

Editorial

Oral Reactions Related to Contact with Dental Amalgam

Dimitrios Dionysopoulos*

Department of Operative Dentistry, Aristotle University of Thessaloniki, Greece

***Corresponding author:** Dr. Dimitrios Dionysopoulos, Department of Operative Dentistry, School of Dentistry, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece, Tel: +302310841425; E-mail: ddiondent@gmail.com

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Oral tissues are often subjected to many external stimuli, such as thermal, chemical or mechanical. Moreover, the oral mucosa may be in constant contact with tobacco, alcohol, or other noxious substances as well as dental restorations. One of the most common restorative materials is dental amalgam, which contains mercury, silver, tin, copper, zinc and other trace metals. Particularly, dental amalgam is an alloy composed of a mixture of approximately equal parts of liquid mercury and a powder consisting of $\geq 40\%$ silver (Ag), $\leq 32\%$ tin (Sn), $\leq 30\%$ copper (Cu) and other trace metals, including $\leq 5\%$ indium (In), $\leq 1\%$ palladium (Pd), $\leq 1\%$ platinum (Pt), $\leq 2\%$ zinc (Zn) and $\leq 3\%$ mercury (Hg) according to ISO 24234 (2005).

Regarding the constituents of dental amalgam, condensing into the tooth cavity preparation, removal of excess surface material and polishing, may cause their release in the oral environment. Furthermore, during restoration process a small amount of dental amalgam debris could be swallowed or become lodged in periodontal tissues, and that erosion of amalgam restoration may also result in release of further amounts of its components. Components of amalgam may, in rare instances, cause local side effects or allergic reactions referred to as oral lichenoid lesions [1].

Amalgam has been used in dentistry for more than 180 years and its excellent clinical behavior is well known. The use of dental amalgam has decreased in recent years due to introduction of esthetic composite materials and concerns about potential environmental hazards related to the release of metal ions, especially mercury (Hg) [2]. Three forms of mercury exist: inorganic, organic and elemental or metallic. Inorganic mercury exists in the form of salts of mercury, such as HgCl_2 and can be highly toxic. The most common form of an organic mercury compound is methyl mercury (CH_3Hg), which can be formed by microorganisms. Elemental or metallic mercury (Hg) is a silver/white liquid at room temperature and is used in dental amalgam. Unfortunately, elemental mercury emits mercury vapor, which is readily absorbed into the blood through alveolar membranes and crosses the blood/brain barrier into the central nervous system [3].

The amount of mercury released from amalgam restorations varies with the number of amalgam restorations, their surface area, particularly the load-bearing surface area, the galvanic currents,

mastication habits, eating habits, chewing gum and tooth brushing habits. Mercury absorption from amalgam restorations lies between 2-5 $\mu\text{g}/\text{day}$ for the average adult [4]. This amount is below the threshold of minimum Hg intake which recently reduced to 0.1 $\mu\text{g}/\text{day}/\text{Kg}$ body weights [5].

It has been found in previous clinical investigations that amalgam restorations may cause pathological reactions in oral mucosa. Three different reactions to amalgam restorations have been recognized in susceptible patients [6]: delayed or type IV hypersensitivity reactions, toxic reactions, and a much rarer condition, acute or generalized sensitivity, the management of which differs considerably. The most common reaction to amalgam is the development of oral lichenoid lesions which is a type IV hypersensitivity reaction. The mercury salts that accumulate in healthy and damaged oral mucosa will cause this hypersensitivity reaction in only a susceptible minority of the population with resulting reticular white patches, papules, plaques, erosion or ulceration, similar to that found in oral lichen planus [7].

Oral lichenoid lesions resemble those of oral lichen planus, and it is therefore necessary to exclude likely lichenoid lesions when making a diagnosis of oral lichen planus. Both oral lichen planus and oral lichenoid lesions can be considered potentially malignant and is important for subsequent management to be able to accurately diagnose each condition [8]. Oral lichenoid reactions should be suspected clinically when lesions of the buccal mucosa or tongue are unilateral, in intimate contact with amalgam restorations and maintain incurable after appropriate therapy.

It is not possible to confirm the diagnosis of oral lichenoid lesions through histology, due to the difficulty in differentiating oral lichen planus from oral lichenoid lesions from the histological viewpoint [9]. Histopathological study is not always necessary except when their clinical presentation is atypical in order to exclude the existence of malignancy.

Currently, the use of epicutaneous patch test to detect sensitivity to specific substances in patients suspected of suffering contact allergy is controversial. Treatment of oral lichenoid lesions related to contact consists of the removal, replacement or recovering of amalgam restorations in direct contact with oral mucosa lesions and are suspected of playing a causal role [10].

References

1. McParland H, Warnakulasuriya S. Oral lichenoid contact lesions to mercury and dental amalgam. A review. *J Biomed Biotech.* 2012; 2012: 589569.
2. Roberts HW, Charlton DG. The release of mercury from amalgam restoration and its health effects: A review. *Oper Dent.* 2009; 34: 605-614.
3. Spencer AJ. Dental amalgam and mercury in dentistry. *Aust Dent J.* 2000; 45: 224-234.
4. Mackert JR. Factors affecting estimation of dental amalgam mercury exposure from measurements of mercury vapour levels in intra-oral and expired air. *J Dent Res.* 1987; 66: 1775-1780.
5. Clarkson TW, Magos L, Myers GJ. The toxicology of mercury – current

- exposures and clinical manifestation. *New England Med.* 2003; 349: 1731-1737.
6. Holmstrup P. Reaction of the oral mucosa related to silver amalgam: a review. *J Oral Pathol Med.* 1991; 20: 1-7.
 7. Bolewska I, Holmstrup P, Moller-Madsen B, Kenrad B, Danscher G. Amalgam associated mercury accumulations in normal oral mucosa, oral mucosal lesions of planus and contact lesions associated with amalgam. *J Oral Pathol Med.* 1990; 19: 39-42.
 8. Warnakulasuriya S, Reibel J, Bouquot J, Dabelsteen E. Oral epithelial dysplasia classification system: predictive value, utility, weaknesses and scope for improvement. *J Oral Pathol Med.* 2008; 37: 127-133.
 9. Cobos-Fuentes MJ, Martinez-Sahuquillo-Marquez A, Gallardo-Castillo I, Armas-Padron JR, Moreno-Fernandez A, Bullon-Fernandez P. Oral lichenoid lesions related to contact with dental materials: A literature review. *Med Oral Pathol Cir Bucal.* 2009; 14: e514-e520.
 10. Issa Y, Brunton PA, Glenny AM, Duxbury AJ. Healing of oral lichenoid lesions after replacing amalgam restorations: a systematic review. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2004; 98: 553-565.