



Nanotechnology and bio-printing-The Avante Garde of future dentistry

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DESCRIPTION

Nano technology and bioprinting are revolutionizing dentistry by interpreting dental imaging data, automating landmark recognition, increasing diagnostic precision and facilitating treatment planning[1]. Combining with 3D bioprinting, they produce accurate, useful dental products, offering revolutionary advancements over conventional prostheses[2]. A dataset of scientific literature was gathered from various databases, evaluating performance metrics like accuracy, precision, and recall[3]. Articles on nanotechnology and bioprinting applications in regenerative dentistry and specific dental subdomains were found using specific search terms. Results - Recent research on nano dentistry, a new dental field using nanomaterials, nanorobots, and nanotechnology, was gathered from sources like PubMed, Google Scholar, Scopus, and WHO, analyzing English-language publications from the last five years. The multipotency makes dental follicular progenitor cells wired for clinical applications, such as bone tissue engineering, tooth root regeneration and periodontium regeneration. In the medical field of dentistry, nanobiotechnology is having a positive impact in a number of ways[4]. Detailed evaluations of the applications of nano dentistry in dental procedures, dental restoration technologies, orthodontics, prosthodontics, restorative dentistry, periodontics, and other dental specialties have been quite intriguing[5].

CONCLUSION

The integration of nanotechnology and bioprinting is ushering in a transformative era in dentistry, significantly advancing diagnostic accuracy, treatment planning, and the fabrication of dental products[6]. These cutting-edge technologies are not only enhancing the interpretation of dental imaging data and automating anatomical landmark recognition but are also driving innovations in regenerative dental procedures. By combining the precision of nanomaterials and the structural capabilities of 3D bioprinting, dentistry is moving toward highly personalized, efficient, and minimally invasive solutions. The reviewed literature from reputable databases such as PubMed, Scopus, Google Scholar, and WHO demonstrates a growing body of research supporting the clinical potential of nano dentistry and

bioprinting across multiple dental domains. Applications include the regeneration of bone and periodontal tissues, development of bioengineered tooth structures, and improvement in prosthetic and orthodontic outcomes. The use of dental follicular progenitor cells and nanorobots in procedures reflects the expanding scope of these technologies in achieving targeted and responsive treatments. Moreover, the versatility and multipotency of nanomaterials and biocompatible scaffolds open promising avenues for applications in periodontics, prosthodontics, restorative dentistry, and beyond. Despite these advances, it is essential to emphasize the need for further clinical validation, regulatory guidance, and ethical considerations, especially as these technologies move from experimental stages to everyday clinical practice[7]. In conclusion, nanotechnology and bioprinting represent powerful tools in redefining the landscape of modern dentistry. Their convergence is not only enhancing precision and functionality but also promoting a new vision for regenerative and patient-specific dental care. Continued interdisciplinary research and collaboration will be pivotal in fully realizing the potential of these technologies and integrating them safely and effectively into routine dental practice.

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