

Environmental impact of mercury waste from dental practice. State of the art.

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Introduction

When we talk about the toxic risk in odontology, the first material that comes to mind is, without a doubt, the amalgam and the mercury in it. However, it is our oldest coronary restoration material (1836), thus the one with the most clinical recoil.

However, this material has always been controversial, blaming it for systemic toxicity (neurotoxicity, nephrotoxicity, fetal abnormalities, etc.) and environmental impact. Through this work, we will try to shed light on the harmful effects blamed on this material, which nevertheless continues to serve public health.

Dental amalgam

Dental amalgam has been used by dental surgeons for over 180 years. This material contains mercury (the only cold liquid metal) at 42-50% of its total volume. It is an economical material with a good cost efficiency ratio. If used properly, it has a survival time between 10 and 20 years. [1-3]

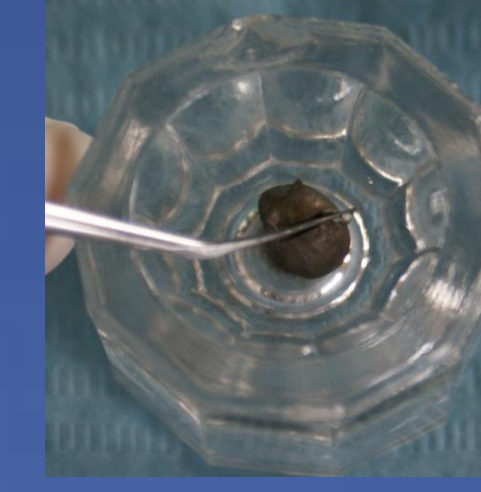
20-30 % Ag ++
11-15% Sn
7-15% Cu
Zn Pb



Presentation of amalgam before mixing



Amalgamator : machine for mixing amalgam: Vibration mixing of alloy and mercury



Once kneaded, it is in the form of a plastic paste that hardens in the cleaned cavity of the carious lesion and becomes almost as resistant as dental tissue.



Biological effects of dental amalgam

Local effects: Mercury allergy



A. White lesion on oral mucosa in close contact with amalgam restoration



B. Complete disappearance of the lesion following replacing amalgam with a composite restoration

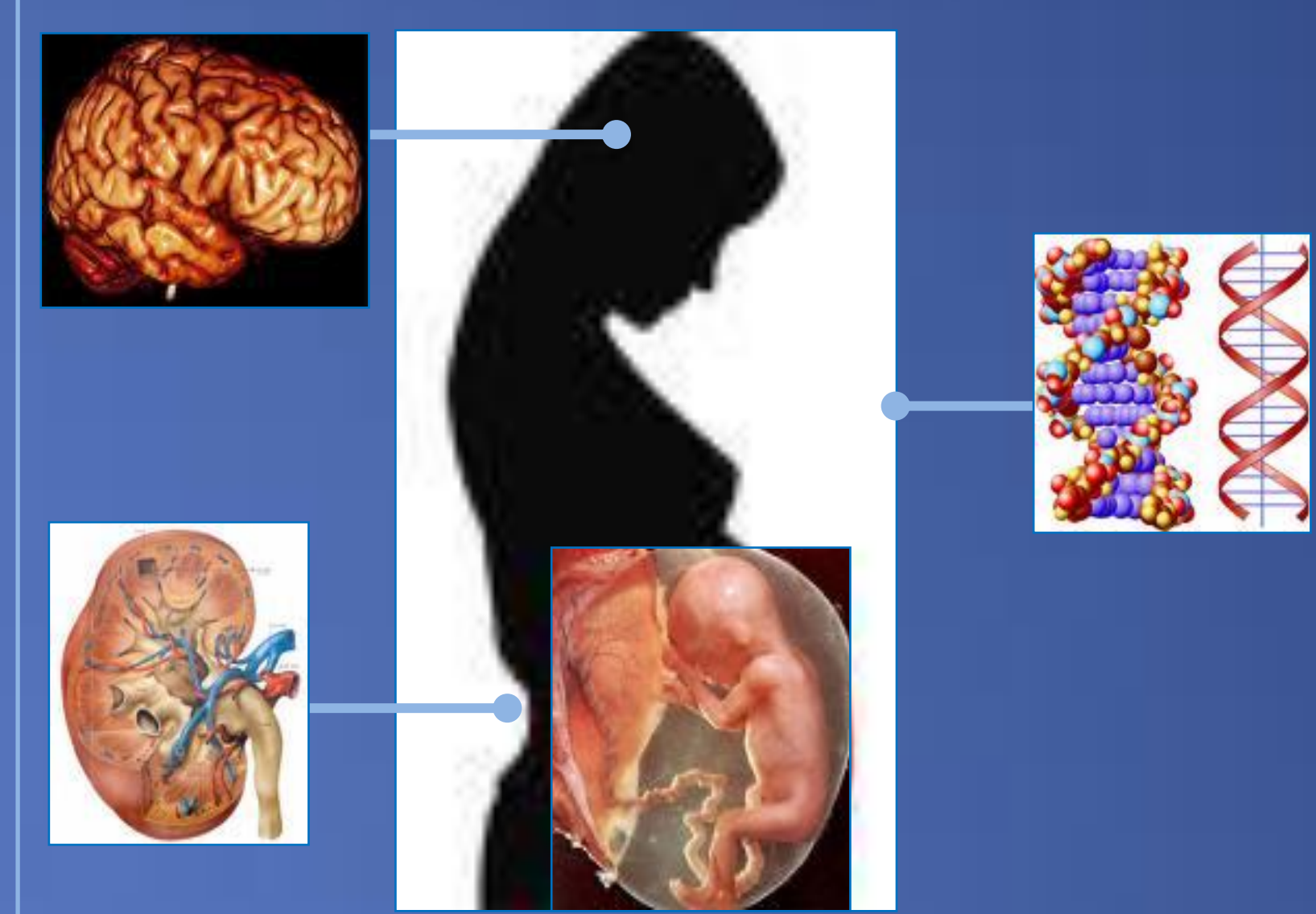
The toxicity of mercury has been recognized since antiquity, and confirmed by the Minamata disaster [4] in Japan (1953-1961).

