

عنوان مقاله:

Comparison of liposomal formulations incorporating BMP-2 peptide to induce bone tissue engineering

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خلاصه مقاله:

Objective(s): Fabricating a biomimetic scaffold platform combined with controlled release of bioactive agents is a practical approach for bone tissue engineering. Controlled delivery of peptides and growth factors which play a significant role in osteogenesis is an important issue reducing the associated adverse effects and leading to cost-effectiveness. Materials and Methods: We developed two liposomal formulations of bone morphogenetic protein-2 (BMP-2) peptide designated as F1 and F2 with controlled release properties. Due to high negative zeta potential of F1 formulation, the surface of the liposomes was decorated with positively charged BMP-2 peptide while the peptide was encapsulated in F2 formulation. Then, we evaluated the hypothesis that whether the electrostatically loaded peptide could act as a ligand and improve the cellular uptake and osteogenic differentiation of mesenchymal stem cells. Results: Both formulations were less than 100 nm in size. The release study revealed that both formulations showed a sustained release pattern for 21 days. However, the cumulative releases were 60% and 40% in F1 and F2 formulations, respectively. Flow cytometry analysis indicated that cell internalization of F1 liposomes was more than the other formulation. In the next step, F1 and F2 formulations were attached covalently to our previously developed nanofibrous electrospun scaffold and biocompatibility and osteogenic differentiation of each formulation were studied. The results indicated that the proliferation of the cells seeded on F1 liposcaffold was significantly more than F2 liposcaffold at days 1 and 3. Furthermore, F1 liposcaffold showed superior osteogenic differentiation through measurement of alkaline phosphatase activity which could be due to the higher release pattern of F1 liposomes and their improved cellular uptake. Conclusion: Our findings revealed that controlled release BMP-2 decorated liposomal formulations immobilized on nanofibrous electrospun scaffold platform could be a promising candidate for bone regeneration therapeutics and merits further investigation.

کلمات کلیدی:

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