

Cadmium and myalgic encephalomyelitis/chronic fatigue syndrome; application of transcranial sonography to the study of cadmium-induced neuronal damage

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Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (CFS) is a neurological disease characterized by widespread inflammation and neuropathology. Aetiology and pathogenesis are unknown and it has been hypothesized that exposure to heavy metals is among the triggers of CFS. We recently hypothesized that cadmium, an occupational and environmental heavy metal pollutant, might be associated with some of the neurological findings typical of CFS. It is worth noticing that cadmium induces neuronal death in cortical neurons; cadmium-induced neuronal cell death and cadmium-induced low angiogenesis may be responsible for decrease in attention level and memory in exposed humans as well as to a diminished ability for training and learning in rats (symptoms pathognomonic for CFS). In order to assess cadmium-induced neuronal damage *in vivo*, we developed a modified procedure for transcranial sonography. This procedure allowed detailed visualization of the cortex of the temporal lobe, the meninges, the subarachnoidal space, and the meningeal and cortical vascularisation. The consequences of our observation could affect prevention, early diagnosis, and treatment of CFS with important repercussions in the definition of clinical cases and in forensic and insurance-related matters. CFS could then be considered as consequence of occupational or accidental exposure to cadmium. Implications in prevention and early diagnosis could entail the evaluation of symptoms typical of CFS in cadmium-exposed subjects as well as the search for signs of exposure to cadmium in subjects diagnosed with CFS. Also the management of the syndrome could be affected; nutritional supplementation of magnesium and zinc have been proposed in the prophylaxis and therapy of cadmium exposure.

Keywords: Myalgic Encephalomyelitis/Chronic Fatigue Syndrome, cadmium, transcranial sonography.