Letter to Editor

The Most Promising Alternative to Mercury-containing Dental Restorations

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Dear Editor;

The European Union Environmental Commission report and the United Nation Minamata Convention have legislated for phasing-out of mercury-containing dental materials use (dental amalgams) by 2030.[1, 2] Several Scandinavian countries have already banned the use of dental amalgams, and this ban is expected to grow to other countries worldwide.[2, 3] This creates a market gap for materials which can be used as an alternative to dental amalgams.[4] Varieties of mercury-free dental materials have been clinically approved as posterior restorations; such as (1) resin-based composite materials, and (2) glass-based materials, including glass ionomers and glass hybrids. Using these types of dental materials will decrease the mercury's risks on human's health and also contribute significantly in the reduction of the environmental mercury pollution.[5, 6]

Recently, several clinical approaches to treat dental caries lesions have shifted the focus to preserving tooth structure and use of adhesive materials. Considering this, Minimally Intervention Dentistry (MID) has become a crucial concept which includes three aspects to fulfil the requirement of preventive and restorative dentistry; these are early caries diagnosis, enhance remineralisation and minimal cutting of tooth surfaces.[7, 8] This approach is identified as an Atraumatic Restorative Treatment (ART). The ART technique was adopted in 1994 by the World Health Organisation (WHO) as an alternative technique for dental caries management in the developed countries either for treating deciduous and/or permanent dentitions.[9] The high viscous glass ionomer cement (GIC) is approved as an ideal candidate material to be used with ART technique; such as GC Fuji IX®, Ketac™ Molar and Glass Carbomer®.[10, 11]

One of the main advances in dental materials field is based on the modifications of the GIC chemical compositions, by introducing a bioactive glass in different particle sizes (for promoting remineralising ability) and/or using a highly molecular weight of poly-acrylic acid (for enhancing matrix strength).[12] When bioactive glass-containing dental materials come into contact with body fluid, will undergo to a sequence of bioactivity reactions; which is summarised into (1) ion exchange, (2) dissolution and (3) precipitation stages, leading to formation of apatite crystals in fractions identical to those of the natural bone and tooth components.[13] Formation of apatite crystals [hydroxyapatite-$Ca_{10}(PO_4)_6OH_2$ or fluorapatite-$Ca_{10}(PO_4)_6F_2$] in the bioactive glass-containing GICs occurs via delivering of calcium (Ca^{2+}), phosphate (PO_4^{3}), hydroxyl (OH^-) and/or fluoride (F^-) species at the interfaces between the GIC/tooth surfaces and/or the GIC/oral environment.[14] For this reason, the bioactive glass-containing GICs are considered as the most promising alternative restorative materials for posterior cavities.

The Libyan oral health care system is mainly privatized;[15] hence the dental professionals continually have to learn and update themselves with the latest advancements in dental materials and technology, to provide the best quality of care for their patients and to stay competitive in a privatized market. Additionally, it is crucial to educate their patients about the reasons behind phasing-out of dental amalgams, to take the right decision about the dental treatment options. Therefore, if the mercury-containing dental material (dental amalgam) is selected, the patient's consent is strongly needed. While this requires the adoption of polices and legislations at the national level, the dentists are ethically required to minimize risk and do the best for their patients.

Yours Sincerely;
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