Oral supplementation of healthy adults with 2'-O-fucosyllactose and lacto-N-neotetraose is well tolerated and shifts the intestinal microbiota

The gut microbiota has been established as an important player influencing many aspects of human physiology. Breast milk, the first diet for an infant, contains human milk oligosaccharides (HMO) that shape the infant’s gut microbiota by selectively stimulating the growth of specific bacteria, especially bifidobacteria. In addition to their bifidogenic activity, the ability of HMO to modulate immune function and the gut barrier makes them prime candidates to restore a beneficial microbiota in dysbiotic adults and provide health benefits. We conducted a parallel, double-blind, randomised, placebo-controlled, HMO-supplementation study in 100 healthy, adult volunteers, consuming chemically produced 2'-O-fucosyllactose (2'FL) and/or lacto-N-neotetraose (LNnT) at various daily doses and mixes or placebo for 2 weeks. All participants completed the study without premature discontinuation. Supplementation of 2'FL and LNnT at daily doses up to 20 g was shown to be safe and well tolerated, as assessed using the gastrointestinal symptoms rating scale. 16S rRNA sequencing analysis showed that HMO supplementation specifically modified the adult gut microbiota with the primary impact being substantial increases in relative abundance of Actinobacteria and Bifidobacterium in particular and a reduction in relative abundance of Firmicutes and Proteobacteria. This study provides the first set of data on safety, tolerance and impact of HMO on the adult gut microbiota. Collectively, the results from this study show that supplementing the diet with HMO is a valuable strategy to shape the human gut microbiota and specifically promote the growth of beneficial bifidobacteria.

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