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Stéphanie Lambert Porcheron, Lemlih × Ouchchane, Hubert Vidal, Corinne
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Impact of milk polar lipid supplementation on postprandial bile acid composition

Le Barz M^{a,#}, Vors C^{a,b,#}, Humbert L^c, Gaudiard E^c, Gaborit P^d, Lambert-Porcheron S^b, Ouchchane L^e, Vidal H^a, Malpuech-Brugère C^f, Rainteau D^c, Michalski M-C^{a,b,*}

^aCarMeN laboratory, INRAE, UMR1397, INSERM, U1060, INSA-Lyon, Université Claude Bernard Lyon 1, Pierre-Bénite, 69310, France

^bCRNH Rhône-Alpes, CarMeN Laboratory, Université Claude Bernard Lyon 1, Hospices Civils de Lyon, CENS, FCRIN/FORCE Network, Pierre-Bénite, 69310, France

^cSorbonne Universités, UPMC Univ. Paris 6, ENS, PSL Research University, CNRS, INSERM, AHP, Laboratory of BioMolecules (LBM), Paris, 75005, France

^dACTALIA Dairy Products and Technologies & ENILIA ENSMIC, Avenue François Mitterrand, BP49, Rue des Babigeots, Surgères, 17700, France

^eUniversité Clermont Auvergne & CHU Clermont-Ferrand, Unité de Biostatistique-Informatique Médicale, CNRS, 34 Avenue Carnot, Clermont-Ferrand, 63000, France

^fUniversité Clermont Auvergne, INRAE, UNH, Unité de Nutrition Humaine, CRNH Auvergne, 34 Avenue Carnot, Clermont-Ferrand, 63000, France

#As co-first authors

*marie-caroline.michalski@inrae.fr

Bile acids (BA) are the end products of cholesterol catabolism and may act as signalling molecules and metabolic regulators of energy homeostasis. Disorders in BA metabolism can lead to liver and cardiovascular diseases. In a 4-week double-blind RCT, we demonstrated that the daily consumption of a cream cheese enriched with 3 or 5g of milk polar lipids (PL) improved lipid metabolism by reducing hypercholesterolemia in overweight postmenopausal women. Postprandial (pp) metabolic explorations (0-480 min) were performed before and after the intervention, including a standardized high fat-high sucrose breakfast at fasting and a standardized lunch containing the test cream cheese at 240min. We aimed to determine the effect of milk PL on circulating BA in the fasting and pp state. Before intervention, serum concentration of total fasting BA in the 3 groups was within physiological concentrations (<8µM). The milk PL intervention slightly increased total fasting BA concentrations (Δ After-Before) ($P_{PL}=0.03$), with no significant effect on BA species profile (% of total BA). Total BA concentration was not impacted during the pp period, but the primary/secondary BA ratio was significantly decreased in both milk PL groups *versus* control ($P_{group}<0.001$, $P_{PL}<0.001$). Milk PL decreased the relative abundance of primary BA ($P_{PL}=0.02$), increased Tauro-conjugated BA ($P_{group}=0.02$) and highly decreased Glyco-conjugated BA ($P_{group}<0.001$). Proportions of GCA (glycocholic acid), GCDCA (glycochenodeoxycholic acid) and GLCA (glycolithocholic acid) were also decreased during the pp period. The latter is derived from the LCA (lithocholic acid) whose accumulation is toxic. In conclusion, the 4-week milk PL supplementation did not alter the overall circulating levels of BA in neither the fasting nor the pp state, but impacted the BA profile by decreasing some of deleterious species. Such results provide new insights in the knowledge of BA metabolism, and a potential link with the cholesterol-lowering effects of milk PL deserves to be investigated.