Cent. Eur. J. Biol. • 8(8) • 2013 • 747-755
DOI: 10.2478/s11535-013-0179-0

VERSITA

Central European Journal of **Biology**

Antioxidant enzymes in the liver of *Chelidonichthys obscurus* from the Montenegrin coastline

Research Article

Sladjan Z. Pavlović*, Slavica S. Borković-Mitić, Tijana B. Radovanović, Branka R. Perendija, Svetlana G. Despotović, Jelena P. Gavrić, Zorica S. Saičić

Department of Physiology,
Institute for Biological Research "Siniša Stanković",
University of Belgrade,
11060 Belgrade, Serbia

Received 08 October 2012; Accepted 11 March 2013

Abstract: The activities of antioxidant defence enzymes - total, manganese and copper zinc containing superoxide dismutase (Tot SOD, Mn SOD, CuZn SOD), catalase (CAT), glutathione peroxidase (GSH-Px), glutathione reductase (GR) and biotransformation phase II enzyme glutathione-S-transferase (GST) - in the liver of longfin gurnard (*Chelidonichthys obscurus*) from the Montenegrin coastline (Adriatic sea) were investigated. The specimens were collected in winter (February) and late spring (May) at two localities: Platamuni (PL, potentially unpolluted) and the Estuary of the River Bojana (EB, potentially polluted). The obtained results show that the activities of Mn SOD, CAT, GSH-Px and GST in winter were significantly lower at EB than at PL. In spring, the activities of CAT and GST were decreased, while GR activity was increased at EB in comparison to PL. The activities of Mn SOD and GST at PL were decreased and GSH-Px, GR and GST activities at EB were increased in spring compared to winter. Our work represents the first study of liver antioxidant enzymes of longfin gurnard from the Montenegrin coastline and reveals that locality, as a variable, has a greater influence on antioxidant enzymes and biotransformation phase II enzyme GST activities compared to season.

Keywords: *Antioxidant enzymes • Reactive oxygen species • Pollution • Season • Longfin gurnard*

1. Introduction

Some reactive oxygen species (ROS) (superoxide anion radicals, hydrogen peroxide and hydroxyl radicals) are produced as side products of an aerobic metabolism. They can also be formed intracellularly under the influence of various xenobiotics. ROS can arise as by-products in some metabolic processes or in some signal pathways [1]. They are very reactive molecules and thus very dangerous for normal cellular function [2]. During the evolution of the aerobic metabolism, cells developed various mechanisms in order to defend themselves from ROS. One of these mechanisms includes antioxidant defence enzymes, such as: superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GSH-Px) and glutathione reductase (GR). Phase II biotransformation components glutathione-S-transferase (GST) and reduced/oxidized glutathione system (GSH/GSSG) are also included in the defence against ROS [3]. ROS generation and antioxidant defences may be influenced by many environmental factors. Consequently, many abiotic and biotic influences should be taken into account when interpreting antioxidant defence biomarkers [4]. Marine ecosystems possess many specificities and many marine organisms have fine cellular control between production of ROS and antioxidant defence mechanisms [5]. The activity of antioxidant defence enzymes can be used as potential biomarkers for various environmental influences and aquatic contamination because these factors can directly or indirectly change the balance between the pro-oxidants and antioxidants [6]. Antioxidant defence enzymes are also related to changes in environmental factors such as temperature, salinity, food availability and dissolved oxygen levels, as well as to intrinsic biological factors such as gonadal development or the reproductive cycle [7]. Since changes at the organism level lead to changes at the population and community

* *E-mail: sladjan@ibiss.bg.ac.rs*