy Gut Development**

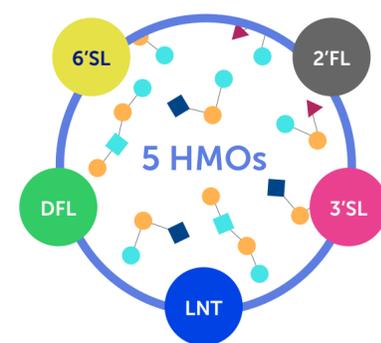
Strengthen gut barrier function<sup>30,31</sup>



Support intestinal immunity<sup>18,25-29</sup>



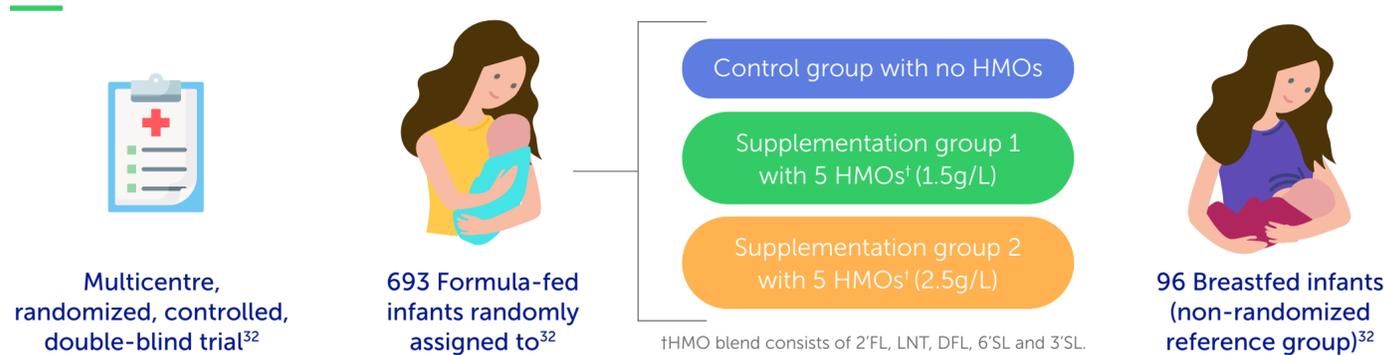
**With the advancement of technology and research activities, more HMOs are available for infant nutrition**



New study on supplementation with 5 HMOs shows they support gut development and growth in infants.<sup>32</sup>

\*Results from multiple pre-clinical or experimental studies investigating HMOs alone or in specific combinations

## What is the clinical evidence for supplementing a unique blend of 5 HMOs?



The infants were exclusively fed their assigned formula from age  $\leq$  21 days until age 4 months, or exclusively breastfed until age 4 months, at least.<sup>32</sup>

## What are the main results of 5 HMOs in improving gut development?

**At age 3 and 6 months, supplementation with the unique blend of 5 HMOs:<sup>32</sup>**

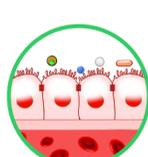
**Shapes gut microbiome closer to that of breastfed infants**



Promoted infant gut microbiome diversity (beta-diversity) closer to that of breastfed infants

Enhanced growth of beneficial bifidobacteria\*, preferentially *Bifidobacterium longum ssp. infantis*<sup>4†</sup> (the main HMO metabolising bifidobacteria)

**Supports a healthy gut barrier**



Lower levels of fecal alpha-1-antitrypsin (a marker of gut barrier function) in comparison with control group<sup>†</sup>

**Inhibits pathogen growth**



Reduced levels of pathogenic *Clostridioides difficile*\*, comparable to the breastfed group

**Promotes intestinal immune development**



Higher levels of secretory IgA in comparison with control group<sup>††</sup>

\*At age 3 months, statistical significant for group 1 vs control; at age 6 months statistical significance for both supplementation groups. †At age 3 months, statistical significant for both supplementation groups vs control. ††At age 6 months, group 1 reached statistical significance. ‡At age 6 months, group 2 reached statistical significance.

**Supplementation with 5 different HMOs has clinically shown to promote early gut development by supporting the intestinal immune system, a healthy gut barrier and shaping the gut microbiome closer to that of breastfed infants.**

DFL, difucosyllactose (also named as LDFT, lactodifucotetraose); DSLNT, disialyl-lacto-N-tetraose; FL, fucosyllactose; HMO, human milk oligosaccharide; Ig, immunoglobulin; LNDHF, lacto-N-difucosylhexaose; LNFP, lacto-N-fucopentaose; LNT, lacto-N-tetraose; LST, sialyl-lacto-N-tetraose; SL, sialyllactose.

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