

Olive and Corn-oil Enriched Diets and Mineral Content in the Brain during Liver Regeneration in Mice

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Monounsaturated oil (MUFA-diet) such as virgin olive oil and polyunsaturated oil (PUFA-diet) such as corn oil are suggested to have selective physiological effects on membrane in tissues. The best experimental model for the study of liver regeneration is a simple operation (partial hepatectomy, pHx) in which a part of the mice liver is removed. Zinc, calcium, magnesium and iron are essential oligoelements. They play important roles in various biological processes, including lipid metabolism. We have examined the influence of olive oil and corn oil enriched diets on zinc, calcium, magnesium and iron concentrations in brain in the early period of liver regeneration. The common procedures for mineral analysis of biological tissue is inductively coupled plasma-atomic emission spectrometry (ICP-AES). This technique requires total digestion of samples by using strong reactants. Sample preparation is the crucial first step in the analysis of this kind of samples. Three groups of C57Bl mice (5-8 animals per group) were fed, over 21 days, diets enriched with corn oil or olive oil (5% addition to standard pellet, w/w) or standard pellet diet. The animals were one-third partially hepatectomised under aether anaesthesia, sacrificed 6th, 12th, 24th, and 48th hours later, when the brains were carefully removed. Minerals were determined by ICP-AES, after microwave brain tissue digestion by HNO₃ and H₂O₂. Mineral content was estimated in the samples (30-50 mg), and the results are presented as a dynamics of Zn²⁺, Ca²⁺, Mg²⁺, and Fe²⁺ found in the brain, in comparison with the changes found in the regenerating liver in mice fed with standard food and with vegetable oil enriched diet. Compensatory liver growth causes changes in the mineral composition of brain. In mice fed standard food, Ca²⁺ accumulated in the brain, and the concentration of Fe²⁺ decreased in the early phase of liver regeneration. These changes were, however, significantly less expressed in mice fed with corn oil and olive oil enriched diets, suggesting that oleic acid (C18:1n-9) and linoleic acid (C18:2n-6) might interfere with some metal-dependent activities of brain.