

THE INFLUENCE OF IL-2 (RONCOLEUKIN) ON THE RATIO OF THE GLUTATHIONE SYSTEM, ENERGY METABOLISM AND OXIDATIVE MODIFICATION OF PROTEINS IN RAT BRAIN CELLS AGAINST A BACKGROUND OF EXPERIMENTAL HYPERGLYCEMIA

Suprun E. V., Tereshchenko S. V., Gubchenko T. D., Rovshan Bayramov

*Institute for Advanced Studies Professional Pharmacy
of the National University of Pharmacy, Kharkiv, Ukraine.*

Diabetes mellitus (DM) is one of 7 main mortality causes in most countries of the world and is third among immediate causes of death after cardiovascular and oncological diseases. Nowadays, a body of evidence is amassed in the whole world, as to the fact that effective DM control determines life expectancy of the patients and their performance capability, as well as may keep development of the related complications to a minimum. Primary goal of the effective DM therapy is to block interdependent mechanisms of DM progression – vascular, metabolic events and oxidant stress phenomenon, for which reason increasingly greater attention is paid to medications with antioxidant effect. Agents, providing both for damaging effect and cell viability system in the ischemia/hypoxia area, include cytokines. Therefore, application of cytokine preparations may become effective perspective link in the complex therapy of post-ischemic complications in DM. On the model of alloxan diabetes in rats to study the influence of thiocetam (500 mg/kg) and recombinant interleukin-2 (Roncoleukin) (0.01 mg/kg) on the performance of the glutathione system, energy metabolism and protein oxidative modification products.

Materials and methods. Experimental diabetes was simulated by means of single subcutaneous administration of alloxan monohydrate water solution (Sigma, USA) – 150 mg/kg as 5% acetate buffer solution with pH 4.5. The study was conducted on 50 white Wistar rats weighing 250-300 g, kept in the standard vivarium conditions and divided into 4 groups with 10 animals in each group. First group consists of intact animals, second group – animals with experimental diabetes mellitus (DM, control), third group – animals with DM, which were made intramuscular injections of 500 mg/kg of thiocetam once a day (group DM+Thiocetam), and fourth group – animals with DM, which were made intramuscular injections of 0.01 mg/kg of IL-2 (ronkoleukin) once a day (group DM+IL-2). Brain tissue fragments from mesencephalic artery region, homogenized in liquid nitrogen, were used as materials for biochemical researches. For further researches, only animals with high glucose level (>11 mmol/l) were used. To study thiol-sulfide system activity in the rat brain tissue homogenate, levels of reduced and oxidized thiols and glutathione, and activity of glutathione peroxidase (GP) and glutathione reductase (GR) were determined.

Results and discussion. As a result of research, we found out that the development of hyperglycemia in experimental animals was accompanied by destabilization of the glutathione system (increased levels of oxidized glutathione and a sharp decrease in its activity and reduced forms of glutathione peroxidase and glutathione reductase), energy shortages and rising levels of markers protein oxidative modification products – aldehyde (AphH) and carboxyle (KphH) products. Proved that the course administration thiocetam and Roncoleukin contributed to the normalization of activity of glutathione peroxidase and glutathione reductase, levels stabilize energy phosphates (ATP, ADP, AMP) and protein oxidative modification products figures, the maximum activity was observed for Roncoleukin.

Keywords: interleukin-2, Roncoleukin, experimental alloxan diabetes, glutathione.