Abstract

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Vitamin A deficiency modifies lipid metabolism in rat liver.

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OBJECTIVE AND METHODS: Liver fatty acid metabolism of male rats fed on a vitamin A-deficient diet for 3 months from 21 d of age was evaluated.

RESULTS: Vitamin A restriction produced subclinical plasma and negligible liver retinol concentrations, compared with the control group receiving the same diet with 4000 IU vitamin A (8 mg retinol as retinyl palmitate)/kg diet. Vitamin A deficiency induced a hypolipidaemic effect by decreasing serum triacylglycerol, cholesterol and HDL-cholesterol levels. The decrease of liver total phospholipid was associated with low phosphatidylcholine synthesis observed by lower [14C]choline incorporation into phosphatidylcholine, compared with control. Also, liver fatty acid synthesis decreased, as was indicated by activity and mRNA expression of acetyl-CoA carboxylase (ACC), and incorporation of [14C]acetate into saponified lipids. A decrease of the PPARalpha mRNA expression was observed. Liver mitochondria of vitamin A-deficient rats showed a lower total phospholipid concentration coinciding with a decrease of the cardiolipin proportion, without changes in the other phospholipid fractions determined. The mitochondria fatty acid oxidation increased by 30 % of the control value and it was attributed to a high activity and mRNA expression of carnitine palmitoyltransferase-I (CPT-I). An increase in serum beta-hydroxybutyrate levels was observed in vitamin A-deficient rats.

CONCLUSION: Vitamin A deficiency alters the mitochondria lipid composition and also enhances fatty acid oxidation by modifying the production of malonyl-CoA, the endogenous inhibitor of CPT-I, due to decreased activity of liver ACC. The incorporation of vitamin A into the diet of vitamin A-deficient rats reverted all the changes observed.

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