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Branched chain fatty acids concentrate prepared from butter oil via urea adduction

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Saturated branched chain fatty acids (BCFA) intake in the US is greater than that of other bioactive fatty acids (FA), yet little information is available on methodologies to concentrate them. We report here the effect of urea-to-FA (urea:FA) ratio, adduction time, and temperature on the enrichment of branched chain fatty acids (BCFA) from butter oil. Urea adducts precipitate both saturated and monounsaturated hydrocarbon chains as urea complexes, leaving solubilized polyunsaturated FA and BCFA in the non-urea adduct fraction (NUA). The optimum urea:FA ratio was found to be 4:1 and the optimum temperature to be 4°C. Adduction time had negligible effect on BCFA enrichment. Anteiso-15:0 was most enriched across major BCFA under all conditions of temperature, time, and urea:FA ratio studied. In our preferred embodiment, a two-stage urea adduction procedure applied to hydrolyzed butter oil resulted in an enrichment from <2% BCFA in the starting oil to >11% BCFA, indicating an enrichment factor of >6. The best method has a first stage performed at 4°C and urea:FA ratio of 4:1, and a second stage at 30°C and lower urea:FA ratio (2:1). Overall yield of BCFA in enriched fraction was about 10% of starting BCFA for two stages.

Practical applications: BCFA are constituents of the GI tract of healthy newborns and are known to prevent necrotizing enterocolitis. The average per capita BCFA intake of Americans is estimated to be about 220 mg/day from dairy whereas based on the current dietary recommendations of USDA it should be about 400 mg/day from dairy alone with total amounting to 575 mg/day including beef. Using the results of the current study, enriched BCFA concentrates can be prepared to meet the demand.

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Association between the lipid levels and single nucleotide polymorphisms of *ABCA1, APOE* and *HMGCR* genes in subjects with spontaneous preterm delivery

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Spontaneous preterm delivery (SPTD) with gestational age between 28 and 37 complete weeks was reported to have a genetic predisposition in lipids metabolism. This study aimed to investigate the association between the lipid levels and gene polymorphisms of *ABCA1* (rs2422493), *APOE* (rs7412) and *HMGCR* (rs12916) in Chinese pregnant women with SPTD. A case-control study was conducted at the baseline randomization in 200 SPTD and 178 healthy full term delivery (FTD) women. Maternal blood lipids were detected close to delivery of fetus in SPTD group and in FTD group with gestational age-matched. Cord blood lipids were detected after delivery in two groups. Three genotypes both in maternal and cord blood were determined by real time PCR. The results showed that the levels of total cholesterol (TCHO), triglyceride (TG), high density lipoprotein (HDL), and low-density lipoprotein cholesterol (LDL) in the maternal blood in the SPTD group were significantly lower than those in the FTD group, while the levels of TCHO, HDL, and LDL in the cord blood in the SPTD group were significantly higher than those in the FTD group. In the SPTD subjects, the levels of TG and LDL in the maternal blood were associated with different genotypes of *HMGCR* gene rs12916 loci. These results indicate that abnormal lipid metabolism may exist in SPTD women and the premature fetus and the *HMGCR* gene may be a susceptible gene for SPTD.

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