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Abstract

Self-assembling peptide nanofibers in bone tissue engineering

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Abstract:

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 integrin. Then, they were implanted in a critical size bone defect in rats for 2 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:

Shima Tavakol is a researcher working at Iran University of Medical Sciences. She competed her PhD in Tehran University of Medical Sciences (2007–2014). Her research interests includes NanoMedicine (Bone and Nerve regeneration), Nanotoxicology, Mechano-transduction.

Publication of speakers:

1. Functionalisation and surface modification of electrospun polylactic acid scaffold for tissue engineering; E Hoveizi, M Nabiuni, K Parivar, S Rajabi Zeleti, S Tavakol.
2. Necrotic, apoptotic and autophagic cell fates triggered by nanoparticles; R Mohammadinejad, MA Moosavi, S Tavakol, DÖ Vardar, A Hosseini.
3. A porous hydroxyapatite/gelatin nanocomposite scaffold for bone tissue repair: in vitro and in vivo evaluation; M Azami, S Tavakol, A Samadikuchaksaraei, MS Hashjin, N Baheiraei.
4. Berberine as a potential autophagy modulator; R Mohammadinejad, Z Ahmadi, S Tavakol, M Ashrafizadeh.
5. Neuroprotective effect of transplanted neural precursors embedded on PLA/CS scaffold in an animal model of multiple sclerosis; E Hoveizi, S Tavakol, S Ebrahimi-Barough

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