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RADIOACTIVE DENTISTRY!

In 1987, the United States Food and Drug Administration (FDA) released its Final Rule on classification of the safety and effectiveness of accepted dental devices [FR 52(155):30082-30108, 12 Aug 1987]. One issue addressed by FDA was the radioactivity of dental porcelain [19a., pp. 30093-4]. FDA stated: *"Some comments on the proposed classifications of porcelain teeth and porcelain powder for clinical use (used fused to make porcelain teeth) agreed that these devices should be classified into Class II as proposed, because the amount of depleted uranium that is used in these devices to provide fluorescing characteristics should be controlled by a standard."*

FDA cited levels of depleted uranium ranging from 300-1000 ppm and stated: *"The devices present increased risks from ionizing radiation"* (at levels greater than 300 ppm), and *"FDA has suggested that manufacturers develop suitable substitute materials to provide fluorescing characteristics to replace depleted uranium ."* Note that FDA only "suggested" the replacement of radioactive uranium, whereas previous government action had banned the use of radioactive materials in watch dials!

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Is There a Renewed Trend of Radioactive Compounds in Dental Materials?

Bio-Probe is very grateful for permission to report on recent dedicated work by Ulf Bengtsson of Sweden, who researched patents on various dental products with radioactive materials. Ulf points out that this information is based only on patent search, not on chemical analysis. In the case of dental composites, he points out that the concern is more with the filler materials used, rather than the polymer.

Abstract: In order to mimic the fluorescence of human enamel radioactive compounds including both natural and depleted uranium has been used in artificial teeth and ceramic powders. This use of uranium has been going on at least since 1925. Strong indications point at a new and accelerated use of radioactive compounds in other dental materials. Especially thorium but also uranium and perhaps others might have been added to some of the new composite resins dominating the market today. The main reason is to achieve the necessary X-ray opacity. Non-radioactive alternatives do however exist.

When used as a fluorescent agent in artificial teeth and ceramic powders, uranium must not exceed 0.03% by weight according to the only standard regulating radioactive compounds in dental materials (USA). This standard explicitly says that the limitations are only valid for uranium in dental porcelain. When used as a radio-opaque agent in dental composites, radioactive compounds are expected to be at a considerably higher level, perhaps as high as 10% or more.

In one scientific article an acrylic resin for polymeric appliances is proposed to contain 11-14% uranium. It is uncertain whether this has materialized into a marketed product. One patent describes a dental cement containing uranium in order to render the product X-ray opacity.

No relationship between radioactive dental materials and cancer has been established. In fact, it has not even been investigated. No scientific article discussing a possible trend towards modern radioactive dental materials has been found.

The use of radioactive compounds in dental materials has to be investigated. It has to be established if radioactive fillings are used and, if so, the problem has to be quantified. Dental materials are ground and polished in the patient's mouth, sometimes with unintentional damage to the oral mucosa, thus resulting in an imbedding of dental material. This possibility has to be taken into account when examining the biocompatibility of these dental materials. The possibility that the patient is swallowing radioactive particles due to teeth grinding or dental treatment has to be addressed. Possible inhalation of radioactive compounds by patients, technicians and dentists has to be taken into account.

The use of intentionally radioactive implants where radioactivity is not used for its therapeutic effects but for technological reasons alone has to be carefully reviewed.

Ingredients of Dental Materials (excerpts):

* *Dent MR* database: www.dentmr.dentalhandel.se.

* Due to very imprecise listing of ingredients and very poor quality of information, this data base is however of limited use to professionals. This especially is true for the more complex materials such as composites.

* The components of composite resins are often disclosed by manufacturers in general terms, but significant information may only be attained by chemical analysis.

* Members from dental industry hold official positions in dental scientific organizations. Few, if any, scientific areas show such a heavy organizational amalgamation of industry with science as dental science does. This connection can be further studied at:

http://vest.gu.se/~bosse/ybftBEN95a.html.

Radioactive Compounds in Some Dental Composites and Other Materials (excerpts):

* Polymers used in dental composites are X-ray translucent. In composites X-ray opacity has been achieved by adding various heavy metal fillers, some being toxic, others being radioactive. Proposed fillers include uranium, thorium, lead, mercury, barium, bismuth, etc. Zirconium glass is also noted as radioactive.

[Ed Note: The author cites 35 references verifying radioactive agents in dental materials.]

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