UDC 577.125

HEPATOPROTECTIVE EFFECTS OF Ω-3 POLYUNSATURATED FATTY ACIDS ON RATS WITH TRANSPLANTED GUERIN'S CARCINOMA

T. MELNYK, O. KETSA

Fedkovych Chernivtsy National University, Chernivtsi, Ukraine;
e-mail: tani4ka.melnik@ukr.net

Introduction. Aminotransaminases are expressed in several cellular compartments by malignant or nonmalignant cells. Alanine aminotransaminase (ALT) is only existent in the hepatocellular cytoplasm and mitochondria; however, aspartate aminotransaminase (AST) is widely spread in several organs, including heart, kidney, brain, skeletal muscle, and liver. The relationship between different levels of these enzymes and patient prognosis are stated in several types of cancer. Omega-3 (ω-3) polyunsaturated fatty acids (PUFAs) play protective roles in the liver, cardiovascular and kidney disease and they have been widely used in clinical preoperative total parenteral nutrition. The aim of this study was to evaluate AST/ALT (De Ritis) ratio and γ-glutamyl transferase (GGT) activity in rat blood serum under conditions of carcinogenesis and ω-3 polyunsaturated fatty acids (PUFAs) administration.

Methods. Female albino rats weighing 130-150 g were used in this study. Animals were subdivided into three groups: I – intact animals (control); II – rats with transplanted Guerin's carcinoma; III – animals that were administered ω-3 PUFAs prior- and post-Guerin's carcinoma injection. ω-3 PUFAs were administered as Vitrum Cardio Omega-3 (Unipharm Inc., USA), derived from fish oil. Rats were decapitated on the 14th day after implantation of Guerin's carcinoma.

Results. The activity of ALT, AST, and GGT increased in the blood serum of the tumor-bearing rats during the intensive growth of the tumor (14 days, which corresponds to the logarithmic phase of oncogenesis) and the De Ritis ratio decreased as compared with the control group. ω-3 PUFAs – eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in dose 120 mg / kg body weight have no influence on the enzyme activity of serum AST, but decreases activity of serum ALT, and GGT as compared with the tumor-bearing rats.

Discussion. The increasing of ALT, AST and GGT in serum of tumor-bearing rats may be due to spill out of these enzymes from the liver cytosol into the bloodstream and/or liver dysfunction and disturbance in the biosynthesis of these enzymes with alteration in the permeability of liver membrane. Releasing of AST, ALT, and GGT from the liver cells can occur as secondary changes to cellular necrosis. The protective effect of ω-3 PUFAs on liver tissue was confirmed by the attenuation of the activities of serum ALT, AST, GGT and in addition to the normalization of De Ritis ratio. The mode of action of ω-3 PUFAs can be intercepted pharmacologically at different levels with agents that scavenge free reactive oxygen, block their generation, or enhance endogenous antioxidant capabilities.

Conclusions. The present results indicated that administration of ω-3 PUFAs had a protective role against hepatotoxicity in rats with transplanted Guerin's carcinoma during intensive tumor growth.