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Novel drug delivery systems loaded with bone morphogenetic protein for the repair of alveolar bone defects

Cleft lip and palate is the most common congenital deformities around the world. It is a severe birth defect that affects facial structures, especially maxilla-mandibular structures. Treatment of patients with cleft lip and palate represents a real problem since it requires a comprehensive multidisciplinary approach that involves multiple surgeries and a lengthy orthodontic treatment. An important step in the treatment involves bone grafting of the associated alveolar defects. Bone morphogenetic proteins (BMPs) are members of the transforming growth factors super family that act as osteoinductive factors by inducing the differentiation of osteoblasts from mesenchymal cell. Previous studies have shown the ability of BMPs to induce bone formation in a variety of models having many clinical applications in orthopedics and in oral and maxillofacial surgery. The aim of our studies is to develop and test a new non-invasive injectable graft for the repair of alveolar bone clefts using recombinant human bone morphogenetic protein-2 (rhBMP-2), encapsulated within injectable vesicular and nanoparticulate drug delivery systems. One of this delivery systems is injectable liposomal in situ gel. Different liposomal formulation loaded with rhBMP-2 were prepared, the effects of method of preparation, and lipid content on encapsulation efficiency of rhBMP-2 within the liposomes were studied. For the preparation of in situ gel, deacetylated gellan gum was used, the *in vitro* gelation characteristics of the gel were evaluated. *In vivo* pharmacokinetic and histology were also assessed. Critical size alveolar defects were surgically created in the maxillae of 30 New Zealand rabbits and were treated by different injectable formulae including rhBMP-2 liposomal in situ gel. The results indicated that the prepared (rhBMP-2) liposomal in situ gel was found to prolong the release and the residence time of BMP-2 within rabbits for more than 7 days. Histomorphometric assessment showed 67% trabecular bone filling of the defects treated by this novel formula.

Biography

Khaled Hosny is a Associate Professor of Pharmaceutics and Industrial Pharmacy at King Abdulaziz University, Kingdom of Saudi Arabia. He was granted his PhD from Cairo university, Egypt, in 2006. He is currently supervising several PhD and Master degree postgraduate students. Hosny participating in several advanced research projects. His major research interests focused on Novel drug delivery systems. Hosny has a lot of publications in international journals.

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