

Flying High Over Mercury

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"The introduction of mercury into the environment is a very serious matter..." These words are attributed to Chemist Andrea Sella, an academic at the University College of London.

It was a routine afternoon of consultations. I was about to see my final patient for a postoperative control. The patient had evolved excellently and had followed the instructions to the letter.

However, the consultation lasted well over an hour. So, what happened? - The reader may ask.

It turned out that the patient had experience both as a dental laboratory technician and as an industry equipment technician. We talked about pollution, the environment and about the public health issue that dental amalgams have become, since they have - among its many components - mercury. That conversation, which lengthened my day, not only led me to research the literature and the web, but also ended up inspiring this article on mercury.

Mercury is a metal that is present in the earth's crust; therefore, it has been with us since ancient times. On the periodic table, it can be distinguished by the number 80 and the acronym HG. It has the uniqueness of adopting or appearing in various forms. It is uncommon to find it as pure metal, but rather, as a part of organic compounds (Methylmercury) or as inorganic salts. The superficial soils of the earth, the waters and the bottom sediments are considered the main biospheric deposits of mercury and this, in addition, has formed (and still forms) part of our everyday life: in thermometers, batteries, fluorescent lights, electrical switches, medication, the aforementioned amalgams and many others. Industrialization and other activities such as mining have helped spread mercury into the environment, polluting air and water.

Mercury ..., "is a serious matter ..." indeed. How does it affect human health?

The bay and the disease.

Many years ago, there was an unfortunate case of mercury contamination. That incident, which occurred in a Japanese bay, sounded the alarms forever.

Minamata Disease is a serious and permanent neurological syndrome caused by mercury poisoning. Symptoms include ataxia, sensory neuropathy in hands and feet, deterioration of sight and hearing, weakness and, in extreme cases, paralysis and death.

Minamata, Japan was the center of an outbreak of methylmercury poisoning in the 1950s, thus the name Minamata disease.

In 1956, the year in which the outbreak was detected, dozens of people died without counting the pregnant women who became ill and transmitted the effects to their children. The cause of the disease was contaminated fish and shellfish caught for human consumption in the Bay of Minamata [3].

Conscious of the black legend that mercury bears, in recent years, several studies have focused on investigating and identifying its effects on human health. The conclusions have not always been categorical, but yes, interesting and worrying data has been demonstrated. The following are some examples.

Effects in adults

In February 2016, in *Jama* magazine, a study of the adult brain and its level of mercury, associated with the consumption of shellfish, was published [1]. The study subjects were octogenarian individuals with "healthy" brains at the time of death, that is to say, without dementia. In spite of the seriousness of the study, conclusive results were not reached in terms of cerebral neuropathology caused by mercury.

Effects on children

Some studies in South Korea and Spain have found a relationship between mercury concentration in umbilical cord blood and low birth weight. However, other researchers in France, New York, the United Kingdom or Canada have found no association with low birth weight or gestational age. In Michigan (USA), an association was found between mercury concentration in umbilical cord blood and prematurity.

Another large, global study that involved a thousand women of childbearing age, who live in transition and developing countries, demonstrated measurements with high levels of mercury [2]. These results were appreciated in countries as distant and dissimilar as Thailand, Chile and Ukraine, among others.

In addition, mercury contamination has a bio-amplifying effect. That is to say, once it is released into the environment by industrial activities (as mentioned), whether extractions and/or combustion, there are certain bacteria that can transform it into methylmercury, which due to its liquid form, accumulates in fish and shellfish. They, in turn, are ingested by other predatory fish which are then caught for human consumption. Proper domestic cleaning and cooking does not eliminate the mercury present in them.

We cannot fail to mention coal combustion, (coal contains mercury), and that it is used to generate heat and electricity. This practice is a significant source of vapor release. These vapors can be inhaled and affect human health with neuromuscular disorders, such as those observed in the tragedy of Japan.

And what about the amalgams?

In 2009, an expert consultation organized by the WHO concluded that a global and short-term ban on amalgams used for dental filling would generate problems for dentistry and public health. Therefore, it was agreed to plan its gradual elimination while developing alternatives in a parallel manner.

Among the countries that adopted public health measures regarding dental amalgam, Norway, Denmark and Sweden banned its use in 2008. Simultaneously, Canada and Germany recommended avoiding the placement and removal of amalgams during pregnancy and in patients with kidney problems.

What a challenge dental professionals have, including my patient. As a matter of fact, all the inhabitants of the planet have this challenge. All of us, without exception, have pending tasks; from institutions such as the EPA [4] and its legislative efforts, the WHO [5], the PAHO [6], the Basel Convention member countries [8] and their re-updates, non-governmental citizen organizations [7] etc. The task is clear: review the processes, replace "dirty" energies with others, promote recycling and, most importantly, put an end to any emissions of mercury into the atmosphere [9] (whether from a small amalgam or from a large mining task). Each and every one of us must begin with our own contribution to the care of the planet.

Late in the afternoon, quite late in fact, I thought of my old molar, treated with an amalgam with mercury. It resisted for years, until it was replaced with a modern implant.

I wonder where the mercury residue is today.....

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