

STUDY ON THE EFFECT OF MERCURY METAL ON THE CHEMICAL STATUS OF GSH IN AQUEOUS MEDIUM

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ABSTRACT

Elemental Mercury is the main ingredient in dental amalgams and in plasma derived medicinal products and in other many medicines, but Mercury is a neurotoxin and can harm to human health, if exposed. Thus it is interesting to study the effect of Mercury on the Glutathione (GSH). The effect of Mercury on the chemical status of the GSH in aqueous has been studied using U.V Spectrophotometer by using Ellman's method with different concentrations of Mercury salt and time dependence. Study showed a profound effect on decreasing the concentration of GSH in aqueous medium, as the concentration of mercury is increased, and/or time has passed, probably due to oxidation of GSH to corresponding disulphide GSSG.

INTRODUCTION

Glutathione (glutamylcysteinylglycine) is a sulfhydryl (-SH) antioxidant, antitoxin, and enzyme cofactor. Glutathione is ubiquitous in animals, plants, and microorganisms, and being water soluble is found mainly in the cell cytosol and other aqueous phases of the living system (Kosower and Kosower, 1978; Kidd, 1991; Lomaestro and Malone, 1995; Meister, 1976). Great interest has been found in recent year in GSH the major nonprotein thiol (NPSH) in cell (Khan and Khan, 2001) due its varied biochemical, physiological and pharmacological activities include; drug metabolism, cellular protection against electrophilic attack of chemical and/or its metabolites. Glutathione is present inside cells mainly in its reduced GSH form. In the healthy cell GSSG, the oxidized (electron-poor) form, rarely exceeds 10 percent of total cell GSH (Kosower and Kosower, 1978). Intracellular GSH status appears to be a sensitive indicator of the cell's overall health, and of its ability to resist toxic challenge. Experimental GSH depletion can trigger suicide of the cell by a process known as apoptosis (Duke *et al.*, 1996; Slater *et al.*, 1995).

Elemental mercury is the main ingredient in dental amalgams. Mercury (I) chloride (also known as calomel or mercurous chloride) has traditionally been used as a diuretic, topical disinfectant, and laxative. Mercury (II) chloride (also known as mercuric chloride or corrosive

sublimate) was once used to treat syphilis (along with other mercury compounds), although it is so toxic that sometimes the symptoms of its toxicity were confused with those of the syphilis (Berdon *et al.*, 2002). It was also used as a disinfectant. Blue mass, a pill or syrup in which mercury is the main ingredient, was prescribed throughout the 1800s for numerous conditions including constipation, depression, child-bearing and toothaches (Hillary, 2001). In the early 20th century, mercury was administered to children yearly as a laxative and dewormer, and it was used in teething powders for infants. The mercury containing organohalide Mercurochrome is still widely used but has been banned in some countries such as the U.S. Some vaccines have contained the preservative Thimerosal (partly ethyl mercury) according to FDA report (Thimerosal in Vaccines). It has been widely speculated that this mercury-based preservative can trigger autism in children who are already genetically predisposed to it (Lowy and Joan, 2004). Mercury compounds are found in some over-the counter drugs, including topical antiseptics, stimulant laxatives, diaper-rash ointment, eye drops, and nasal sprays.

Mercury has affinity for the GSH present in aqueous phases of blood. This affinity is mainly formed between metal and sulfhydryl groups of proteins (Quig, 1998). This affinity can cause a depletion of the reduced form GSH in the blood, but with the depletion of the GSH, its