ABSTRACT

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Title of diploma thesis: Oxidative stress biomarkers of the erythrocyte in the newborn – a follow-up study

Increased levels of oxidative stress (OS) have been described in healthy, full-term newborns as a consequence of the drastic changes introduced by birth and by the exposure to extrauterine environment. Our intention was to examine the OS levels in red blood cells (RBCs) of neonates and to further understand the changes that the newborn organism undergoes with its newly-acquired autonomy as this knowledge is limited and there are no reference values. Umbilical cord blood samples were collected from a small population of newborns ($n = 8$) and several hematological and biochemistry parameters were evaluated. Our experimental data consist of OS biomarkers measurements performed in different fractions of blood (RBC membrane, total RBCs and plasma): membrane bound hemoglobin (MBH), lipid peroxidation (LPO), quantification of catalase (CAT) and glutathione peroxidase (GPx) activities, determination of total antioxidant status (TAS) and quantification of total and oxidized glutathione; the same parameters were assessed after two months in the same subjects ($n = 8$) using peripheral blood samples, to obtain the follow-ups. Hematological and biochemistry data were in accordance with general knowledge and available reference values. Significant changes were recorded in five of our OS biomarkers: decrease in membrane LPO and MBH levels suggests that OS really fades with age. We recorded a significant decrease in GPx activity and an increase in CAT activity which probably reflects different specialization of the enzymes and the newborn´s increasing autonomy. With all the gathered data we could observe the process of the newborn´s adaptation to the outer world. The most significant contribution of this work are the new OS biomarkers reference values, which, to our knowledge, have not been published before. However, our population was small and only half of the selected biomarkers displayed a significant change in the follow-ups two months after birth. Further studies are warranted to extend the knowledge in the field of OS and its biomarkers because we believe that there is a great potential for them to be used in clinical monitoring and diagnosis.

keywords: oxidative stress, biomarker, erythrocyte, newborn