This toxicity is mainly due to the high volatility of mercury and the solubility in water and fats of its inorganic form leading to the formation of methylmercury, whose bonding facilities with other molecules allow it to be absorbed and transported in the body. [5]

Although this toxicity is continually raised and discussed, a clear conclusion about the effects on human health at the exposure level has not yet been established, especially in situations of chronic exposure to low concentrations such as in patients with dental amalgam. [7-12]

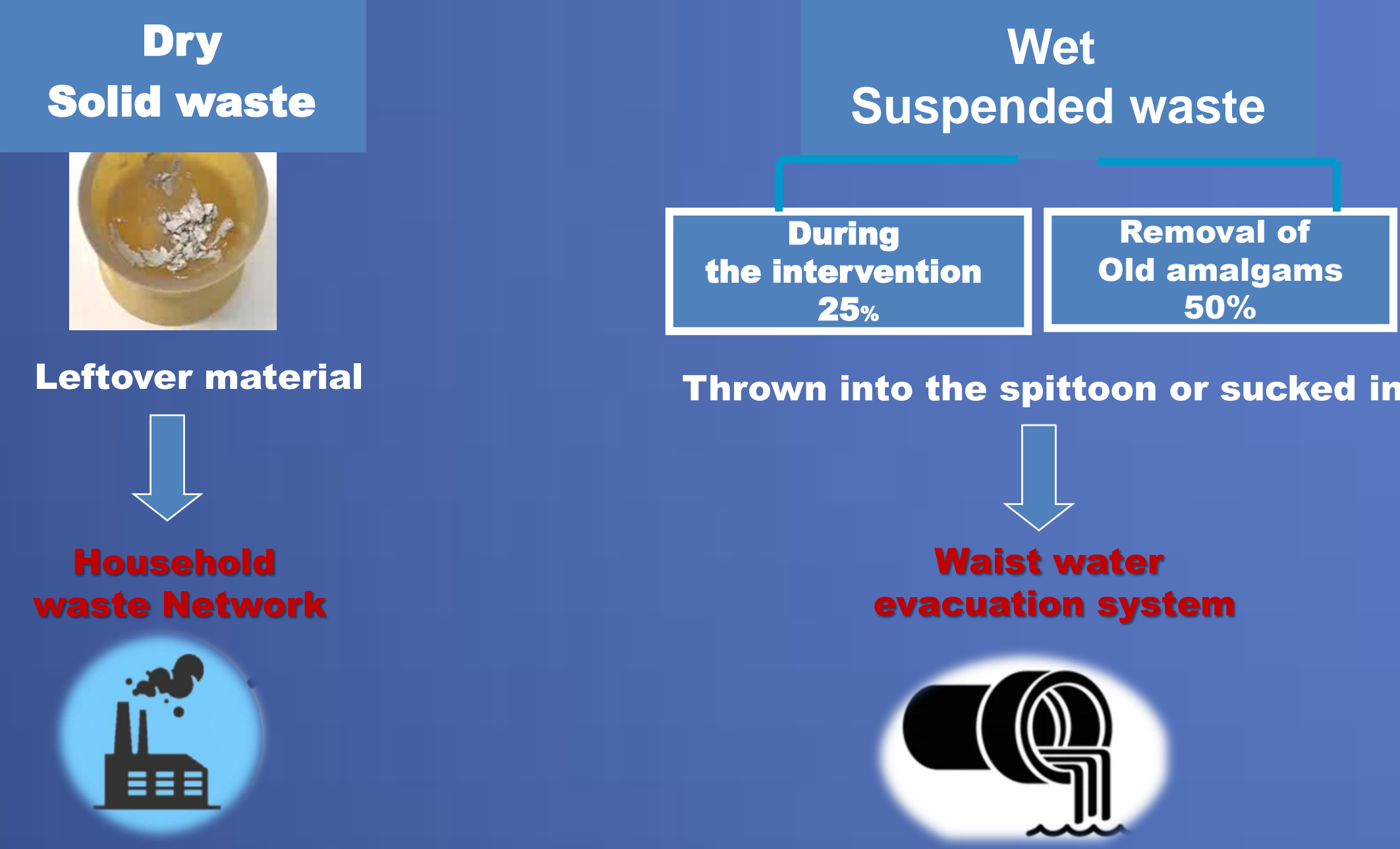
Dental amalgam can, in rare cases, cause local allergic reactions. They result clinically in the appearance of contact dermatitis (coloration of the mucous membranes), eczema, stomatitis, glossitis or cheilitis. [13,14]

