

Combining preclinical models with mother-infant cohort studies to unravel the benefits of human milk oligosaccharides

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Human milk oligosaccharides (HMO) are a family of structurally diverse unconjugated glycans that are highly abundant in and unique to human milk. The HMO concentration in human milk often exceeds the concentration of all human milk proteins combined. In sharp contrast, today's infant formula does not contain HMO. Originally, HMO were discovered as a prebiotic "bifidus factor" that serves as a metabolic substrate for desired bacteria and shapes an intestinal microbiota composition with health benefits for the breast-fed neonate. Today, HMO are known to be more than just "food for bugs". An accumulating body of evidence suggests that HMO are antiadhesive antimicrobials that serve as soluble decoy receptors, prevent pathogen attachment to infant mucosal surfaces and lower the risk for viral, bacterial and protozoan parasite infections. HMO also directly impact bacterial growth in the infant's intestine and urinary tract, where they act as bacteriostatics and reduce the risk for infections. In addition, HMO may modulate epithelial and immune cell responses and reduce excessive mucosal leukocyte infiltration and activation. The first part of the presentation introduces HMO and provides an outline of their potential benefits for the breast-fed infant. The second part of the presentation highlights some of the work from our own lab that aims to decipher the role of specific HMO in preventing necrotizing enterocolitis as an example of how a combined approach of preclinical models and mother-infant cohort studies help unravel the benefits of HMO for the breast-fed infant.

References

Bode L (2012) Human Milk Oligosaccharides: Every baby Needs a Sugar Mama. *Glycobiology* 22: 1147-62

Lin AE, Autran CA, Espanola SD, Bode L, Nizet V (2014) Human Milk Oligosaccharides Protect Bladder Epithelial Cells Against Uropathogenic Escherichia coli Invasion and Cytotoxicity. *J Infect Dis.* 209(3):389-98

Jantscher-Krenn E, Zherebtsov M, Nissan C, Goth K, Guner YS, Naidu N, Choudhury BP, Grishin AV, Ford HR, Bode L (2011) The Human Milk Oligosaccharide Disialyllacto-N-tetraose prevents Necrotizing Enterocolitis in neonatal rats. *GUT.* 61(10):1417-25