Long Lasting in-situ forming implant loaded with raloxifene HCl: An injectable delivery system for treatment of bone injuries

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Abstract

Bone injury is very serious in elder people or osteoporotic patients. In-situ forming implants (IFI) for bone rebuilding are usually poly-lactic-co-glycolic acid (PLGA)-based, which have a burst release effect. This study aimed to prepare novel liquid lipid-based PLGA-IFI loaded with raloxifene hydrochloride for prolonged non-surgical treatment of bone injuries by applying solvent-induced phase inversion technique. Labrasol È and Maisine È were added to the selected IFI forming long lasting lipid-based IFI (LLL-IFI). The formulations were characterized by analysing their in-vitro drug release, solidification time, injectability, rheological properties, and DSC in addition to their morphological properties. Results revealed that the LLL-IFI composed of 10%w/v PLGA with a lactide to glycolide ratio of 75:25 with ester terminal and 10% Maisine È possessed the most sustained drug release and lowest burst effect, as well as delayed pore formation compared to its counterpart lacking Maisine È. The selected LLL-IFI and PLGA-IFI formulations were tested for their capability to enhance bone regeneration in bone injuries induced in rats. Both formulations succeeded in healing the bones completely with the superiority of LLL-IFI in the formation of well-organized bone structures lacking fibrous tissues. The results suggest that LLL-IFI and PLGA-IFI are innovative approaches for treating critical and non-critical sized bone injuries.

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