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Editorial

Nanomaterials: A Boon in Prosthodontics

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At this scale, which is referred to as the nanoscale, nanotechnology includes science, medicine, engineering, computers, and robotics. "The art and science of controlling matter at the nanoscale (1 - 100 nm)" is how it is described. Nanodentistry is the future of dentistry. Nanodentistry holds the promise of developing new and quicker computer types, more effective power sources, and life-saving medical procedures.

Nanotechnology is desperately needed in the field of prosthodontics. The characteristics of materials that have been reduced to the nanoscale can unexpectedly change, offering novel uses. For instance, opaque compounds can become transparent (like copper), inert substances can act as catalysts (like platinum), stable substances can catch fire (like aluminum), solids can convert into liquids at ambient temperature (like gold), and insulators can turn into conductors (silicon). At nanoscales, substances like gold, which are chemically inert at larger scales, can act as powerful chemical catalysts. When scaled down to the nanoscale, this emphasizes the significance of using applied nanotechnology in a variety of industries, including dentistry. Both top-down and bottom-up strategies are used in nanotechnology.

The use of nanomaterials in prosthodontics is common. The creation of novel inorganic nanoparticles and the modification of the surface with inorganic nanofillers are the two main areas of focus for research on nanotechnology in dental materials. Due to their widespread use in ceramics, metals, resins and composites, there is a lot of room for dental material innovation and improvement.

Nanoceramic offers better strength and hardness in terms of mechanical qualities. Many nanoceramics have four to five times the hardness and strength of conventional materials. Most notably, nanoceramics are much more durable than conventional ceramics. Because of their excellent mechanical and electrical capabilities, carbon nanotubes (CNTs) have gained a lot of attention as material reinforcement. The two categories of composite restorative materials known as "nanocomposite"-characterized by filler-particle sizes of less than 100 nm-in general, are nanohybrid and nanofilled. The two types of monodispersed non-agglomerated discrete nanoparticles that are uniformly dispersed in resins or coatings to create nanocomposites are nanomers and nanoclusters. Newer light-cure nanocomposites with multiple advantages have been created as a result of the addition of nanofillers to the resin matrix. More recent light-cure nanocomposites have enhanced mechanical strength, wear resistance comparable to microfill composites, superior flexural strength, elasticity modulus, translucency, and superior polish and gloss resistance. Vinylpolysiloxanes are combined with nanofillers to create a special siloxane additive for impression materials. Fewer voids at the margin and better model pouring are results of the material's improved hydrophilic characteristics and better flow. Denture teeth comprised of nanocomposite materials are composed of polymethyl methacrylate (PMMA) and evenly dispersed nanofillers. To boost the viscoelastic property of resins, antimicrobial nanoparticles are added to polymethyl methacrylate. To enhance the functionality of PMMA, several nanoparticles including ZrO_2, TiO_2 and carbon nanotubes (CNT) have been utilized. The stable nanoparticles in the new bonding agents made from nano solutions are uniformly disseminated throughout the solution. Higher bond strength performance is a result of silica nanofiller technology. The light-cured materials are applied as a final coating over composite restorations, glass ionomer restorations, jacket crowns, veneers, and provisionals. They contain nanosized fillers. With their increased wear resistance, these coating agents guard against abrasion and discoloration. By applying a covering of nanoparticles to dental implants, nanotechnology can be applied to implants. The four material characteristics that can affect events at bone-implant interfaces are surface topography, surface energy, surface roughness, and implant surface composition. The next advancement in the field could be a biomimetic implant. Inducing cell differentiation and proliferation as well as promoting higher vascularity in cortical bone using implant coatings made of nano-textured titanium, hydroxyapatite and pharmaceuticals like bisphosphonates may improve the circumstances for both short-term and long-term bone remodeling. Bone is a naturally occurring nanocomposite consisting of nanohydroxyapatite (HA), which is strengthened by collagen fibrils. Its strength and toughness are known to be greatly influenced by this interaction. Tensile and tearing loads are the main causes of mechanical failure in maxillofacial prostheses. The tensile and tear strengths of traditional materials have increased thanks to the introduction of polyhedral oligomeric silsesquiox as a reinforcing agent.

Nanomaterials have proven fundamental to the development of basic science and clinical technology in prosthodontics. It demonstrates how the prosthodontic materials' many properties, including modulus of elasticity, surface hardness, polymerization shrinkage and filler loading, can be significantly improved after their scales were reduced from micron to nano size by nanotechnology. It also demonstrates how the performance of composites can be improved by incorporating the right nanomaterials. Nanoscience is a novel technique that will have an impact on the domains of healthcare, research and medicine. Dentists will benefit from having more tools, medications and materials created with precision, which will improve patient compliance [1-5].

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