MANGANESE CHLORIDE-INDUCED NEUROTOXICITY: EXPERIMENTAL MODEL OF MANGANISM IN WISTAR RATS

Hartwig, J. M.¹, Santos, D. B.¹, Souza, V.¹, Ventura, M.¹, Farina, M.¹

¹ Departamento de Bioquímica, Centro de Ciências Biológicas, Departamento de Bioquímica, Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, Brazil

Manganese (Mn) is an essential metal that composes some enzymes involved in metabolic regulation and elimination of reactive oxygen species. However, it can also cause neurotoxicity if present in high amounts. Particularly, Mn accumulation in the striatum can cause a neurodegenerative condition known as manganism. Some evidence suggests that the damage caused by chronic exposure to Mn affect dopaminergic neurons, but the full understanding of the mechanisms that mediate Mn-induced neurotoxicity are not elucidated. This project evaluated the mechanisms that lead to neurotoxicity caused by Mn in target structures with a focus in the striatum through assessment of the activity of oxidative stress-related enzymes. The occurrence of peripheral toxicity was also evaluated through the analysis of serum biochemical parameters. Male Wistar rats were divided into two groups and treated intraperitoneally with 4 injections of saline or MnCl₂ (25 mg/kg; 48 h of interval between each injection). A behavioral test (open field) was performed at 24 h after the end of the treatments, followed by euthanasia and biochemical analyses. A parallel group of animals were subjected to behavioral and biochemical analyses 30 days after the end of the treatment. Twenty-four h after treatment, Mn caused a significant decrease in weight of the animals and reduced the number of rearings and crossings in the open field compared to controls. It also increased the serum TGP activity, but did not change serum TGO or activity of striatal GR, GPx and SOD activities. Following 30 days after treatment, mice treated with Mn regained normal weight, and had no difference in the open field compared to controls. However, Mn increased serum
TGP and striatal GPx activity, whereas striatal GR, SOD and serum TGO remained unchanged. These results contribute to better understand the mechanism of damage caused by MnCl₂ through oxidative stress and biochemical changes.

Keywords: Manganese chloride, manganism, oxidative stress.

Acknowledgements: CNPq, CAPES, UFSC.