

HMOs. Nature's Formula for Success.

Human Milk Oligosaccharides



A Significant Milestone:

Breast milk is considered the gold standard for infant development and nutrition.

Human Milk Oligosaccharides (HMOs), a key component of breast milk, help shape the gut microbiota of an infant and may support the immune system and cognitive development.

Kyowa Hakko's Human Milk Oligosaccharides (HMOs) Products

- 2'FL** 2'-Fucosyllactose
- 3'SL** 3'-Sialyllactose Sodium Salt
- 6'SL** 6'-Sialyllactose Sodium Salt

What Makes HMO Oligosaccharides Unique?



Natural

HMOs include >200 different substances and is the 3rd largest vital component in human breast milk.



Promising

Increasing scientific publications suggest multiple health benefits of HMOs for infants, children and adults.



Safe

Breastfeeding is as old as our species itself. HMOs have been naturally part of breast milk that is digested by gut bacteria.



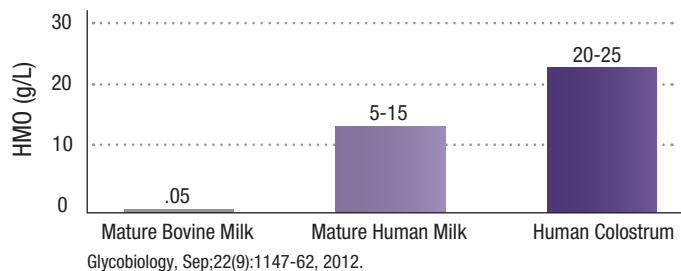
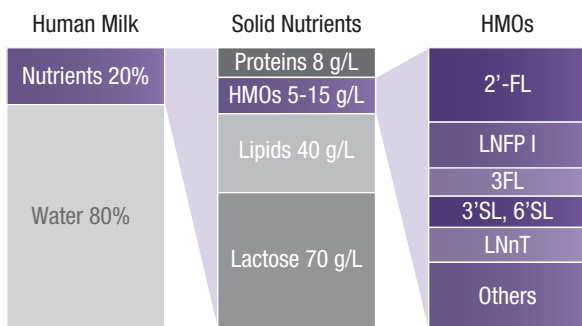
For more information on HMOs, including our anticipated product release and supporting science, please contact your regional office listed on the next page.

Human Milk Oligosaccharides (HMOs)

Unique Oligosaccharides

HMOs are a key component that distinguish human milk from other mammalian milk. HMOs are naturally found and form the third largest solid nutrient after lactose and lipids in breast milk. As a complex family of carbohydrates, the composition of HMOs is unique to our species.

Human Milk Composition



Neutral HMOs

■ **2'FL** is the most abundant neutral HMO.

What is Fucosyllactose? It is the most prevalent human milk oligosaccharide naturally present in human breast milk, making up about 30% of all of HMOs.



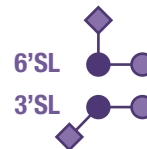
Acidic HMOs

Having sialic acid residues

■ **6'SL** is the most abundant acidic HMO.

■ **3'SL** is one of the top 5 acidic HMOs.

What is Sialic Acid? Sialic acids represent a family of 9-carbon sugars present in human cells. They are known as the building blocks of brain gangliosides.



Advancing the Science

Since their first identification in the 1930s, multiple health benefits of HMOs have been revealed by numerous studies. However, further research is ongoing as even more health benefits are expected to be found.



Gut Health

HMOs may help support the growth of beneficial bacteria and establishing healthy microbiota of infants.*^{1,2}



Immune Health

HMOs contribute to immune system support.*^{3,4,5,6}



Clinical research (including observational study)

In vitro study



Brain Health

HMOs potentially support cognitive development of infants.*^{7,8,9}



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