Guanosine Administration Protects Mitochondria Brain Regions Against Oxidative Damage Caused by Traumatic Brain Injury in Rats

Marques, N.F.¹, Dobrachinski, F.¹, Gerbatin, R.R.³, Sartori, G.², Royes, L.F.¹,³, Soares, F.A.¹

¹Laboratorio de Bioquímica Toxicológica, DQ, UFSM, RS; ²Laboratório de Síntese, Reatividade e Avaliação Farmacológica e Toxicológica de Organocalcogênios, DQ, UFSM, RS; ³Laboratório de Bioquímica do Exercício, CEFD, UFSM, RS, Brasil

Introduction: During the past several years, there has been increasing appreciation of the key role of reactive oxygen–induced mitochondrial dysfunction in the secondary injury process that follows traumatic brain injury (TBI) (Sullivan et al, 2005). Several lines of experimental data have implicated mitochondrial dysfunction as a prominent feature of TBI (Sullivan et al, 2005), moreover glutamate seems to be very involved in this process. Guanosine to modulate the glutamatergic system (Burgos, et al., 1998) and reducing neuronal damage caused by injury. The goal of this study was to evaluate whether treatment with guanosine was able to avoid the damage of mitochondrial brain regions submitted a TBI. Material and Methods: The animals were anesthetized, the cannula was placed and the TBI were realized (D’Ambrosio et al. 2004). The treatment with Guanosine (GUO) 7.5mg/Kg injected intraperitoneally began 15 min after TBI. The animals were sacrificed, the brain was removed and the structures (hippocampus and cerebral cortex) were separated. Mitochondria preparation were performed on isolated structures (Sims, et al., 1990). The evaluation of mitochondrial membrane potential (ΔΨm) (Akerman & Wikstrom, 1976), reactive oxygen species production (ROS) (Garcia-Ruiz, et al., 1997) and mitochondria electron flow (Cohen et al., 1997) were performed. Results and discussion: The results revealed a significant increase in mitochondria ROS production, in consequence the ΔΨm and mitochondria electron flow shows a decrease in their levels in all the analyzed structures submitted a TBI. However, GUO treatment prevented the increase of ROS production, moreover avoided a decrease of ΔΨm and mitochondria electron flow when compared to sham group. Conclusion: In summary, our results demonstrate an increase in ROS production is associated with a loss of membrane potential which in turn decreases the flow of electrons, showing that the TBI event is harmful to brain mitochondria and GUO avoid these harmful effects.

Key words: traumatic brain injury, guanosine, mitochondria, oxidative stress

Supported by: FAPERGS, CNPq and CAPES