



Applications of Nanocomposite Materials in Dentistry

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






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Dental pulp capping nanocomposites

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4.1 Introduction

With the progress of nanotechnology, extensive research has been done on designing and developing newer nanobiomaterials, such as nanoparticles, nanocapsules, nanovesicles, nanoceramics, nanocomposites, nanofibers, nanocoatings, nanotubes, nanorods, and so forth, for various biomedical applications [1–8]. Among these newer nanobiomaterials, nanocomposites are comprised of multiple nanoscale materials, or a nanoscale material incorporated into a bulk material [9, 10]. Numerous composites and nanocomposites of diverse types have already been synthesized and evaluated for applications in diverse biomedical sectors such as orthopedics, dentistry, drug delivery, tissue engineering, cardiac prosthesis, biosensors, and so forth [7, 11–20]. With the steady expansion of nanodentistry, a variety of dental nanocomposites are being developed and investigated for dentin-pulp regeneration, dental restoration, enamel substitution, periodontal ligament regeneration, periodontal drug delivery, and so forth [21–24].

The purpose of direct and/or indirect pulp capping is the care and treatment of exposed crucial pulp by the use of capping material for ease of reparative dentin formation and to maintain the exposed pulp [25]. Calcium hydroxide [Ca(OH)₂]-based cements such as Dycal and mineral trioxide aggregate (MTA) are frequently-used pulp-capping materials in clinics [26]. Additionally, adhesive resin-based composites have been reviewed as an efficient pulp capping substance [27]. While formerly there were no sufficient treatments for uncovered pulp, these new solutions offer the possibility of recovery and hope. The development of diverse pulp capping composites has significantly improved the epoch of vital-pulp treatment. In recent years, a variety of pulp capping nanocomposites for fortification of multifaceted vital dentin pulp has been investigated [28]. Further, caries, mechanical sources, and trauma are the three core causes of vital pulp exposure. Pulp disclosure prior to entirely removed caries is termed “caries exposure,” while disclosure during the generation of a cavity lacking