## 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. |
| **Clinical Considerations** | Tolerant to a wide range of clinical place-ment conditions, moderately tolerant to the presence of mois-ture 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 edges, but good bulk strength in larger high-load restorations. | Moderate resistance to fracture in high-load restorations. | Low resistance to fracture. | Low to moderate resistance to fracture. |
| **Biocompatibility** | Well-tolerated with rare occurrences of allergenic 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. |
| **Ave. # of Visits To Complete** | One. | One for direct fillings; 2+ for in-direct 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.

## 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 under-lying 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. Moderate resistance to fracture in high-load restorations. Low resistance to fracture. Low to moderate resistance to fracture. | | | |
| **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 allergenic sensitivity to base metals. | Well tolerated. | Well tolerated, but some patients may show allergenic sensitivity to base metals. |
| **Post-Placement Sensitivity** | Sensitivity, if present, is usually not material specific. | | | |
| | Low thermal conductivity reduces the likelihood of dis-comfort 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. | |
| **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. | |
| **Ave. # 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 | |

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