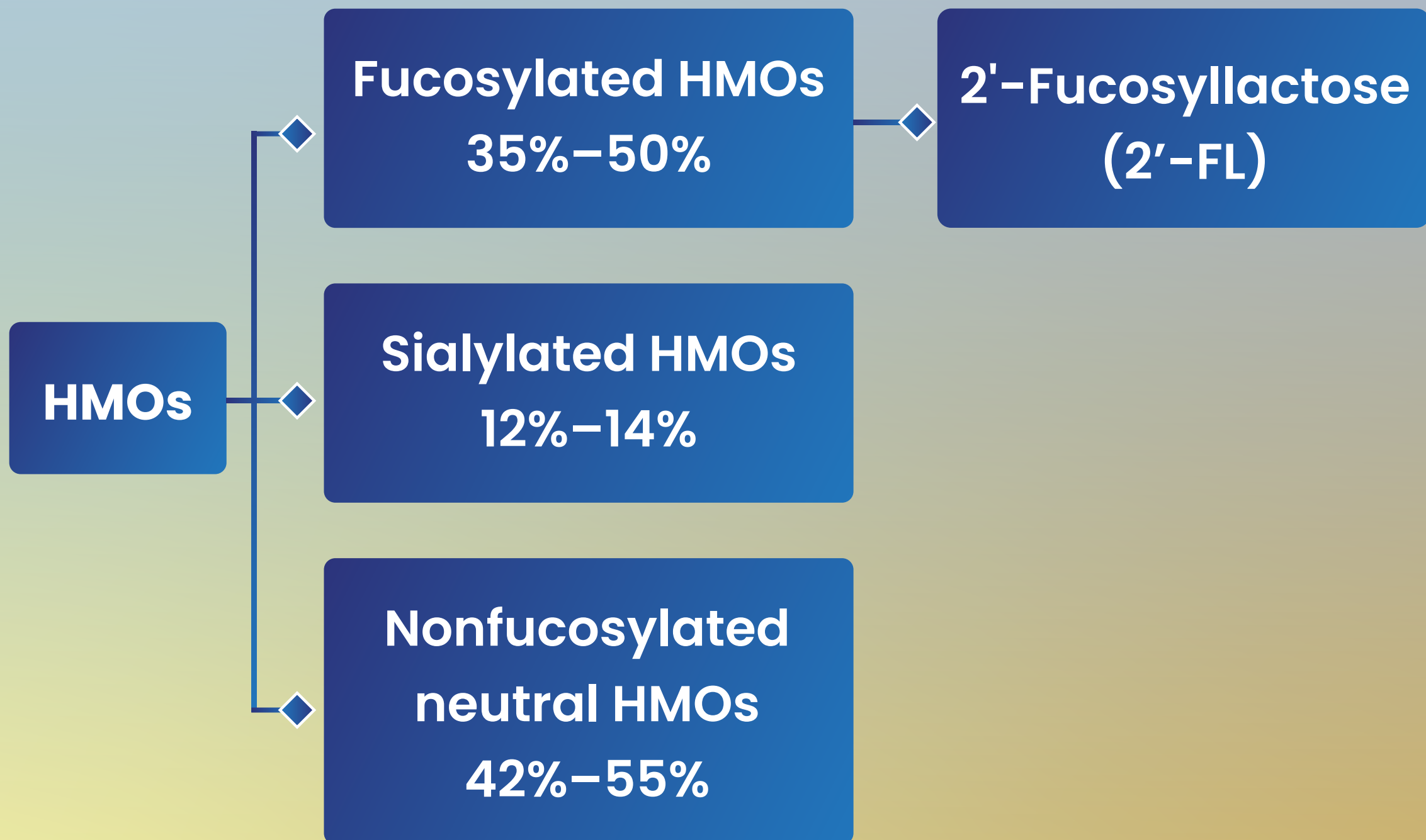




HMOs: Unique Constituent of Breastmilk

Human milk oligosaccharides (HMOs) are non-digestible carbohydrates present in breastmilk, that are metabolized by gut microbiota.¹

Types of HMOs:²





Health benefits of HMOs³

Modulation of intestinal microbiota

- ◆ Energy source for the beneficial intestinal bacteria
- ◆ Serve as a decoy receptor for the opportunistic pathogens in the mucosal surface

