Abstract

The aim of this work was to study the expression of proteins involved in reactions in which harmful free radicals are degraded in an organism. was observed difference between the expression of selected myocardial proteins in non-influenced animals, animals who were treated with low dosage of morphine (0.1 mg/kg/day or 1 mg/kg/day), and animals administered high dosage of morphine (10 mg/kg/day). Low dosages were administered for 28 days and high dosage for 10 days. In addition, the effect of abstinence lasting one week was assessed after cessation of morphine administration (1 mg/kg/day). Morphine at low dosage (0.1 mg/kg/day) increased levels of glutathion peroxidase-1/2, which may be considered as one of the possible consequences of the ongoing oxidative stress. There were no significant differences in glutathion peroxidase-6 expression.

Next aim of this work was to study the expression of antioxidant enzymes. These experiments were carried out on myocardial preparations from the animals treated with a constant dosage of morphine (10 mg/kg/day) for 10 days. Samples from these animals were used for measuring the total antioxidant capacity of the left and right ventricles. These samples were also used for determination of concentration of the oxidative stress marker 8-isoprostane. We also aimed to establish a novel methodology for *in situ* analysis of the levels of superoxide radicals in rat heart slices and to assess the levels of expression of antioxidant enzyme glutathion peroxidase-1/2, glutathion peroxidase-6, superoxid dismutase-1, superoxid dismutase-2, superoxid dismutase-3 and catalase. There was a significant change in the expression of superoxid dismutase-2 and superoxid dismutase-3 in the left ventricles. Both these types of superoxide dismutase are important components of the cell defense against free radicals. Increased levels of these components may reflect the effect of oxidative stress in cardiocytes . Determination of elevated 8-isoprostane levels indicated an increased oxidative stress in both the right and left ventricles. Similarly, measurement of the total antioxidant capacity of myocardial samples indicated that there the left venticles were more susceptible to oxidative stress. Interestingly, the *in situ* analysis also showed increased levels of superoxide radicals mainly in the left ventricles.

Overall, several independent methods proved that morphine treatment can induce harmful oxidative stress in rat myocardium , which may be accompanied by altered redox state of this tissue.

Key words: oxidative stress, moprhine, myocardium, antioxidants