The Torch
Vol. 3 (13)

Tissue engineering in periodontology

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Periodontium involves a group of specialised tissue that surrounds and supports the tooth in the jaw bone. The tissues of the periodontium include periodontal ligament, cementum, gingiva and alveolar bone. Regeneration of these tissues to aid as a one for all solution to the numerous complications in dentistry has been an ambitious dream of all researchers. This vastly depends on the astonishing capacity of these tissues to regenerate due to properties such as cementogenesis, periodontal stem cells and complex interactions of growth factors and signalling molecules. Periodontal diseases comprise more than half of the dental diseases, which generally affects the paediatric population and the elderly. The solutions to these diseases often get complicated due to poor patient involvement, the requirement of specialised equipment and the lack of guarantee of prolonged successful treatment. The treatment is further complicated as diverse problems require customised solutions. Therefore, tissue engineering is a unique solution to a wide spectrum of dental diseases. Regenerative dentistry aims at engineering periodontal tissue to repair or regenerate damaged and lost dental tissues. This involves the interaction of numerous complex factors, such as growth factors, signalling molecules, stem cells and periodontal tissues. The fact that these components are involved effortlessly during the physiological functioning of these tissues makes utilising these elements in periodontal tissue engineering quite promising. Growth factors act as signalling molecules during physiological regeneration, which includes bone morphogenic proteins, fibroblast growth factor and enamel matrix derivative. Periodontal tissues consist of a plethora of tissue elements, such as hyaluronic acid, collagen matrix, which have shown potential as scaffolds. Stem cells in periodontal tissues, like periodontal ligament stem cells, have proven to be beneficial and can act as a promising element for the successful regeneration of periodontal tissues. However, this vision still involves several complicating factors. This includes difficulty in controlling the interactions between the tissue engineering components. At cellular levels, tissue engineering involves the interaction of more than thousands of molecules making the control of certain elements slightly challenging. Nevertheless, recent research by Hamakura et al. has shown the ability to regenerate periodontal tissues in rodents. Such research acts as a beacon of hope to many who aim at finding periodontal tissue engineering as a true one for all solution to all the challenges in dentistry.

Keywords: Periodontology, Dentistry, Stem Cells, Periodontium, Regeneration

Citation:
Jacqueline Jacinta Dias. Tissue engineering in periodontology. The Torch. 2022. 3(13). Available from:
https://www.styvalley.com/pub/magazines/torch/read/tissue-engineering-in-periodontology.