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Should I be worried about aluminum in fillings and crowns?

Aluminum is an extremely ubiquitous metallic element found widely distributed in nature. In its fully reduced (shiny metal) form, aluminum will react with a vast number of chemical constituents, and some of these are quite toxic. We are very concerned with how a patient reacts with aluminum in such forms, as well as with some of the compounds which it can participate in.

However, not all forms of aluminum are readily reactive, nor do they have appreciable toxicity concerns. In order to be a toxic problem, aluminum must be ionizable or dissociable or otherwise available to bind chemically with tissue constituents. If the aluminum does not have opportunity to chemically separate and bind, toxic constituents are simply not formed.

Examples of this 'benign' group of aluminum compounds include alumina, aluminum oxide and aluminosilicate. In such fully oxidized forms, the aluminum is either completely bound, or is part of a chemical matrix in crystalline lattice form, or both. Some common occurrences of these forms of aluminum are quartz, mica, feldspar, opal, glass and basic sand. While it is technically possible to force aluminum to chemically separate from any of these materials, it would require extreme furnace heat or high irradiation energy. These conditions are not commensurate with life and tissue survival.

Some dental treatment products, such as certain astringents, do contain aluminum in potentially dangerous or toxic forms. We are concerned about these and will flag them as 'not well suited' for aluminum sensitive patients. However, most restoratives such as composites, glass ionomers, ceramics, porcelains, compomers and ceromers which contain aluminum will have them present in the 'benign' forms. These forms are not readily dissociable and are well suited for duty in the respective restoratives.

As a routine measure of stability of an element included in a compound, scientists measure the 'half-life' of the element. Expressed in units ranging from fractional seconds all the way up to years, the half life tells us the time required for half of the element to exit the compound in which it is contained. In the case of alumina, aluminum oxide and aluminosilicates examined under conditions expected to occur in the oral cavity (temperature, osmolality, pH, etc.), the half-life for dissociable / ionized / bioavailable aluminum is conservatively estimated at 10^9 - 10^{11} years. In other words, the time for one-half of the aluminum to exit the filling or crown and to be available for toxic binding in the body would be 1,000,000,000 - 100,000,000,000 years. There will not be enough dissociable aluminum from the restoration over a lifetime to measure. While tiny fines or bits of the restoration or crown may be physically broken off, these bits are intact, non-reactable alumina / aluminum oxide / aluminosilicate and will not be dissociated aluminum to participate in a toxic combination.

Dental products are not the only ones where we find the benign forms of aluminum. The glass jars which contain our foods and beverages on the grocer's shelf are basically barium-boro-aluminosilicates. Sand on the seashore is a rich mix of aluminum oxide and various aluminosilicates. Glass utensils, dishes and vessels in the kitchen (ie., Pyrex, Kimax, Corningware, Stoneware, Anchor-Hocking) are similar aluminosilicates and aluminum oxides. In our bodies, by nature, the bones are comprised of 2.0% - 2.5% aluminosilicate, aluminum oxide or alumina . If the patient can safely have food or beverage stored in glass, or can safely eat food prepared in a Pyrex pan or bowl, or can safely walk on sand, then it becomes immediately obvious that these forms of aluminum are not a threat to good health. The aluminunosilicate / aluminum oxide content of the bones is supplied and replenished daily from the fruits, grains and vegetables of the diet. The aluminosilicate content of lettuces and other vegetables in a single fresh garden salad serving will easily exceed the total quantity of aluminum released in ionized form from a mouthful of porcelain or ceramic crowns over a period of years.

For the patient concerned about aluminum and its participation in toxicity and pathological processes, the form which the aluminum takes is critical. In the screening testing supplied through our company, we will immediately flag products containing dissociable aluminum as ‘not well suited’ for a patient showing aluminum sensitivity. For those products which contain aluminum as alumina, aluminum oxide or aluminosilicate, we will not consider such aluminum to be of any issue whatsoever unless the patient also shows an issue with silicates. This precludes throwing out the baby with bath-water, so to speak.

Parenthetically, all modern composites, glass ionomers, porcelains and ceramics contain metals. We have seen the advertisements for ‘metal-free dentistry’. Such ads would be accurate if they indicated that the materials contained only fully oxidized, non-dissociable metals. There is no such creation as a metal-free restorative. The fillers will either be of the aluminum oxide / aluminosilicate, or they will be one of several zirconium or strontium compounds. Aluminum, strontium and zirconium are metals. Recalling freshman chemistry, any time there is an anion in nature, there will need to be a balancing cation present. Cations are usually metals. Dentistry has not found a mechanism to thwart the laws of nature. The issue of importance is the form the metals take and not their mere presence.

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