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Poster Presentation

Thermogel Nanofiber Induces Human Endometrial-Derived Stromal Cells to Neural Differentiation and Improves Motor Dysfunction Following Spinal Cord Injury

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Abstract

Although spinal cord injury (SCI) is one of the most common injuries after a road accident, there is no definite treatment for it. In this regard, nanotechnology has focused to retrieve damaged tissue function by designing of a biomaterial as a mimicking extracellular matrix to reduce inflammation, scar and lactate dehydrogenase, to fill the cyst and improve the graft integration, cell proliferation and differentiation in site of injury. In this study, the neuronal differentiation potential of termogel nanofibrous Matrigel as a self-assembling nanofiber was investigated. Human endometrial-derived stromal cells (hENSCs) were isolated and encapsulated into nanofibrous termogel and cell viability and cell membrane damage were assessed. Encapsulated hENSCs into Matrigel were treated with neural differentiation medium for 21 days, and then neural genes and protein markers were analyzed using real time-PCR and immunocytochemistry assays. In addition, Matrigel was implanted into an animal model of SCI and followed up for 45 days using Basso-Beattie-Bresnahan (BBB) test. Our results showed higher cell viability and lower cell membrane damage in cells encapsulated into the nanofiber as compared to 2D cell culture. Also, it was seen neural differentiation in the level of genes and proteins and significant improvement in motor function of the injured animals. Matrigel with the ability of neural induction and motor function improvement could be as an applied scaffold in tissue engineering for SCI.

Keywords: Matrigel, Nanofiber, Spinal Cord Injury.

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