Analysis of Peroxiredoxins in Patients with Glucose-6-Phosphate Dehydrogenase Deficiency and Hemoglobin SC Disease

Lopes, KK.¹; Romanello, KS.¹; Bezerra MA²; Hatzlhofer BLD²; Domingos IF²; Araujo AS³; Oliveira MA⁴; Netto L.E.S.⁵; Costa FF⁶; Malavazi I¹; Cunha AF¹

¹Universidade Federal de São Carlos, São Paulo, Brazil; ²Universidade Federal de Pernambuco, Pernambuco, Brazil; ³HEMOPE, Pernambuco, Brazil; ⁴Universidade Estadual Paulista Julio Mesquita Filho - Campus Experimental do Litoral Paulista; São Paulo, Brazil; ⁵USP-SP Laboratório de Biologia Molecular e Estrutural, São Paulo, Brazil; ⁶Universidade Estadual de Campinas – HEMOCENTRO, São Paulo, Brazil

INTRODUCTION. Erythrocytes are the cells responsible for oxygen transport and are normally exposed to oxidative stress caused by reactive oxygen species (ROS). Nevertheless, they have an effective defense mechanism against ROS performed by catalase, glutathione and peroxiredoxins (PRDX). PRDXs (mainly PRDX2) are the most abundant antioxidants enzymes in erythrocytes. However, in the erythroid cells of patients with hemolytic anemia, such as glucose-6-phosphate dehydrogenase deficiency (G6PD), the ROS levels are highly increased, leading to hemolysis and other damages observed in these diseases. There are no studies correlating the expression and production of these enzymes with the ROS levels as well as the severity of hemolytic anemia. Here, this correlation was evaluated in patients with G6PD deficiency and hemoglobin SC disease compared to healthy controls.

MATERIAL AND METHODS. Real Time PCR analysis was performed to evaluate gene expression and the abundance of PRDX proteins was analysed by western blot.

RESULTS AND DISCUSSION. Our results showed a decrease in mRNA levels of Prdx 6 in G6PD deficiency and no difference was observed for the other enzymes. The human PRDX6 main action is the ROS detoxification, thus protecting cells against oxidative injury. However it also presents different functions including phospholipase A2 activity, regulating the phospholipid turnover. The observed decrease of this enzyme could be involved in the hemolysis observed in these patients. For hemoglobin SC disease, no difference in PRDXs expression were observed. Experiments increasing the number of patients and evaluating the enzymes production and activity will be conducted.

CONCLUSION. This is the first study correlating gene expression of peroxiredoxins in these hemolytic anemias. The preliminary results are very promising and could contribute in better understand the role of these protein in the severity of these diseases and in the identification of new targets that could help in the management of patients.

Key words: peroxiredoxin, glucose-6-phosphate dehydrogenase deficiency, hemoglobin SC disease, reactive oxygen species

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