



## Policy Statement

# Alternative direct restorative materials to dental amalgam

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## FDI World Dental Federation

### KEYWORDS:

minimal intervention  
resin-based composite  
glass ionomer cement  
dental amalgam

### CONTEXT

The use of dental amalgam is declining worldwide. The Minamata Convention has provided direction for a phase down of its use as a restorative material to eliminate the release of mercury into the environment. Alternative direct dental restorative materials have improved with time, but still have limitations. Adequate knowledge of these limitations is critical for appropriate material selection and optimal patient care. Ease and costs of placement, preservation of tooth tissue, performance in high stress areas, caries risk status, adverse reaction to the material as well as the relevance of ion release by such materials are important issues to consider when selecting from these alternatives to dental amalgam.

Existing alternatives have a range of physical and chemical properties that influence their application and longevity. Placement of resin-containing materials requires rigorous moisture control and is technically more demanding and costly than placement of dental amalgam. Moreover, these materials contain unreacted molecules, potentially including bisphenol-A (BPA) and others, that can leach from the material and may be associated with adverse effects in patients. The major mode of failure of these resin-containing materials is fracture and secondary caries. To prevent the latter, optimal oral hygiene is important. Placement of glass ionomer materials is technically less demanding and less costly. Glass ionomer biocompatibility is comparatively high. Failure of these materials largely relates to their limited fracture toughness, with restorations fracturing or wearing. Glass ionomers have been found to release measurable amounts of (fluoride) ions that may minimize the incidence of secondary caries adjacent to the material. Other ion releasing materials have more recently been introduced to the market and more clinical performance data is needed.

### SCOPE

This policy statement aims to provide a basic understanding of significant issues around direct restorative materials that are not dental amalgam, mainly of resin-containing composites, glass ionomers, or resin composite – glass ionomer combinations.

### DEFINITIONS

**Restorative material:** Material (medical device) designed to be used in rebuilding or correcting the form and function of lost tooth substance.

### PRINCIPLES

Clinical success of direct restorations depends on individual factors, e.g. location and extent of the defect, number of surfaces involved, the interaction between material and tooth, the individual's caries risk (oral hygiene, dietary factors, fluoride intake, reduced saliva flow and certain medical conditions), behavioural aspects (e.g. bruxism) and operator skills. Preparation of cavities to be restored using direct materials should be minimally invasive. There are multiple alternative materials for dental amalgam, but no single material is an amalgam replacement for all clinical situations.

The use of alternative materials may impact the cost of treatment, and may necessitate more complex treatment techniques.

### POLICY

FDI recommends:

- using a patient-centred approach instead of a purely material-centred approach when selecting a restorative material, taking individual and material factors into consideration, including:
  - location and size of the planned restoration as these impact the required physical and biological properties of the material;

- carries risk of the individual as fluoride-releasing materials may be preferred in high-risk individuals;
- systemic risk and medical conditions including allergies as alternative materials (specifically resin-containing ones) may induce allergic reactions;
- protection of the provider by use of a no-touch-technique when handling resin-based materials, as well as relevant physical, chemical and biological personal protective measures including protection against blue light emitted from curing devices;
- use of copious water spray when adjusting or removing restorative materials for sufficient cooling and to mitigate the presence of nanoparticles;
- cost and reimbursement policies for placing different materials in different countries;
- patients' expectations and demands as the material of choice should be the result of shared decision-making;
- informed consent for using a specific material should be sought;
- further research is needed to improve overall material properties and, eventually, their clinical performance and cost-effectiveness;

- oral health professionals are encouraged to remain up-to-date as research continues.

### DISCLAIMER

The information in this Policy Statement was based on the best scientific evidence available at the time. It may be interpreted to reflect prevailing cultural sensitivities and socioeconomic constraints.

### FURTHER READING

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