Improved Mechanical Properties and Osteogenesis in Electrospun Poly L-Lactic Ultrafine Nanofiber Scaffolds Incorporated with Graphene Oxide

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Abstract : Recently, the applications of graphene oxide in fabricating scaffolds for bone tissue engineering have been received extensive concern. In this work, poly l-lactic/graphene oxide composite nanofibers were successfully fabricated by electrospinning. The morphology structure, porosity and mechanical properties of the composite nanofibers were characterized using different techniques. And mouse mesenchymal stem cells were cultured on the composite nanofiber scaffolds to assess their suitability for bone tissue engineering. The results indicated that the composite nanofiber scaffolds had finer fiber diameter and higher porosity as compared with pure poly l-lactic nanofibers. Furthermore, incorporation of graphene oxide into the poly l-lactic nanofibers increased protein adsorptivity, boosted the Young's modulus and tensile strength by nearly 4.2-fold and 3.5-fold, respectively, and significantly enhanced adhesion, proliferation, and osteogenesis in mouse mesenchymal stem cells. The results indicate that composite nanofibers could be excellent and versatile scaffolds for bone tissue engineering.

Keywords : poly l-lactic, graphene oxide, osteogenesis, bone tissue engineering

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