Maternal supplementation with n-3 long chain polyunsaturated fatty acids during perinatal period alleviates the metabolic syndrome disturbances in adult hamster pups fed a high-fat diet after weaning

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Résumé en anglais	Perinatal nutrition is thought to affect the long-term risk of the adult to develop metabolic syndrome. We hypothesized that maternal supplementation with eicosapentaenoic acid and docosahexaenoic acid during pregnancy and lactation would protect offspring fed a high-fat diet from developing metabolic disturbances. Thus, two groups of female hamsters were fed a low-fat control diet, either alone (LC) or enriched with n-3 long chain polyunsaturated fatty acids (LC-PUFA) (LO), through the gestational and lactation periods. After weaning, male pups were randomized to separate groups that received either a control low-fat diet (LC) or a high-fat diet (HC) for 16 weeks. Four groups of pups were defined (LC-LC, LC-HC, LO-LC and LO-HC), based on the combinations of maternal and weaned diets. Maternal n-3 LC-PUFA supplementation was associated with reduced levels of basal plasma glucose, hepatic triglycerides secretion and postprandial lipemia in the LO-HC group compared to the LC-HC group. Respiratory parameters were not affected by maternal supplementation. In contrast, n-3 LC-PUFA supplementation significantly enhanced the activities of citrate synthase, isocitrate dehydrogenase and α-ketoglutarate dehydrogenase compared to the offspring of unsupplemented mothers. Sterol regulatory element binding protein-1c, diacylglycerol O-acyltransferase 2, fatty acid synthase, stearoyl CoA desaturase 1 and tumor necrosis factor α expression levels were not affected by n-3 LC-PUFA supplementation. These results provide evidence for a beneficial effect of n-3 LC-PUFA maternal supplementation in hamsters on the subsequent risk of metabolic syndrome. Underlying mechanisms may include improved lipid metabolism and activation of the mitochondrial oxidative pathway.
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