

Abstract

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Title of diploma thesis:

Formulation and characterization of w/o emulsions for local treatment of musculoskeletal infections

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The aim of the diploma thesis was to formulate a depot dosage form for the prevention and local treatment of musculoskeletal infections. A water-in-oil emulsions have been formulated which, due to the partition coefficient between the outer and inner phases, can provide sustained drug release. Oils with different viscosities were tested as oil phases. Tricaprin was chosen for the preparation of emulsions, due to the highest stability of the prepared emulsion. Lecithin and sorbitan monooleate or polyglyceryl-3-polyricinooleate (PGPR) and magnesium stearate were used as emulsifiers. The aqueous phase was a solution of vancomycin hydrochloride and gentamicin sulphate. The flow properties on a rotational rheometer were evaluated. The influence of the emulsion composition and the homogenization method on the coefficient of consistency and the index of flow behaviour of the emulsions was studied. The emulsions stabilized with lecithin have a higher viscosity and a structure more sensitive to changes in composition (e.g., NaCl addition) or homogenization method compared to PGPR stabilized emulsions. The dissolution of antibiotics from emulsion-impregnated bone grafts was tested. The burst effect was reduced, and the dissolution time was extended to 6 days compared to the antibiotic solution. The emulsions slightly reduced the viability and proliferation of mesenchymal stem cells, but due to the osteoinductivity of the grafts, it was not reduced below the limit of 80%.

Key words: musculoskeletal infections; w/o emulsion; antibiotics; flow behaviour; drug release