عنوان مقاله:

Behavior of Human Umbilical Cord Wharton s Jelly Mesenchymal Stem Cells on Electrospun Poly(lactic Acid)WaxNanofibers

محل انتشار:

سومین جشنواره ملی و کنگره بین المللی علوم و فناوری های سلول های بنیادی و پزشکی بازساختی (سال: 1397)

تعداد صفحات اصل مقاله: 1

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خلاصه مقاله:

Background and Aim: Extracellular matrix (ECM) contains extracellularmolecules secreted from cells. It has important roles in biochemicaland structural support of surrounding cells and regulates the criticalcell behaviors. Scientists use nanotechnology, especially nanofibers todevelop the tissue engineering scaffolds. In the present study, in vitroresponses of Human umbilical cord, Wharton s jelly mesenchymalstem cells (WJ-MSCs), on polylactic acid/WAX (PLA/WAX) electrospunnanofibrous scaffold were reported in comparison with those of the cellson corresponding PLA scaffold.Methods: In this study, umbilical cord (UC) was taken from cesareandelivery and transported to the laboratory in 2 hours. MSCs were isolatedfrom umbilical cord Wharton s jelly using the explant method. After MSCcharacterization, cells were passaged for 4-6 times and cultured bothtwo- and three-dimensionally (2D and 3D). Bee wax was used for themodification of PLA scaffold surface. For electrospinning, PLA and Waxwere dissolved in hexafluoroisopropanol (HFIP) solvent and chloroform,respectively. Different scaffolds were fabricated by an electrospinningtechnique (PLA, PLA/wax 8:2) and Fourier transform infrared (FT-IR)spectroscopy, scanning electron microscope (SEM), MTT assay and DAPIstaining were used for the evaluation of cells morphology and viability.Results: Our results demonstrated that cells are able to attach to the PLA/wax nanofibrous scaffold easier and this scaffold is a better support forthe attachment and proliferation of WJ-MSCs than the correspondingPLA scaffold. In addition, PLA scaffold had the average fiber diameterof 350 nm while PLA/wax scaffold had a significantly decreased averagefiber diameter (70 nm). Toxicity of the scaffolds was tested and theresults indicated that PLA/wax scaffold was more biocompatible thanPLA scaffold. MTT assay results also showed that nanofibrous scaffoldscould significantly improve the viability of WJ-MSCs compared with 2Dculture.Conclusion: Consequently, the results of this study confirm that WJ-MSCscan sense the chemical composition of the materials and their physicalproperties. These components are able to regulate the behavior of thesecells accordingly. We also conclude that Nanofibrous PLA/wax scaffoldscan be used as a suitable broad-spectrum scaffold for tissue engineering.

کلمات کلیدی:

Adhesion; cell viability; WJ-MSC; Bee Wax; Electrospinning Scaffold