Abstract

Background: Oxidative stress is supposed to be implicated in the pathogenesis of several diseases which are connected with increased formation of reactive oxygen and nitrogen species (RONS). Oxidative stress could play an important role in the pathogenesis of inflammation and sepsis, acute and chronic pancreatitis or in the development of cancer. Organisms are protected against RONS from antioxidant system that is composed of antioxidant enzymes and non-enzymatic antioxidants. To the most important antioxidant enzymes belong superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase, glutathione reductase and paraoxonase (PON). The aim of this Doctoral Thesis was to investigate the behaviour of three of these antioxidant enzymes – CuZnSOD, CAT and PON1 in different pathophysiological states.

Materials and methods: The activities of CuZnSOD, CAT and PON1 were measured in six different pathophysiological states. Forty patients with metabolic syndrome (MetS), 35 women with depressive disorder (DD), 30 septic patients (SP), 50 patients with pancreatic cancer (PC), 50 patients with chronic pancreatitis (CP) and 13 patients with acute pancreatitis (AP) were included in different studies together with sex- and age-matched healthy controls (CON). Patients with AP and SP were observed in the course of the disease and samples were taken four times (three times, respectively). The enzymatic activities were determined with spectrophotometric kinetic methods. In all these studies also the levels of oxidative stress markers were measured.

Results: The activity of CAT was found to be decreased in patients with sepsis or septic shock, MetS and PC in comparison with CON, while in patients with DD, CP and AP no differences in CAT activity were detected. The activities of CuZnSOD were in the contrast to CAT either increased or unaffected. Increased activities of CuZnSOD were observed in MetS, DD, PC and SP, while no differences in CuZnSOD activities were found between CP or AP and CON. In all observed pathophysiological states the arylesterase activity of PON1 was measured and was found to be decreased (with the exception of DD) in comparison with CON.

Conclusion: It was shown, that all selected diseases are connected with increased oxidative stress, which leads to the changes in antioxidant enzymes activities.