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Electrospun hydroxyethyl cellulose nanofibers functionalized with calcium phosphate coating for bone tissue engineering (Article)

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Abstract

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The aim of this study is to develop a facile and efficient scaffold from electrospun hydroxyethyl cellulose (HEC) functionalized with bone-like calcium phosphate (CaP). The HEC/PVA nanofibers were fabricated by electrospinning and mineralized by incubating in 10x simulated body fluid (SBF) for different period of times. After 24 h of incubation, the nanofibers were uniformly coated by a thin layer of mineral deposit. SEM, FTIR, and FESEM-EDS analyses confirm the deposition of CaP on the nanofibers. The nanostructured biomaterial maintained its fibrous and porous structure after mineralization. The XRD results suggest that the deposited mineral phase is a mixture of calcium phosphate hydrate and apatite. The mechanical properties of CaP coated scaffolds show similar tensile strength and elastic modulus with that of trabecular and proximal femoral bones. The cytocompatibility of the CaP coated HEC/PVA scaffolds were evaluated using human osteosarcoma cells. The CaP coated HEC/PVA scaffolds support cellular attachment and proliferation of osteosarcoma cells and will be a promising candidate for bone tissue engineering. © The Royal Society of Chemistry 2015.

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Engineering
controlled terms:Biological materials Biomechanics Bone Calcium Calcium phosphate
Cell engineering Cellulose Deposition Hydrates Mechanical properties
Mineral resources Mobile security Nanofibers Phosphate coatings Phosphate minerals
Prosthetics Tensile strength Tissue Tissue engineering

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Bone tissue engineering Cellular attachments Human osteosarcoma cells
Hydroxyethyl cellulose Hydroxyethyl celluloses (HEC) Nanostructured biomaterials
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