Self-Assembling Peptide Nanofiber Containing Biologic Motif Induces Neural Differentiation, Tubulin Polymerization and Neurogenesis; In-Vitro, Ex-Vivo and In-Vivo Studies

Shima Tavakol1, 2, 3, 4, Reza Saber 1, Elham Hoveizi 5, Hadi Aligholi 4, 6, Jafar Ai 7, 8, Seyed Mahdi Rezayat1, 9, 10*

1Department of Medical Nanotechnology, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran.
2Razi Drug Research Center, Iran University of Medical Sciences, Tehran, Iran.
3Student’s Scientific Research Center, Tehran University of Medical Sciences, Tehran, Iran.
4Shefa Neuroscience Research Center, Khatam Alanbia Hospital, Tehran, Iran.
5Department of Biology, Faculty of Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran.
6Department of Neurosciences, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran.
7Department of Tissue Engineering, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran.
8Brain and Spinal Injury Research Center, Imam Hospital, Tehran University of Medical Sciences, Tehran, Iran.
9Department of Toxicology & Pharmacology, School of Pharmacy, Pharmaceutical Sciences Branch, Islamic Azad University (IAUPS), Tehran, Iran.
10Department of Pharmacology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran.

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Abstract

Spinal cord injury (SCI) in humans remains a devastating and incurable disorder. A very important obstacle in axonal regeneration after spinal cord injury is astroglial scaring. The use of self-assembling peptide nanofiber, a hydrogel mimicking extracellular matrix, has been suggested as a scaffold for spinal cord regeneration and inhibition of astrogliosis. However, neurogenesis potential of laminin has been proved. The purpose of this study was to investigate the role of self-assembling peptide nanofiber containing long motif of laminin (SAPN-LL) in neural differentiation of human endometrial-derived stem cells (hEnSCs) in-vitro, in polymerization of tubulin isolated from sheep brain ex-vivo and assess the supportive effects of this hydrogel in an animal model of SCI. Results showed that although nanofibers strongly differentiated hEnSC towards neuron and there were not significant differences between their neural differentiations but motor recovery results demonstrated that concentration of laminin influences motor recovery and tubulin polymerization. However, both of in-vitro and in-vivo results showed that SAPN-LL inhibited astrogenesis. Based on our results it might be concluded that, SAPN containing long motif of laminin holds great promise for spinal cord injury.

Keywords: Self-assembling Peptide Nanofiber, Long Motif of Laminin, Spinal Cord Injury, Polymerization of Tubulin.

*Corresponding Author: Seyed Mahdi Rezayat

E-mail: Rezayat@tums.ac.ir