

Food as a Method of Heavy Metal Detoxification

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Editorial

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Editorial

Heavy metal toxicity and pollution is one of the major health problems in the environment. This is because they can persist for long period in environment due to their non degradable nature [1]. Technology release large amount of waste, contaminants and heavy metals into the environment, these lead to building up of heavy metals storage in soil and water, which increase more than the allowed level and increase the health hazards [2].

Heavy metals enter the human body through different routes like food, air, water, and skin. They should be metabolized inside the human body in order to be non-toxic especially the most toxic of them which are lead, mercury, aluminum, cadmium and arsenic [3].

Lead as an example of heavy metals can induce toxicity for human being through oxidative stress, this stress can caused by imbalance between production of free radicals and the generation of antioxidants to repair the damage. Glutathione is one example of the antioxidants in cells that can protect it from the free radicals. When the free radicals increase more than the ability of the antioxidants to detoxify, the cell damage occurs, damage to protein, nucleic acid, membranes and lipids [4-6].

Mercury, another example of the heavy metals. Mercury can binds to freely available thiols leading to microtubule destruction, mitochondrial damage, lipid peroxidation and neurotoxic molecules accumulation. It can attack the selenohydral and sulphydral groups, leading to many hazards on human health [7,8].

Metals can exert their mechanism of action in body through binding with enzymes containing thiol group, and then perform their toxic action on cells. This action can

called "interaction with and inhibition of the thiol group containing enzymes" [9].

Sulphur, perform a part in the sulphydral groups, this are necessary for molecules activation as acetate. Also, the atoms are important in the formation of flavoenzymes as succinate dehydrogenase and NADH dehydrogenase. In cysteine, they are responsible for the covalent cross links in protein structure [10].

The main treatment for heavy metal intoxication is that of chelation therapy. The idea of chelation is based upon binding with the metal ions to form a complex called "chelates" this help to remove the metal from its binding site. Later on, these chelates can be excreted from the body [11]. Although, chelation therapy is the mostly used treatment for heavy metal intoxication, but they have many side effects. The chelating agents like 2,3-dimercaprol, dimercaptosuccinic acid, dimercaptopropane-sulfonic acid, and D-penicillamine [12].

Side effects of the chelating agents can make some limitations of using them. For example CaNa₂EDTA cannot pass through the cellular membrane and so its uses are limited in chelating metals enzyme complex. Another example is DMSA has limited distribution extracellular, and so it is better to be used in chronic toxicity. Specificity of the chelators to metal is also another limitation factor, as they can chelates beneficial, essential metals as zinc. D penicillamine also has disadvantage, as it can cause anaphylactic shock in patients with penicillamine allergy, also has an effect on skin can produce different types of coetaneous lesions.

Some less adverse effects can be produced by chelating agents as nausea, vomiting, headache and increase the blood pressure [13].

Dietary supplements, food which contains thiol group can act as a chelators for heavy metal intoxication. In addition to food which can increase the level of glutathione level in the body can help in detoxification of heavy metals toxicity by antagonizing the level of free radicals produced. Cruciferous vegetables, as broccoli, cauliflower, cabbage, Brussels sprouts, kale, bok Choy, turnips, and kohlrabi, are rich in sulfur-containing substances known as glucosinolates. Protein-rich foods, as fish, meats, nuts, poultry, and legumes, are good sources of sulfur. Allium vegetables, such as onions, garlic, chives and leeks, contain organo-sulfur compounds, which are organic compounds that contain sulfur. Eggs are a good source for protein, and also they're high in sulfur, with the white, containing the majority.

Consuming foods containing sulphur amino acids can help in increasing the glutathione levels. Like milk thistle which is an excellent antioxidant prevent the consumption of glutathione. In addition to, silymarin which is the active compound of milk thistle. It is a natural liver detoxifier, can protect liver from many toxins such as carbon tetrachloride [14,15].

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