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Application of Bioreactors in Regenerative Dentistry: Literature Review

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Abstract : Background: Bioreactors in tissue engineering are used as devices that apply mechanical means to influence biological processes. They are commonly employed for stem cell culturing, growth and expansion as well as in 3D tissue culture. Contemporarily there use is well established and is tested extensively in the medical sciences, for tissue-regeneration and tissue engineering of organs like bone, cartilage, blood vessels, skin grafts, cardiac muscle etc. Methodology: Literature search, both electronic and hand search, was done using the following MeSH and keywords: bioreactors, bioreactors and dentistry, bioreactors & dental tissue engineering, bioreactors and regenerative dentistry. Articles published only in English language were included for review. Results: Bioreactors like, spinner flask-, rotating wall-, flow perfusion-, and micro-bioreactors and in-vivo bioreactor have been employed and tested for the regeneration of dental and like-tissues. These include gingival tissue, periodontal ligament, alveolar bone, mucosa, cementum and blood vessels. Based on their working dynamics they can be customized in future for regeneration of pulp tissue and whole tooth regeneration. Apart from this, they have been successfully used in testing the clinical efficacy and biological safety of dental biomaterials. Conclusion: Bioreactors have potential use in testing dental biomaterials and tissue engineering approaches aimed at regenerative dentistry.

Keywords : bioreactors, biological process, mechanical stimulation, regenerative dentistry, stem cells
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