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Summary of the doctoral thesis "Effect of dietary supplements with different content of fatty acids on hepatocyte morphology and markers of oxidative stress in selected mouse tissues"

Dietary supplements are concentrated foodstuffs that are a source of vitamins, minerals or fatty acids, marketed in the form of tablets, capsules, dragees, sachets with powder, ampoules with liquid or liquid, intended for consumption in small, measured unit quantities. Before making a decision to use supplements, it is important that it is preceded by an analysis of the nutritional status. Dietary supplements are used to supplement the deficiencies of nutrients, improve concentration, add vitality, improve metabolism, improve the appearance and condition of hair, nails, skin, as well as protect the body against the adverse effects of stress and environmental pollution. However, despite the many proven positive effects of dietary supplements, one cannot forget about the existing threats resulting from the possibility of overdosing these preparations, interactions between drugs and supplements, the impact on the results of diagnostic tests and contraindications in certain diseases.

This paper investigates the effect of fatty acids contained in dietary supplements on the oxidation-reduction balance in the liver and kidney of mice. The study was carried out on 120 male Swiss mice, aged 6 weeks, with an average body weight of 22.0±2g. The animals came from the breeding of the Institute of Genetics and Animal Biotechnology PAN in Jastrzębiec near Warsaw. At the age of 8 weeks, the animals were divided into 12 experimental groups [n=10], which were given per os 10µl and 50µl of Icelandic cod liver oil, evening primrose oil, olive oil, omega 3-6-9 and coconut oil for seven days.

Despite the beneficial effects of PUFA on the human body, in general, excess fat disturbs the oxidation-reduction balance, therefore determining the effect of excess fatty acid supplementation on the biochemical parameters of oxidative stress is very important. The aim of the study was to show that an excess of dietary supplements can affect the biochemical parameters of oxidative stress, and even in extreme cases cause a strong toxic effect. In order to verify the research hypotheses, the concentrations of glutathione, malondialdehyde, cholesterol and triacylglycerols as well as the activity of glutathione

peroxidase, glutathione reductase, glutathione transferase, superoxide dismutase and catalase in the liver and kidney of mice after per os supplementation with preparations containing fatty acids in volume were determined in the mouse liver and kidney. 10µl and 50µl. Structural changes in the liver of mice after supplementation with preparations containing fatty acids in a volume of 10µl and 50µl were also analyzed

As a result of the conducted research, an increase in the activity of superoxide dismutase, catalase and glutathione peroxidase was found after the supply of dietary supplements, which may indicate the effect of activating the antioxidant enzyme system of the body. An increase in the activity of glutathione transferase and a decrease in the concentration of glutathione were also shown, which may suggest that the products of exogenous fatty acid transformations formed in the body are also metabolized with the participation of GST. The decrease in the activity of glutathione reductase in the liver and kidney may result from the deficiency of the cofactor (NADPH) necessary for the catalysis of the reaction and used in the process of beta-oxidation of unsaturated fatty acids. The level of cholesterol and triacylglycerols decreased in the liver under the influence of supplementation with preparations containing EFAs. No such relationship was found in the case of consumption of coconut oil, the main component of which are saturated fatty acids. MDA concentrations in the examined organs decreased, i.e. the increased amount of supplements did not cause an increase in lipid peroxidation. The experimental data obtained showed interactions in changes in the activity of enzymes and the level of the tested metabolites depending on the type of the tested organ - liver and kidney, and on the dose of the 10µl and 50µl supplement used. With the observed changes in the tested parameters, it is difficult to determine which supplement is the "healthiest" dietary supplement for the body. The increase in the dose of supplements generally caused greater changes in the activity of the tested enzymes and the concentration of the tested metabolites. The revealed ultrastructural changes in the liver of experimental animals are an adaptive response of cells to the action of the studied factors. It can be suggested that the mouse organism has great adaptation potentials in relation to the impact of the fat dietary supplements used, and the type of this adaptation depends on the type of fatty acids consumed.

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