General effects of mercury



No study has currently established a direct causal link between dental amalgam and any general pathology.

The environmental impact of mercury waste from dental office



Human activity (mining, agricultural, industrial, health activities) tends to dominate environmental pollution with about 85% of the mercury pollution of lakes and streams.

Dental discharges to wastewater are small quantities of course, but multiplied by the number of dentists and the frequency of amalgam use. [6-12]

Considering that amalgam waste contains 50% mercury, 20 tons of this metal would end up in nature, for lack of a regulatory recovery organization. [5]

European studies [15] have shown that each dental practice releases 24 to 1700 mg of Hg/year into the environment. In their great majority, until 1998, in France, this waste was evacuated with waste water.

In Morocco, a study carried out in 2010 shows that 46% of dental amalgam waste ends up in the trash, and 32% in the spittoon. [16]

The mercury from dry waste that arrives in landfills always ends up reaching the water table. If household waste is incinerated, the mercury in the form of vapor causes air pollution and mixed with rainwater will again lead to water contamination. In addition, the wet waste found at the outlet of the spittoons and suction passes directly into the wastewater circuit and contaminates the treatment plants.

As a result, dental offices must manage the risk of mercury pollution to the environment and public health.

Amalgam waste management in dental office

Regulatory framework

Every dental practitioner has responsibilities with regard to the risks inherent in his activity.

Like in most European countries, since 1998 [17], every French dentist is required to comply with the regulations.

Whereas in Morocco, the definition of a regulatory mechanism for the recovery of amalgam waste is far from being on the agenda.

Moroccan legislation [18] refers to the general texts of liability. Judges apply general articles of the Civil and the Penal Code.

As for the council of dentists, it refers to the code of ethics of dentists. However, according to one study [16] very few dentists (8%) believe they have a responsibility for their waste.

The mercurial waste treatment channel at the dental office

Wastes from dental care activities, including mercurial wastes, are very different in nature. Although their treatments are specific, they remain identical in their principle: collection, transport, disposal or recovery and finally the assurance of the traceability of their disposal.

In 1994, in most northern European countries, the collection of amalgam waste was already efficient. Sweden, the Netherlands, Norway, Denmark, Switzerland and Germany were already capable of recovering, sorting, transporting, treating and recycling amalgam waste.

North-american and most European countries require dental surgeons to equip their dental chairs with an amalgam separator. It is a device that prevents solid waste from entering the conventional wastewater system.

In Morocco, in 2010, 63% of dentists surveyed said they did not use amalgam separators. 34% of dentists entrust their waste to a household waste collector. A significant amount (60%) is evacuated by sewers and 40% of respondents have no idea about the existence of amalgam waste treatment companies and 50% say they do not exist. [16]

Conclusion

The toxicity of oral dental amalgams has never been scientifically proven.

Better designed studies are needed, particularly for investigation of effects on subpopulations possibly more susceptible to amalgam exposition.

However, since mercury is a biocumulative and non-biodegradable poison, mismanagement of amalgam waste is a significant source of environmental pollution and indirectly health toxicity.

A major step could be taken in our country by the adoption of texts specifically governing the management of dental amalgam waste and the development of waste collection and recycling systems for mercury waste.

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