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ASSESSMENT OF ANTIGLYCOOXIDANT PROPERTIES OF NEBIVOLOL – I N VITRO STUDY

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Introduction. Cardiovascular diseases (CVDs) are the most common cause of death worldwide – every year, more people die from CVDs than from any other disease. It makes them one of the most important health problems of the modern world. This is why it is necessary to educate patients about risk factors of CVDs, but also to search for new methods of treatment. It is widely known that oxidative stress and glycation of proteins play a crucial role in atherosclerosis's pathogenesis, leading to the development of conditions such as coronary artery disease or heart failure. Preventing these processes may be a breakthrough in treating patients suffering from diseases which would save millions of lives each year. Such properties – antioxidant and antiglycation – may be presented by substances that are already used in cardiology. One of the most widely used classes of medications are beta-blockers – competitive antagonists of beta-adrenergic receptors. The drug belonging to this group – nebivolol – except for its well-known impact on beta-adrenergic receptors, may also have antiglycooxidant activity.

Aim: to evaluate antioxidant and antiglycation properties of nebivolol in an in vitro model of oxidized bovine serum albumin (BSA).

Materials and methods. In this study, glucose was used as a glycation agent. 1 mM nebivolol and 0,09 mM BSA were incubated for six days with 0,5 M glucose. The experiment was conducted three times, each time in duplicate. The concentration of advanced oxidation protein products (AOPP), protein carbonyls (PC), and levels of advanced glycation end products (AGE), Amadori product, dityrosine, and kynurenine were assessed in every sample. Aminoguanidine and metformin were used as protein glycation inhibitors and captopril, Trolox, reduced glutathione, and lipoic acid as oxidation inhibitors.

Results. AOPP and PC concentration and AGE, Amadori products, dityrosine, and kynurenine levels were significantly lower in samples containing BSA and glucose with nebivolol comparing to samples without the examined drug. Moreover, all evaluated parameters were also lower in the presence of nebivolol than in metformin – a well-known antiglycation agent commonly used in diabetes mellitus treatment. Those results prove that nebivolol has antiglycation and antioxidant properties, leading to the possibility of nebivolol being more effective in treating cardiovascular diseases, especially in patients with coexisting diabetes mellitus. It is necessary to conduct studies in animal and human models to prove that these findings are also valid in living organisms.

Conclusions. Our study confirms that nebivolol, a widely used beta-blocker, shows antiglycooxidant properties in the oxidized bovine serum albumin model.