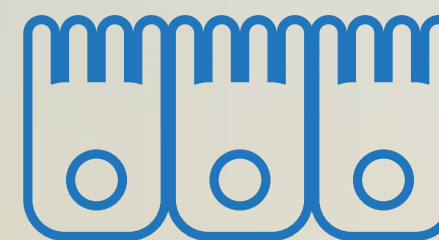


Anti-adhesive properties

- ◆ Strengthen the gut barrier function

Modulators of intestinal cell response

- ◆ Induce cell differentiation and apoptosis
- ◆ Increase the intestinal cell maturation



Immune modulators

- ◆ Modulate lymphocyte cytokine production and enable a more balanced helper T-cell response
- ◆ May act locally on the mucosa-associated lymphoid tissue or at a systemic level.



2'-FL: Nature's elixir

Most abundant HMO

Contributes to 30% of the total HMOs present in breastmilk



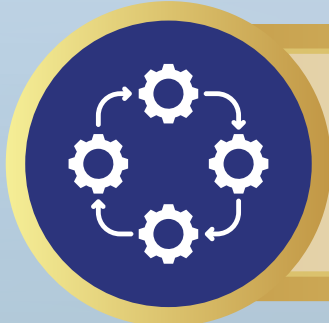
Approved by EFSA and FDA

- ◆ 2'-FL is approved by the USFDA as GRAS substance.
- ◆ Safe for infants at concentrations up to 1.2 g/L.

Abbreviations: EFSA: European Food Safety Authority; FDA: Food and Drug Administration; GRAS: Generally Recognized as Safe



Mechanism of action and benefits of 2'-FL



How does 2'-FL work?



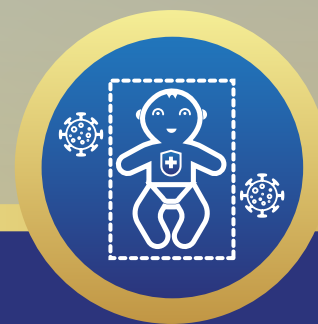
Acts as a substrate for beneficial bacteria and suppresses the growth of pathogens



Prevents adherence of microorganisms to the intestinal mucosa



Improves the integrity of tight junctions, strengthening the intestinal barrier against pathogens and toxins



Regulates immune responses



Mechanism of action and benefits of 2'-FL



What are the benefits?



Increases the proliferation of beneficial species in the gut



Improves stool consistency



Supports immunity and reduces use of medications





Clinical efficacy of 2'-FL²

Study	Design	Intervention	Outcomes
Marriage BJ et al., 2015	Prospective RCT	Feed with 2'-FL vs. Breastfed infants	<ul style="list-style-type: none">○ Growth and uptake of 2'-FL were similar in 2'-FL and breastfed infants.○ 29–83% lower concentrations of plasma inflammatory cytokines and TNF-α in test group.
Berger B, et al., 2016	Prospective RCT	Feed with 2'-FL vs. Control	<ul style="list-style-type: none">○ Stool consistency was similar in both groups.○ Anthropometric measurements were comparable between the two groups.
Puccio et al., 2017	Prospective RCT	Feed with 2'-FL vs. Control	<ul style="list-style-type: none">○ Safe and well-tolerated○ Supports age-appropriate growth○ Significantly softer stools○ Reduced incidence of bronchitis (-63%) and lower respiratory tract infections (-44%)○ Reduced use of antipyretics (-21%) and antibiotics (-33%).

Abbreviations: RCT: Randomized controlled trial; 2'-FL: 2'-fucosyllactose; GOS: Galacto-oligosaccharides; FOS: Fructo-oligosaccharides; LNnt: Lacto-N-neotetraose; TNF- α : Tumour necrosis factor alpha



Key takeaways³

- 📎 2'-FL constitutes 30% of total HMO content. It is well studied and regarded safe for infant nourishment at concentrations up to 1.2 g/L.
- 📎 HMOs support modulation of the gut microbiota, anti-adhesive action against pathogens, modulation of the intestinal epithelial cell response, and development of immune system.
- 📎 Several clinical studies have demonstrated that supplementing infant feed with 2'-FL is a promising approach that benefits infant health.

References:

1. Wiciński M et al., *Nutrients*. 2020;12(1):266.
2. Hegar B et al., *Pediatr Gastroenterol Hepatol Nutr*. 2019;22(4):330-340.
3. Vandenplas Y et al., *Nutrients*. 2018;10(9):1161.