

Occupational and environmental exposure to manganese and the occurrence of Manganism and Parkinson's diseases in manganese mining areas (South Portugal)

MMS Cabral Pinto^{1,2}, EA Ferreira da Silva¹, PIS Moreira², MMVG Silva³

1 — Department of Geosciences &

GeoBioTec, University of Aveiro

2 — CNC Centre—Centre for Neuroscience and Cell Biology, College of Medicine, University of Coimbra

3 — Department of Earth Sciences,
University of Coimbra

FIGURE 1

Major explored mines in Portugal.

* - Uranium mines.

Occupational and environmental exposure and inhalation to Mn has been suggested as a possible cause of neurodegenerative disorders. The inhalation and ingestion of Mn affects the central nervous system of rats, primates and humans. Various cases have been reported of pathological neurologies, and even deaths, induced by chronic consumption of waters containing moderate to high levels of Mn. Manganese is essential to the regular functioning of the immune system and regulates sugar levels in the blood and cellular energy. However, when present in excessive quantities it becomes toxic, giving rise to the development of neurodegenerative diseases such as manganism. Manganese exposure can also play an important role in causing Parkinsonian disturbances, possibly by potentiating ageing of the brain, which in conjunction with genetic predisposition may lead to a sub-threshold neurodegeneration in the basal ganglia in more susceptible populations generating a pre-Parkinsonian condition. Since Mn elimination from the central nervous system requires a long time, neurotoxic effects may occur later in life, increasing the frequency of Parkinsonian disturbances in elderly individuals. In Baixo Alentejo region there are several abandoned Mn mines (Fig. 1), related with the Fe-Cu-Zn-Pb massive sulphides deposits and close to the mines there are abandoned tailings deposits, freely exposed to weathering. This study presents the preliminary results of the neuropsychological assessment of inhabitants of Baixo Alentejo Mn mines areas and analyze the statistical significant differences with the control participants at level of the global cognitive status and the cognitive domains such as memory, executive functions, visuospatial skills, language, orientation and attention. The neuropsychological assessment of a pre-selected population in the studied areas is being investigated and compared to the chemical contents of select metals on human biological samples of urine, hair and nails.

