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# The core of self-assembling peptide nanofibers will influence neurogenesis potential of its attached biological motif

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To date, spinal cord injury (SCI) has remained an incurable disaster. The use of self-assembling peptide nanofiber containing bioactive motifs such as bone marrow homing peptide (-BMHP1) as an injectable scaffold in spinal cord regeneration has been suggested and investigated earlier. Although, in all the investigation, the effect of biological motifs have been investigated but the influence of self-assembling core of peptide nanofibers in tissue engineering has been neglected. In the present investigation for the first time, the influence of two major core of self-assembling peptide nanofibers attached to the famous neurogenic biological motif of BMHP1 was assessed. BE2M17 one of the reference cell line (human neuroblastoma cell line) in neurological investigation was choose and cells were treated with the peptide nanofibers and cell behavior investigated. Then cells were differentiated for four days and neural genes were assessed by real time PCR. To investigate the spinal cord recovery potential of nanofibers, they were implanted into a chronic model of SCI in rat. Results showed that the core of KSL-B induced higher cell viability and LDH release while the core of RADA-B exhibits higher acidic environment and induced more ROS, NO production and higher amount of PI positive cells (Dead cells) with higher percentage of Sub-G1 in cell cycle characterized by flowcytometery. However, these results were in good agreement with BAX/BCL2 ratio indicated higher BAX/BCL2 ratio for cells treated by RADA-B. Interestingly, the RADA-B induced higher gene expression of nNOS in agreement with NO production. Results showed that although RADA-B induced higher gene expression of Integrin 5 as a cell membrane signaling receptor but KSL-B over-expressed higher gene of focal adhesion kinase 2 as a downstream of integrin and resulted in higher gene expression of Nestin, MAP2, TH, GFAP and GDNF while the over-expression of NF and GABA was higher in RADA-B. Interestingly, RADA-B induced over-expression of GABA while, KSL induced over-expression of TH. The BBB score of spinal cord injury model in rat disclosed that KSL-B induced higher motor recovery in rats. In conclusion, it might be said that based on the targeted tissue the core of self-assembling peptide nanofiber must be choose. In a bone with acidic friendly environment the RADA core would be better (data not shown) while in the neural tissue, KSL with less inducible acidic environment would be preferred.

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