"The impact of human milk oligosaccharides on the gut microbiome"

Over the past few decades, global incidence rates of Type 1 diabetes (T1D) have been rapidly increasing and is expected to double worldwide over the next decade. T1D onset is most common in childhood; however, there is an increasing trend for the development of T1D at earlier ages. Majority of T1D cases carry predisposed genetic risk factors. However, only 3-7% of genetically susceptible individuals develop T1D, highlighting the influence of environmental factors on T1D pathogenesis. Human milk consumption during infancy is a known dietary influence as studies have shown this has a protective role against T1D development. Human milk oligosaccharides (HMOs) are the third most abundant component in breastmilk and confer several beneficial functions to infant development. In breastfed infants, dominant species of gut microbes that can utilize HMOs have a growth advantage over those which are unable to. Recent findings from the Allen-Vercoe lab have shown various growth strategies used by a wide diversity of bacteria isolated from infant fecal samples in presence of pooled HMOs (pHMOs). Several strains experienced (pHMO)-induced growth inhibition, demonstrating a novel and seemingly specific antimicrobial property of HMOs. Because breastmilk plays a protective role in the gut microbiome and with the antimicrobial properties of HMOs, it is important to understand the selectivity of HMOs in regards to promoting and inhibiting specific gut microbial species. I propose to study the range of pHMO-induced growth inhibition across various genera and species of gut microbial strains and determine the nature of the pHMO-inhibition.