

Hepatic and very low-density lipoprotein fatty acids in obese offspring of overfed dams

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Abstract :

The combined effects of developmental programming and high-fat feeding at weaning on fatty acid metabolism of the offspring are not well known. In the present study, we aim at characterizing the influence of maternal and offspring's own diets on liver and very low-density lipoprotein (VLDL) lipids; fatty acid profiles of VLDL and liver phospholipids, triglycerides, and cholesteryl esters; and hepatic enzyme activities. Twenty obese male rats born to cafeteria diet-fed dams and 20 control rats born to control diet-fed dams were selected. At weaning, 10 rats of each group were fed control or cafeteria diet. Obese rats had a significant increase in serum glucose, insulin, leptin, VLDL apolipoprotein B100 and lipid levels, and hepatic fatty acid synthase and a reduction in acyl-coenzyme A oxidase and dehydrogenase activities compared with control pups at day 21 and day 90. Hepatic steatosis was apparent only at day 90. The proportions of saturated fatty acids and monounsaturated fatty acids and the oleic to stearic acid ratio were significantly increased, whereas polyunsaturated fatty acids and the arachidonic to linoleic acid ratio were decreased, in liver and VLDL lipids of obese pups compared with controls. The cafeteria diet at weaning induced more severe abnormalities in obese rats. In conclusion, maternal cafeteria diet induced a permanent reduction in hepatic β -oxidation and an increase in hepatic lipogenesis that caused liver steatosis and VLDL and fatty acid alterations in adult offspring. These preexisting alterations in offspring were worsened under a high-fat diet

from weaning to adulthood. Nutritional recommendations in obesity must then target maternal and postnatal nutrition, especially fatty acid composition.

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