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Influence of bioactive compounds of milk on intestinal cell cultures

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Introduction: Milk- and galacto-oligosaccharides (MOS/GOS) are natural compounds in mammalian milk. It is quite known that MOS/GOS have bio-functional properties like prebiotic, immune modulating, bifidogenic and anti-inflammatory effects, but the mechanism is unknown. The aim of this study was to analyse the effects of MOS/GOS on the lipid- and metabolome of intestinal cells. In addition, specific metabolic patterns and corresponding pathways should be identified. Material and Methods: The experimental protocol was a cell treatment for 24 h with different compositions of MOS or GOS. The cell-cultivation followed a harvest by physical force and acidified water, cell disruption with ultrasonic on ice and finally a SIMPLEX extraction. SIMPLEX allows the simultaneous extraction of metabolites, proteins and lipids. The samples were analysed by shotgun ESI-FT-ICR-MS. Data validation was conducted by the quality control (QC) approach (Demetrowitsch et al., 2015) and were evaluated by non-targeted (supervised and non-supervised) and targeted approaches. Results: First results from the non-supervised approach provides a correlation between treatment and cell metabolome. The PCA-models showed tight clusters for each treatment. Significant regulations were found e.g. for the compounds 543.1334 [M+K] with the calculated formula C₁₉H₂₈N₄O₁₂ and 279.0391 [M+Na] with the calculated formula C₁₁H₁₂O₅P. The targeted lipidomics approach showed significant effects between the treatments. Highly significant changes were analysed for e.g. phosphatidylinositol (42:3), phosphatidylcholine (22:4) and phosphoglyceride (28:5).