The immune benefit of breastfeeding has been attributed in part to the diverse bioactive components in human milk

Human Milk Oligosaccharides Influence Neonatal Mucosal and Systemic Immunity

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Key insights

Human milk confers multiple layers of protection to the newborn by providing bioactive components that protect the infant from pathogenic infection, facilitate intestinal and immune development, and support healthy gut microbes. An important bioactive component of human milk are the human milk oligosaccharides (HMOs). HMOs are a complex mixture of indigestible carbohydrates with a high degree of structural diversity and represent one of the largest groups of bioactive components in human milk.

Current knowledge

HMOs are a family of soluble glycans that are sialylated or fucosylated and provide carbon sources for gut bacterial species that colonize breastfed infants. Through their actions on the gut, HMOs directly and indirectly affect the infant’s mucosal and systemic immunity. A large number of studies have shown that HMOs can influence the proliferation and maturation of intestinal cells (such as crypt cells and goblet cells). Furthermore, HMOs can also modulate gene expression in the intestinal epithelium. Altogether, these affect the function of the intestinal barrier, which in turn regulates local and systemic immunity.

Practical implications

Human milk contains a higher concentration and a greater structural diversity and degree of fucosylation compared to the milk oligosaccharides in other species, including cow’s milk from which many infant formulae are derived. Commercially produced HMOs are becoming increasingly available, and evidence suggests that supplementing infant formulae with HMOs is safe and beneficial for human infants. There are also potential applications of HMOs as prophylactic and therapeutic treatments for those who are immune compromised and at high risk of infection.

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