Manganese Superoxide Dismutase Gene Polymorphism is Associated to Acute Splenic Sequestration in Sickle Cell Anemia Patients

Mendonça, T.F.¹, Mola, C.², Silva, A.S.³, Ferreira, F.R.B.⁴, Vasconcelos, L.R.S.⁵, Bezerra, M.A.C.⁶,⁷, Araújo, A.S.⁷, Moura, P.², Cavalcanti, M.S.M.².

¹Faculdade de Ciências Médicas, Universidade de Pernambuco, Recife, Brazil; ²Instituto de Ciências Biológicas, Universidade de Pernambuco, Recife, Brazil; ³Faculdade de Enfermagem Nossa Senhora das Graças, Universidade de Pernambuco, Recife, Brazil; ⁴Departamento de Bioquímica, Universidade Federal de Pernambuco, Recife, Brazil; ⁵Instituto do Fígado de Pernambuco, Recife, Brazil; ⁶Centro de Ciências Biológicas, Programa de Pós-graduação em Genética, Universidade Federal de Pernambuco, Recife, Brazil; ⁷Fundação HEMOPE, Recife, Brazil.

Introduction Sickle cell anemia (SCA) is due to the homozygous inheritance of the gene HBSS that encodes a hemoglobin S (HbS), which polymerizes under low oxygen tension, leading to sickling of red blood cells and triggering vasoocclusions manifestations (VOM). Recurrent vasoocclusion and ischemia reperfusion induces continuous inflammatory responses, related to the reactive oxygen species (ROS) produced by oxidative stress in SCA. Alterations in the defense systems against ROS may play a role in the clinical severity of SCA. Antioxidant enzyme systems are important to diminish ROS damage. Manganese superoxide dismutase (MnSOD) is a mitochondrial enzyme that protects cells against damage caused by superoxide radicals. SNPs at the gene of MnSOD (SOD2) at codon 16 (T→C) causes a substitution Val16Ala altering the protein structure, affecting location and transport of MnSOD into mitochondria. Ala allele has been associated with an increased MnSOD activity and induction of oxidative stress due to high production of H2O2 and the antioxidant system imbalance. The aim of this study was to associate the SOD2 polymorphism with VOM in SCA patients. Material and Methods The SOD2 polymorphism (rs4880) was performed by real time PCR using the methodology Taqman Genotyping Assays (ID: C__8709053_10). Results and Discussion We analyzed 195 children with SCA, from 8 months to 9 years old, median 4 years and 52% were male. The populations were in Hardy–Weinberg equilibrium. There was no difference of genotype and allelic frequencies of SOD2 polymorphism between SCA and control group (p=0.29 and p=0.19, respectively). Nevertheless, the genotypes Val/Ala+Ala/Ala of SOD2 were more frequently in SCA patients with acute splenic sequestration (p=0.02 OR=2.98 CI=1.14–8.07) and higher frequency of the Ala allele in patients with VOM (p=0.04 OR=1.60 CI =1.01–2.53). Conclusion The results suggest that the polymorphism of SOD2 could be involved in the clinical course of SCA.