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Journal of Dental Health, Oral Disorders & Therapy

The Dangers of Dental Amalgam

Keywords: Amalgam; Mercury; Inflammation; Toxicity

Editorial

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Volume 2 Issue 3 - 2015

Essam Soussa*

Department Oral Biology, Mansoura University, Egypt

***Corresponding author:** Essam Soussa, Department of Oral Biology, Mansoura University, 9 Victor Bassili El-Azzarita, No.15-Alexandria, Egypt, Tel: +201207751183; Email: esoussa24@hotmail.com

Received: May 23, 2015 | **Published:** June 01, 2015

Dental amalgam is the most common restorative material used in clinics. In 1819 Invention of silver/mercury amalgam by the English chemist, Bell. About 1830, a revolutionary new dental restorative material called 'amalgam' was introduced to the United States. This amalgam was developed in England and France and contained silver, tin, copper, zinc and mercury. The amalgam fillings were not openly embraced by organized dentistry in America, and in 1840, members of the American Society of Dental Surgeons were required to sign pledges not to use mercury fillings. In 1926 the German chemist, Dr. Alfred Stock researched mercury poisoning and identified through his research that silver amalgam fillings in the mouth were a source of mercury vapor. More recently, many studies reported that amalgam may constitute potential toxic hazards to patients through mercury release and absorption, surface corrosion, and the reaction of released mercury with residual alloy particles to form additional inter metallic compounds. Furthermore, mercury may migrate gradually from an amalgam restoration into the enamel, dentin, pulp tissues, and adjacent gingival tissue where it accumulates [1]. Increased mercury levels in the gingiva adjacent to sub gingival amalgam restorations have been reported. In addition, fine amalgam particles may become accidentally embedded in the soft tissues of the mouth, most commonly the gingiva, when they are abraded by high speed rotary instruments, during the removal of the amalgam fillings and preparation of crowns over amalgam cores. Moreover, this can occur when amalgam is used as a retrograde root filling material, and produces tattoo [2].

Examinations of tissue biopsies from both human and experimental animal lesions by light, electron microscopy and energy dispersive x-ray micro-analysis have shown that the small particles of amalgam undergo progressive degradation within phagocytic cells, with a subsequent redistribution of their constituted elements. Fine secondary particles containing silver become widely distributed in tissues, producing the characteristic tattooing, thereafter, mercury is released into surrounding soft tissues [3]. Amalgam debris is able to activate immunologic adaptive reaction where tissue reaction to amalgam tattoo depends on amalgam particles size and composition. While copper and zinc are rapidly lost from the area of the tattoo, mercury and tin are lost more slowly and finally silver remains permanent in the tissues. The residual elements of amalgam tattoo develop a noxious effect within soft tissues, where mercury passes from the tissue fluid into the blood stream and accumulates in the kidneys [4]. Exposure to large amounts of metallic mercury vapor, compared to small amounts released from amalgam fillings, causes certain symptoms that may include cough, fever, skin rashes, tremors, difficulty in muscle coordination and walking, renal abnormalities, and memory loss [5]. Patients allergic to mercury used in dental clinics may experience itching, hives, local soreness, burning, and dryness of throat and mouth. Several studies reported a strong relationship between the total surface areas of amalgam restorations and blood or urine mercury levels [6]. Heintze et al. [7] reported *in vitro* formation of methyl mercury from a conventional and mixed amalgam by the action of streptococcus sanguis, mutans and mitior in pure cultures, suggesting the possibility of methyl mercury formation in the mouth if amalgam is present. Mercury compounds have high affinity to proteins, amino acids, purine, pyrimidine and nucleic acid [8]. Mercury toxicity was explained by its interaction with these molecules through sulfhydryl groups, and disulfide bonds on cell membrane; thus, mercury compounds alter the selective permeability of cell membranes for ions and nutrients and possibly block more specific membrane transport processes.

Fetal exposure may follow previous mercury uptake by a pregnant mother where mercury compounds, as most other substances, may pass through the placenta to the fetal circulation [9]. Fetal toxicity occurs following certain degrees of mercury compounds accumulation within the central nervous system. Although studies shown that little mercury compounds penetrate to fetal tissues, embryopathic effects of these compounds have been demonstrated as growth retardation, subcutaneous edema, exencephaly, anophthalmia, and teratogenic effects, such as cleft lip and palate, ribs fusion and syndactylia and embryopathic death. Therefore, the safety of dental amalgam-released-mercury during pregnancy became questionable.

Data from Soussa E [10] study shows a positive correlation between blood mercury levels in mothers and their oral tissue response; however, the negative impact of mercury on oral tissues is regarded to have taken place during pregnancy in relation to elevated blood mercury levels of mothers. Monitoring the blood mercury following dental amalgam restorations during pregnancy is recommended to avoid its harmful effect on the fetus. The World Health Organization (WHO) has stated that there is no safe level of mercury. That means that no amount of mercury is safe, not even one atom. Even if enough mercury hasn't accumulated to manifest a symptom directly or indirectly related to chronic mercury poisoning,

The World Health Organization, O.S.H.A., N.I.O.S.H., etc, all agree that mercury is an environmental poison and have established specific occupational exposure limits. The Environment Protection Agency has declared amalgam removed from teeth to be a toxic waste. Even the American Dental Association warns that amalgam filling material is hazardous to dental office personnel,

but is safe in patients' mouths. Dental amalgam is the most restorative material in dentistry. Local effects of amalgam debris over tissues have been sparsely studied, most scientific studies find no relationship between amalgam fillings and symptoms of mercury poisoning in any age group. Research continues in order to expand knowledge about any potential effects of amalgam fillings. The dental profession has generally ignored or denied the great risks of using mercury and other metals in mercury fillings.

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Citation: Soussa E (2015) The Dangers of Dental Amalgam. J Dent Health Oral Disord Ther 2(3): 00052. DOI: 10.15406/jdhodt.2015.02.00052