Which Strategies can be Adopted against Heavy Metal Intoxication?

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Editorial

Much evidence exists showing heavy metals (mainly arsenic, lead, mercury, and cadmium) to be common environmental pollutants. They induce the interruption of intracellular homeostasis, causing damage to lipids, proteins, enzymes, and DNA through the production of oxygen and nitrogen free radicals. These products impair the balance between the pro-oxidant and antioxidant systems in the body: The shift towards the former is known as "oxidative stress". Oxidative stress-mediated toxicity caused by heavy metals mainly involves the liver and kidneys, the central nervous system, and the endocrine system [1-4]. Which strategies can be adopted against the dangerous effects of toxic metals? The most commonly used strategy against heavy-metal poisoning is chelation therapy, which promotes metal excretion. This treatment is suggested following both acute and chronic intoxication, and can also be used to remove intoxication caused by a non-heavy metal, such as aluminum [4]. However, new strategies have recently been reported, describing the protective effects of dietary supplements against cadmium and lead toxicity [5]. Essential metals, vitamins, edible plants, phytochemicals, and probiotics have been proposed, in association with a selection of recommended food products. Moreover, evidence of sub-commissural organ involvement in the rat brain response to lead exposure, and the modulatory potential of curcumin, a polyphenolic natural compound with antioxidant and anti-inflammatory properties, have been described [6]. Neurodegenerative diseases have been associated to metal-induced neurotoxicity [7]. Several nutraceutical approaches have been proposed against neurodegeneration [8]. Neurodegenerative disorders are complex and multifactorial, involving pathways such as mitochondrial dysfunction, intracellular Ca^{2+} overload, oxidative stress, and inflammation. Food-based approaches are believed to target these pathways. Finally, since neuro-inflammation is generally associated to neurodegeneration, various pharmacologic targets of inflammation have been considered [9].

In our opinion, the first efficient treatment for toxic metal burden is chelation therapy with CaNa2 ethylenediaminetetraacetic acid (EDTA) for the following reasons:

EDTA is an important antioxidant compound. It has been shown to decrease oxidative DNA damage and lipid peroxidation [10].

EDTA efficiently removes all toxic metals present in the body, as shown by the results of chelation tests [5-12].

EDTA administration preserves kidney function [13-14].

EDTA chelation therapy can reduce cardiovascular events in patients with diabetes, because metals such as cadmium and lead are toxic for the cardiovascular system [14].

EDTA reaches the central nervous system and exerts a protective activity against endothelial cell activation [15].

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