

Species specific milk glycosignature

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Introduction:

Glycans are key components on cell surfaces and involved in most physiological and pathological processes including cell-cell interaction, antibody receptor binding. Therefore, glycosylation pattern influence inflammation, cancer, autoimmune diseases and infections. Codified in the glycans structure, each nutrient contains a glycosignature depending on the source of the dietary proteins. As glycan introduced by diet were suggested to influence human health based on potential differences with human pattern, we aimed to determine the glycan composition of milk from different sources.

Method

N-glycans are characterized by MALDI mass spectrometry in positive mode after derivatization and purification. Sialic acids in the antenary position of the glycoalyx were characterized by HPLC.

Results

The N-glycan structure and the amount of sialic acids detected in human breast milk was compared with infant formula as well as cow, goat and sheep milk. We observed substantial variations in N-glycome depending on the source of the milk samples. The difference between milk from human and non-human source including infant formula was confirm by concentration determination of total and specific sialic acid content. Non-human sialic acid (N-glycolyl neuraminic acid) concentrations were lowest in human breast milk (5 mg/L) compared to infant formula (7 mg/L) and cow's milk (9 mg/L). For goat and sheep milk higher levels of Neu5Gc that Neu 5Ac was detected.

Conclusion

Our result clearly confirm species specific glycan pattern reflected by a distinct N-glycome of different milk samples. As the dietary glycan composition influences human health, immuninutritional effects should be taken into consideration.