Immunohistochemical evaluation of superoxide dismutase (Cu/Zn SOD) concentrations in erythrocytes of dairy cattle and farm-raised deer by a computer-assisted analysis of microscopic images

K. Paździor-Czapula¹, M. Gesek¹, T. Rotkiewicz¹, W. Kluciński², J. Kołodziejska², M. Kleczkowski², M. Fabisiak²

¹ Department of Pathological Anatomy, Faculty of Veterinary Medicine, University of Warmia and Mazury in Olsztyn, Oczapowskiego 13 bl. D, 10-719 Olsztyn, Poland
² Department of Pathology and Veterinary Diagnostics, Faculty of Veterinary Medicine, Warsaw University of Life Sciences, Nowoursynowska 159c, 02-776 Warsaw, Poland

Abstract

The effectiveness of the immunohistochemical method in determining Cu/Zn SOD concentrations in red blood cells of dairy cattle and farm-raised deer was evaluated by a computer-assisted analysis of microscopic images and scanning technique. Superoxide dismutase (Cu/Zn SOD) concentrations in erythrocytes were determined in smears of whole blood samples collected from 16 Polish Holstein-Friesian cows and 22 farm-raised deer in spring. Mouse anti-bovine SOD (Cu-Zn) monoclonal antibodies (2F5, Serotec) were used in 1:50 dilution. The degree of immunostaining for SOD in red blood cells was determined with the use of the MIDI 3DHistech Panoramic Scanner (Hungary) and 3DHistech Panoramic Viewer, NuclearQuant and MembraneQuant software. Our findings indicate that the immunohistochemical method is a useful technique for evaluating Cu/Zn SOD concentrations in red blood cells of cattle and deer.

Key words: superoxide dismutase, erythrocytes, cattle, deer, immunohistochemical evaluation

Introduction

The results of recent research demonstrate that intensive dairy cattle production leads to homeostatic disorders, including disruptions of the prooxidant-antioxidant balance (Heidarpour et al. 2013, Wang et al. 2013). Those disorders are caused by excessive production of reactive oxygen species and weakening of antioxidant mechanisms which rely on primary antioxidants, such as superoxide dismutase (SOD) and glutathione peroxidase (GSH), secondary antioxidants, including vitamins E and C, uric acid,