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Dr. Amar Bhochhibhoya

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## Translucent Monolithic, Multi-Layered Zirconia: Matching Esthetics with Strength

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High esthetic demand of patients has led to the development of newer tooth colored restorative materials. Yttria-stabilized Zirconia (3Y-TZP) ceramic is considered an acceptable material for prosthetic rehabilitation due to its high fracture resistance, biocompatibility, biomechanical stability, and better color matching compared to the traditional porcelain fused to metal restorations. Tetragonal stabilized polycrystalline zirconia (TZP: tetragonal zirconia polycrystal) is doped with 3 mol% yttrium oxide (3Y-TZP).<sup>1</sup>

The opaque appearance of zirconia is a key challenge in obtaining optimum esthetics. These restorations are typically veneered with a weak glassy phase ceramic to mask the opaque appearance. The risk of delamination and chipping of ceramic veneer from such layered prosthesis is the major concern. High masticatory load in posterior teeth, poor framework design, inadequate thickness of ceramic veneer, contamination of zirconia substructure, low elastic modulus and thermal conductive of zirconia compared to veneer porcelain could be some of the factors leading to such catastrophic failures.<sup>2</sup>

Various methods have been developed to increase translucency of zirconia such as increasing percentage of the cubic phase, increasing sintering temperature, reducing impurities, altering yttria content, and reducing the grain size. With higher yttrium doping, the proportion of cubic phase zirconia is increased by 25 % for 4Y-TZP and 53 % for 5Y-TZP, which allows for improved translucency.<sup>1</sup> However, with the increase in the cubic phase proportion, there is risk of reduced strength, due to a reduction in the extent of transformation toughening.

More recently, new monolithic multi-layer zirconia has been developed that has a color gradient from the incisal to cervical third, which mimics natural tooth color. Different grades of translucent blank are available such as High Translucent Multi-layered (HTML), Super Translucent Multi-layered (STML) and Ultra Translucent Multi-layer zirconia (UHTML). Multi-layer zirconia discs consist of different layers with varying degrees of translucency: the outer enamel layer, transitions layers, and an inner body layer.<sup>2</sup> This new innovative multilayer polychromatic zirconia blank allows technicians to work with a nearly universal zirconia blank. However, more researches ensuring optimum mechanical properties of newer products are necessary before they can be safely used in all the clinical scenarios.

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