
Title: Dentin Biomodification in Adhesive Dentistry - Need of the Hour



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Proposal

Although adhesive dentistry has shown revolutionary advancement since last decade, poor durability of composite restorations still remains a major challenge. The failure occurs mainly due to secondary caries, marginal discrepancies and post-operative sensitivity. Success of composite restoration largely depends on an effective resin-dentin bond which, however, remains the weakest interface. Despite high immediate bond strength of contemporary adhesive systems, bond strength continues to fall over time. It seems that the simplification of adhesive systems has not led to improved stability of the resin-dentin bond. Deterioration of resin dentin interface occurs due to inability of resin monomers to completely displace water, and encapsulate collagen for the entire depth of demineralized dentin. This makes exposed collagen susceptible to degradation by endogenous matrix metalloproteinases (MMPs). Moreover, the current adhesive systems are hydrophilic and allow water movement across the bonded interface, leading to nanoleakage and facilitating the action of dentin MMPs. Therefore, more research focusing on solving this clinical problem is needed. Although preliminary research has shown promising results using dentin biomodification technique with various MMP inhibitors and collagen cross-linking agents, efforts need to be made to incorporate MMP inhibitory functionality in the adhesive systems to develop biofunctional adhesives which could enable our composite restorations to last longer in the mouth.
