

Comparison of Indirect Restorative Dental Materials

FACTORS	ALL-PORCELAIN (ceramic)	PORCELAIN FUSED TO METAL	GOLD ALLOYS (high noble)	BASE METAL ALLOYS (non-noble)
General Description	Porcelain, ceramic or glass-like fillings and crowns.	Porcelain is fused to an underlying metal structure to provide strength to a filling, crown or bridge.	Alloy of gold, copper and other metals resulting in a strong, effective filling, crown or bridge.	Alloys of non-noble metals with silver appearance resulting in high strength crowns and bridges.
Principal Uses	Inlays, onlays, crowns and aesthetic veneers.	Crowns and fixed bridges.	Inlays, onlays, crowns and fixed bridges.	Crowns, fixed bridges and partial dentures.
Leakage and Recurrent Decay	Sealing ability depends on materials, underlying tooth structure and procedure used for placement.	The commonly used methods used for placement provide a good seal against leakage. The incidence of recurrent decay is similar to other restorative procedures.		
Durability	Brittle material, may fracture under heavy biting loads. Strength depends greatly on quality of bond to underlying tooth structure.	Very strong and durable.	High corrosion resistance prevents tarnishing; high strength and toughness resist fracture and wear.	
Cavity Preparation Considerations	Because strength depends on adequate porcelain thickness, it requires more aggressive tooth reduction during preparation.	Including both porcelain and metal creates a stronger restoration than porcelain alone; moderately aggressive tooth reduction is required.	The relative high strength of metals in thin sections requires the least amount of healthy tooth structure removal.	
Clinical Considerations	These are multiple step procedures requiring highly accurate clinical and laboratory processing. Most restorations require multiple appointments and laboratory fabrication.			
Resistance to Wear	Highly resistant to wear, but porcelain can rapidly wear opposing teeth if its surface becomes rough.	Highly resistant to wear, but porcelain can rapidly wear opposing teeth if its surface becomes rough.	Resistant to wear and gentle to opposing teeth.	Resistant to wear and gentle to opposing teeth.
Resistance to Fracture	Prone to fracture when placed under tension or on impact.	Porcelain is prone to impact fracture; the metal has high strength.	Highly resistant to fracture.	
Biocompatibility	Well tolerated.	Well tolerated, but some patients may show allergic sensitivity to base metals.	Well tolerated.	Well tolerated, but some patients may show allergic sensitivity to base metals.
Post-Placement Sensitivity	Sensitivity, if present, is usually not material specific.			
	Low thermal conductivity reduces the likelihood of discomfort from hot and cold.	High thermal conductivity may result in early post-placement discomfort from hot and cold.		
Esthetics	Color and translucency mimic natural tooth appearance.	Porcelain can mimic natural tooth appearance, but metal limits translucency.	Metal colors do not mimic natural teeth.	

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Relative Cost to Patient	Higher; requires at least two office visits and laboratory services.	Higher; requires at least two office visits and laboratory services.	Higher; requires at least two office visits and laboratory services.	
Average Number of Visits To Complete	Minimum of two; matching esthetics of teeth may require more visits.	Minimum of two; matching esthetics of teeth may require more visits.	Minimum of two.	

Comparison of Direct Restorative Dental Materials

FACTORS	AMALGAM	COMPOSITES Direct and Indirect	GLASS IONOMERS	RESIN- IONOMERS
General Description	A mixture of mercury and silver alloy powder that forms a hard solid metal filling. Self-hardening at mouth temperature.	A mixture of submicron glass filler and acrylic that forms a solid tooth-colored restoration. Self- or light-hardening at mouth temperature.	Self-hardening mixture of fluoride containing glass powder and organic acid that forms a solid tooth colored restoration able to release fluoride.	Self or light-hardening mixture of sub-micron glass filler with fluoride containing glass powder and acrylic resin that forms a solid tooth colored restoration able to release fluoride.
Principal Uses	Dental fillings and heavily loaded back tooth restorations.	Esthetic dental fillings and veneers.	Small non-load bearing fillings, cavity liners and cements for crowns and bridges.	Small non-load bearing fillings, cavity liners and cements for crowns and bridges.
Leakage and Recurrent Decay	Leakage is moderate, but recurrent decay is no more prevalent than other materials.	Leakage low when properly bonded to underlying tooth; recurrent decay depends on maintenance of the tooth-material bond.	Leakage is generally low; recurrent decay is comparable to other direct materials, fluoride release may be beneficial for patients at high risk for decay.	Leakage is low when properly bonded to the underlying tooth; recurrent decay is comparable to other direct materials, fluoride release may be beneficial for patients at high risk for decay.
Overall Durability	Good to excellent in large load-bearing restorations.	Good in small-to-moderate size restorations.	Moderate to good in non load-bearing restorations; poor in load-bearing.	Moderate to good in non load-bearing restorations; poor in load-bearing.
Cavity Preparation Considerations	Requires removal of tooth structure for adequate retention and thickness of the filling.	Adhesive bonding permits removing less tooth structure.	Adhesive bonding permits removing less tooth structure.	Adhesive bonding permits removing less tooth structure.
Clinical Considerations	Tolerant to a wide range of clinical placement conditions, moderately tolerant to the presence of moisture during placement.	Must be placed in a well-controlled field of operation; very little tolerance to presence of moisture during placement.		
Resistance to Wear	Highly resistant to wear.	Moderately resistant, but less so than amalgam.	High wear when placed on chewing surfaces.	
Resistance to Fracture	Brittle, subject to chipping on filling	Moderate resistance to	Low resistance to fracture.	Low to moderate resistance to

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	edges ,but good bulk strength in larger high-load restorations.	fracture in high-load restorations.		fracture.
Biocompatibility	Well-tolerated with rare occurrences of allergic response.			
Post-Placement Sensitivity	Early sensitivity to hot and cold possible.	Occurrence of sensitivity highly dependent on ability to adequately bond the restoration to the underlying tooth.	Low.	Occurrence of sensitivity highly dependent on ability to adequately bond the restoration to the underlying tooth.
Esthetics	Silver or gray metallic color does not mimic tooth color.	Mimics natural tooth color and translucency, but can be subject to staining and discoloration over time.	Mimics natural tooth color, but lacks natural translucency of enamel.	Mimics natural tooth color, but lacks natural translucency of enamel.
Relative Cost to Patient	Generally lower; actual cost of fillings depends on their size.	Moderate; actual cost of fillings depends on their size and technique.	Moderate; actual cost of fillings depends on their size and technique.	Moderate; actual cost of fillings depends on their size and technique.
Average Number of Visits To Complete	One.	One for direct fillings; 2+ for indirect inlays, veneers and crowns.	One.	One.

NOTE: The information in this chart is provided to help dentists discuss the attributes of commonly used dental restorative materials with their patients. The chart is a simple overview of the subject based on the current dental literature. It is not intended to be comprehensive. The attributes of a particular restorative material will vary from case to case depending on a number of factors.

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