# ATP content in tissues under the influence of IL-2 during physical training

V. A. Shvets

Kherson State University
27, Universytets'ka Str, Kherson, Ukraine, 73000
*shvetsvika88@gmail.com*

**Background.** Functional shifts occur in various body systems during physical training, as well as at other types of the stress (Magherini *et al.*, 2019; Wang *et al.*, 2020). Exercises disrupt homeostasis, change the level of circulating mediators and hormones, increase the need of skeletal muscles and other vital organs in energy substrates. The fatigue after physical training is caused by depletion of energy substrates (creatine phosphate, ATP and glycogen) in tissues with further accumulation of products of their metabolism in the blood (creatine, lactic acid and inorganic phosphates) (Lombardi *et al.*, 2020). Therefore, the change of these indicators is important to evaluate how the body adapts to exercises in different physiological conditions. **The aim** of the study was to investigate the effect of interleukin-2 (IL-2) and its inhibitor on the content of ATP in the tissues of white mice during physical training. **Methods.** Research groups were formed. For 6 weeks, the experimental animals received subcutaneously the drug IL-2 and orally its inhibitor Cyclosporine. Group I of animals was injected with an inhibitor of IL-2 (10 mg / kg), II, III and IV — IL-2 in concentrations of 5000, 7500 and 30,000 IU/kg, V — saline, control — without the influence of drugs and physical activity. Forced swimming with load was used as physical training. The tissues (liver and muscles) were isolated in the cold, washed from the blood with chilled saline. In the prepared homogenates, the ATP content was determined by spectrophotometric method]. **Results.** The study of the ATP content in homogenates of the liver and the muscles of experimental animals during physical training showed that at the 2$^{nd}$ week in all experimental groups of animals the indicators (both in muscles and liver) were lower than in control group. The ATP content in liver decreased from 14.5 % to 34.9 %, the lowest rate was observed in II (8.94 μmol/g tissue), and the highest — in III (11.74 μmol/g tissue) experimental groups. In muscles, the concentration of ATP decreased from 21.5 % to 41.4 %, with the lowest values in IV and V groups of animals — 3.52 and 3.64 μmol/g of tissue, respectively. At the 4$^{th}$ week of the experiment, the content of ATP in muscles increased in I, III and V (by 9.7 %, 21.5 %, 13.2 %, respectively) and decreased in II and IV (by 24.6 % and 13.6 %, respectively) groups of animals relative to the previous period. During this period, the concentration of ATP in liver decreased only in Group V (by 13.6 %) and increased in all other groups of animals (from 13.5 % in Group III to 50.6 % in Group II) compared with the 2$^{nd}$ week of the experiment. At the 6$^{th}$ week (at the end of the experiment), compared with the 4$^{th}$ week of the study, the ATP content in liver increased only in Group V, and decreased in Groups I-IV from 2.5 % to 11. 9 %. However, the concentration of ATP in liver during the experiment was lower than in control group. During this period, the concentration of ATP in muscles of experimental animals decreased only in IV and increased in I-III and V groups compared to the previous period. Noteworthy, the indicators of Group III almost did not differ from the level of control, i.e. the normalization of in energy metabolism occurs. **Conclusion.** Therefore, IL-2 had a different effect on the ATP concentration in tissues depending on the IL-2 concentration and duration of its administration. It may be considered as one of the indicators of adaptive processes in tissues during physical training.