Development of biomimetic electrospun polymeric biomaterials for bone tissue engineering. A review

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ABSTRACT

Electrospinning is a promising and versatile technique that is used to fabricate polymeric nanofibrous scaffolds for bone tissue engineering. Ideal scaffolds should be biocompatible and bioactive with appropriate surface chemistry, good mechanical properties and should mimic the natural extracellular matrix (ECM) of bone. Selection of the most appropriate material to produce a scaffold is an important step towards the construction of a tissue engineered product. Bone tissue engineering is an interdisciplinary field, where the principles of engineering are applied on bone-related biochemical reactions. Scaffolds, cells, growth factors, and their interrelation in microenvironment are the major concerns in bone tissue engineering. This review covers the latest development of biomimetic electrospun polymeric biomaterials for bone tissue engineering. It includes the brief details to bone tissue engineering along with bone structure and ideal bone scaffolds requirements. Details about various engineered materials and methodologies used for bone scaffolds development were discussed. Description of electrospinning technique and its parameters relating their fabrication, advantages, and applications in bone tissue engineering were also presented. The use of synthetic and natural polymers based electrospun nanofibrous scaffolds for bone tissue engineering and their biomineralization processes were discussed and reviewed comprehensively. Finally, we give conclusion along with perspectives and challenges of biomimetic scaffolds for bone tissue engineering based on electrospun nanofibers.

KEYWORDS
Biomimetic scaffolds, electrospinning, synthetic and bio-polymers, bio-mineralization, bone tissue engineering

ACKNOWLEDGMENT
This work was supported by Fundamental Research Grant Scheme (FRGS) RDU100106, by Ministry of Higher Education, Malaysia.