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Formulation of an injectable implant for peptide delivery and mechanistic study of the effect of polymer molecular weight on its release behavior

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Abstract:

The effects of polymer molecular weight on drug release from erodible matrices are not well known. It would be more complicated for in-situ forming injectable implants that change gradually from liquid to solid after injection. To investigate this phenomenon, two commerciallyaavailable PLGA polymers (lactic acid-co-glycolic acid) with molecular weights of 12000 and 48000 Da were used to prepare injectable implants containing leuprolide acetate as a model peptide. The influence of polymer molecular weight on the morphology and erosion of matrices and also on their in-vitro drug release behavior over a period of 28 days was investigated. Results showed that the amount of drug released (32%) over the first 24 hours (burst phase) for 12 kDa PLGA system, was significantly ($P<0.05$) higher than that of the one higher molecular weight (13%). There was no difference between the steady-state release fluxes of drug from the systems. Erosion profiles were also in agreement with those of release behavior in both burst and steady-state phases. Electron microscopy studies showed that the lower molecular weight system is more porous than the higher one, which can explain the difference between burst effects.

Keywords:

"Injectable implant ، Poly (lactide-co-glycolide) ، Molecular weight ، Erosion ، Leuprolide acetate"

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