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The core of self-assembling peptide nanofiber beside of its biological motif will define osteogenesis: an in-vitro and in-vivo study

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Bone is a real nanocompsite of nanofibers and nano ceramics and approximately 600,000 suffers from craniofacial deficits in US. RADA as a core of self-assembling peptides exhibits an acidic pH while the pH of KSL is higher than RADA. The acidic pH of RADA usually is an obstacle in tissue engineering but by regards to the acidophilic nature of bone, it was investigated for the first time. In the present investigation, for the first time the BMHP motif was bound to the RADA and KSL as a core of self-assembling peptide nanofiber and was evaluated its cell viability, ROS, NO and LDH release on MG-63 cell line as a cell line of bone osteosarcoma and then its effects was evaluated as a gene expression of apoptotic and integrins. Then, they were implanted in a critical size bone defect in rats for two month and densitometry of bone defects were analyzed and compared. Results showed that KSL core due to higher cell viability, BCL2 gene over-expression and less intracellular ROS production was more effective than RADA ones in bone regeneration. However, KSL showed higher cell membrane damage and BAX gene over-expression than RADA. These data were in good agreement with X-ray radiographic data that disclosed higher bone density in KSL nanofiber than RADA. Based on the presented data since KSL induced higher nerve regeneration (not shown) and bone regeneration it is a good candidate for spine repair that its biodegradation will improve motor neuron recovery, as well.

Biography

Bita Rasoulian has completed her graduated from Maziar University, Royan, Mazandaran in the field of Biomedical Engineering, Biomaterials in Bachelor degree on 2017. She is a Research Assistant of Nanomedicine under Supervision of Dr. Shima Tavakol at Cellular and Molecular Research Center, Iran University of Medical Science. However, she is interested in the investigation of nanomaterials and their influence and interaction with biological systems especially nervous and bone. Meanwhile, she has expertise in in-vitro and in-vivo studies, as well. Her major researches has been on spinal cord injuries and craniofacial injuries, modeling and treating them with various specified nanomedicines in which she has gained exclusive results.

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