What Are Human Milk Oligosaccharides?

A Healthcare Professional Backgrounder
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Human Milk Oligosaccharides (HMOs) are the 3rd most abundant solid component in human milk.\(^1\) These unique prebiotics, that resist digestion by human intestinal enzymes,\(^2\) support the developing immune system\(^3\) and are associated with reduced risk of gastrointestinal and respiratory illness.\(^4\)

HMOs and Immune Development

Aside from prebiotic effects, research has identified several potential modes of action for HMOs:

- Modulation of cytokine expression to decrease inflammation\(^5,6,7\)
- Modulation of signaling pathways involved in the innate immune system\(^5,6,8\)
- Modulation of gut epithelial cell differentiation and maturation\(^9,10\)

70% of immune cells reside in the digestive tract, and may interact directly with HMOs consumed by infants.\(^11\) About 1% of HMOs consumed are absorbed systemically into the body,\(^3\) opening up the possibility that they could have effects beyond the gut lumen.
2’-Fucosyllactose – a multifunctional prebiotic found in human milk

What is 2’-Fucosyllactose?

2’-fucosyllactose (2’-FL) is a trisaccharide consisting of glucose, galactose, and fucose. It is the most abundant HMO in a majority of mothers’ milk. Approximately 80% of women have the enzyme (FUT2) that enables them to make and secrete 2’-FL in their breast milk.

Preclinical Research of 2’-FL

In addition to prebiotic effects and inhibition of pathogenic bacteria, preclinical research has shown 2’-FL beneficially impacted synaptic plasticity, learning and memory, and gut motility. 2’-FL has been shown to block binding of several gut pathogens by acting as a receptor decoy and to reduce necrotizing enterocolitis. 2’-FL has also been shown to attenuate inflammation through modulation of CD14 expression in human enterocytes.

Clinical Research of 2’-FL

Commercially produced 2’-FL, which is structurally identical to 2’-FL in human milk, has now been evaluated in human clinical studies. Clinical studies have shown that infant formula containing 2’-FL is safe and well tolerated. 2’-FL in formula was absorbed and excreted similar to 2’-FL in human milk. In addition, in a clinical study, 2’-FL HMO was shown to lower levels of multiple inflammatory cytokines to be more like levels in breastfed infants.
References:


