Comparisons of InDirect Restorative Dental Materials

TYPES OF INDIRECT RESTORATIVE DENTAL MATERIALS				
COMPARATIVE FACTORS	**PORCELAIN (CERAMIC)**	**PORCELAIN (FUSED-TO-METAL)**	**GOLD ALLOYS (NOBLE)**	**NICKEL OR COBALT-CHROME (BASE-METAL) ALLOYS**
General Description	Glass-like material formed into fillings and crowns using models of the prepared teeth.	Glass-like material that is "enameled" onto metal shells. Used for crowns and fixed-bridges.	Mixtures of gold, copper and other metals used mainly for crowns and fixed bridges.	Mixtures of nickel, chromium.
Principle Uses	Inlays, veneers, crowns and Fixed-bridges.	Crowns and fixed-bridges	Cast crowns and fixed bridges; some partial denture frameworks.	Good if the restoration fits well.
Resistance to Further Decay	Good, if the restoration fits well.	Good, if the restoration fits well.	Good, if the restoration fits well.	Good if the restoration fits well.
Estimated Durability (permanent teeth)	Moderate; Brittle material that may fracture under high biting forces. Not recommended for posterior (molar) teeth.	Very good. Less susceptible to fracture due to the metal substructure.	Excellent. Does not fracture under stress; does not corrode in the mouth.	Excellent. Does not fracture under stress; does not corrode in the mouth.
Relative Amount of Tooth Preserved	Good - Moderate. Little removal of natural tooth is necessary for veneers; more for crowns since strength is related to its bulk.	Moderate-High. More tooth must be removed to permit the metal to accompany the porcelain.	Good. A strong material that requires removal of an thin outside layer of the tooth.	Good. A strong material that requires removal of a thin outside layer of the tooth.
Resistance to Surface Wear	Resistant to surface wear; but abrasive to opposing teeth.	Resistant to surface wear; permits either metal or porcelain on the biting surface of crowns and bridges.	Similar hardness to natural enamel; does not abrade opposing teeth.	Harder than natural enamel but minimally abrasive to opposing natural teeth. Does not fracture in bulk.
Resistance to Fracture	Poor resistance to fracture.	Porcelain may fracture.	Does not fracture in bulk.	Does not fracture in bulk
Resistance to Leakage	Very good. Can be fabricated for very accurate fit of the margins of the crowns.	Good - Very good depending upon design of the margins of the crowns.	Very good - Excellent. Can be formed with great precision and can be tightly adapted to the tooth.	Good-Very good - Stiffer than gold; less adaptable, but can be formed with great precision.
Resistance to Occlusal Stress	Moderate; brittle material susceptible to fracture under biting forces.	Very good. Metal substructure gives high resistance to fracture.	Excellent	Excellent
Toxicity	Excellent. No known adverse effects.	Very Good to Excellent. Occasional/rare allergy to metal alloys used.	Excellent; Rare allergy to some alloys.	Good; Nickel allergies are common among women, although rarely manifested in dental restorations.
Allergic or Adverse Reactions	None	Rare. Occasional allergy to metal substructures.	Rare; occasional allergic reactions seen in susceptible individuals.	Occasional; infrequent reactions to nickel.
Susceptibility to Post-Operative Sensitivity	Not material dependent; does not conduct heat and cold well.	Not material dependent; does not conduct heat and cold well.	Conducts heat and cold; may irritate sensitive teeth.	Conducts heat and cold; may irritate sensitive teeth.
Esthetics (Appearance)	Excellent.	Good to Excellent	Poor - Yellow metal	Poor - dark silver metal
Frequency of Repair or Replacement	Varies; depends upon biting forces; fractures of molar teeth are more likely than anterior teeth; porcelain fracture may often be repaired with composite resin.	Infrequent; porcelain fracture can often be repaired with composite resin.	Infrequent; replacement is usually due to recurrent decay around margins.	Infrequent; replacement is usually due to recurrent decay around margins.
Relative Costs to Patient	High; requires at least two office visits and laboratory services.	High; requires at least two office visits and laboratory services.	High; requires at least two office visits and laboratory services.	High; requires at least two office visits and laboratory services.
Number of Visits Required	Two - minimum; matching esthetics of teeth may require more visits.	Two - minimum; matching esthetics of teeth may require more visits.	Two - minimum	Two - minimum

Comparisons of Direct Restorative Dental Materials

TYPES OF DIRECT RESTORATIVE DENTAL MATERIALS				
COMPARATIVE FACTORS	**AMALGAM**	**COMPOSITE RESIN (DIRECT AND INDIRECT RESTORATIONS)**	**GLASS IONOMER CEMENT**	**RESIN-IONOMER CEMENT**
General Description	Self-hardening mixture in varying percentages of a liquid mercury and silver-tin alloy powder	Mixture of powdered glass and plastic resin; self-hardening or hardened by exposure to blue light	Self-hardening mixture of glass and organic acid	Mixture of glass and resin polymer and organic acid; self hardening by exposure to blue light.
Principle Uses	Filling; sometimes for replacing portion of broken teeth.	Fillings, inlays, veneers, partial and complete crowns; sometimes for replacing portions of broken teeth	Small fillings; cementing metal & porcelain/metal crowns, liners, temporary restorations.	Small fillings; cementing metal & porcelain/metal crowns, and liners
Resistance to Further Decay	High; self-sealing characteristics helps resist recurrent decay; but recurrent decay around amalgam is difficult to detect in its early stages.	Moderate; recurrent decay is easily detected in early stages.	Low-Moderate; some resistance to decay may be imparted through fluoride release.	Low-Moderate; some resistance to decay may be imparted through fluoride release.
Estimated Durability (permanent teeth)	Durable	Strong, durable.	Non-stress bearing crown cement.	Non-stress bearing crown cement.
Relative Amount of Tooth Preserved	Fair; Requires removal of healthy tooth to mechanically retained; No adhesive bond of amalgam to the tooth.	Excellent; bonds adhesively to healthy enamel and dentin.	Excellent; bonds adhesively to healthy enamel and dentin.	Excellent; bonds adhesively to healthy enamel and dentin.
Resistance to Surface Wear	Low Similar to dental enamel; brittle metal.	May wear slightly faster than dental enamel.	Poor in stress-bearing applications. Fair in non-stress bearing applications.	Poor in stress-bearing applications; Good in non stress bearing applications.
Resistance to Fracture	Amalgam may fracture under stress; tooth around filling may fracture before the amalgam does.	Good resistance to fracture.	Brittle; low resistance to fracture but not recommended for stress-bearing restorations.	Tougher than glass ionomer; recommended for stress-bearing restorations in adults.
Resistance to Leakage	Good; self-sealing by surface corrosion; margins may chip over time	Good if bonded to enamel; may show leakage over time when bonded to dentin; Does not corrode.	Moderate; tends to crack over time.	Good; adhesively bonds to resin, enamel, dentine/ post-insertion expansion may help seal the margins.
Resistance to Occlusal Stress	High; but lack of adhesion may weaken the remaining tooth.	Good to Excellent depending upon product used.	Poor; not recommended for stress-bearing restorations.	Moderate; not recommended to restore biting surfaces of adults; suitable for short-term primary teeth restorations.
Toxicity	Generally safe; occasional allergic reaction to metal components. However amalgams contain mercury. Mercury in its elemental form is toxic and as such is listed on prop 65.	Concerns about trace chemical release are not supported by research studies. Safe; no known toxicity documented. Contains some compounds listed on prop 65.	No known incompatibilities. Safe; no known toxicity documented.	No known incompatibilities. Safe; no known toxicity documented.
Allergic or Adverse Reactions.	Rare; recommend that dentist evaluate patient to rule out metal allergies.	No documentation for allergic reactions was found.	No documentation for allergic reaction was found. Progressive roughening of the surface may predispose to plaque accumulation and periodontal disease.	No known documented allergic reactions; Surface may roughen slightly over time; predisposing to plaque accumulation and periodontal disease if the material contact the gingival tissue.
Susceptibility to Post-Operative Sensitivity	Minimal; High thermal Conductivity may promote temporary sensitivity to hot and cold ; contact with other metals may cause occasional and transient galvanic response.	Moderate; Material is sensitive to dentist's technique; Material shrinks slightly when hardened and a poor seal may lead to bacterial leakage, recurrent decay and tooth hypersensitivity.	Low; material seals well and does not irritate pulp.	Low; material seals well and does not irritate pulp.
Esthetics (Appearance)	Very poor. Not tooth colored initially silver-gray, gets darker, becoming black as it corrodes. May stain teeth dark brown or black over time.	Excellent; often indistinguishable From natural tooth.	Good; tooth colored, varies in translucency.	Very good; more translucency than glass ionomer.
Frequency of Repair or Replacement	Low; replacement is usually due to fracture of the filling or the surrounding tooth.	Low-Moderate; durable material hardens rapidly; some composite materials show more rapid wear than amalgam. Replacement is usually due to marginal leakage.	Moderate; Slowly dissolves in mouth; easily dislodged.	Moderate; more resistant to dissolving than glass ionomer but less than composite resin.
Relative Costs to Patient	Low, relatively inexpensive; actual cost of fillings depends upon their size.	Moderate; higher than amalgam fillings; actual cost of fillings depends upon their size; veneers & crowns cost more.	Moderate; similar to composite resin (not used for veneers and crowns).	Moderate; similar to composite resin (not used for veneers and crowns).
Number of Visits Required	Single visit (polishing may require a second visit)	Single visit for fillings; 2+ visits for indirect inlays, veneers and crowns.	Single visit.	Single visit.

SAMPLE DENTIST

Patient Acknowledgement of Receipt of Dental Materials Fact Sheet

I,_____, acknowledge I have
patient name

received from Sample Dentist a copy of the
Dental Materials Fact Sheet

_____

Patient Signature. *Date:*

The introductory prevision of the Dental Materials Fact Sheet is reprinted below for reference purpose only.

The following document is the Dental Board of California's Dental Materials Fact Sheet. The Department of consumer Affairs has no post position with respect to the language of this Dental Material Fact Sheet; and its linkage to the DCA web site does not constitute an endorsement of the content of this document.

The Dental Board of California
Dental Materials Fact Sheet
Adopted by the Board on October 17, 2001
As required by Chapter 801, Statutes of 1992, the Dental Board of California has prepared this fact sheet to summarize information on the mast frequently used restorative dental materials. Information on this fact sheet is intended to encourage discussion between the patient an dentist regarding the selection of dental materials vest suited for the patient's dental needs. It is not intended to be a complete guide to dental materials science.
The most frequently used materials in restorative dentistry are amalgam, composite resin, glass ionomer cement, resin-ionomer cement, porcelain (ceramic), porcelain (fuse-to-metal), gold alloys (noble) and nickel or cobalt-chrome (base-metal) alloys. Each material has its own advantages and disadvantages, benefits and risks. These and other relevant factors are compared in the attached matrix titled "Comparisons of Restorative Dental Materials." A Glossary of Terms" is also attached to assist the reader in understanding the terms used.
The statement made are supported by relevant, credible dental research published mainly between 1993 - 2001. In some cases, where contemporary research is sparse, we have indicated our best perceptions based upon information that predates 1993.
The reader should be aware that the outcome of dental treatment or durability of a restoration is not solely a function of the material from which the restoration was made. The durability of any restoration is influenced by the dentist's technique when placing the restoration, the ancillary materials used in the procedure, and the patient's cooperation during the procedure. Following restoration of the teeth, the longevity of the restoration will be strongly influenced by the patient's compliance with dental hygiene and home care, their diet and chewing habits.