

[*Advanced Powder Technol.*, **11**, 311-322 (2000)]

[Lab. of Pharm. Engineering]

Evaluation of Poly(DL-lactide-co-glycolide) Nanoparticles as Matrix Material for Direct Compression.

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The objectives of this study were to prepare matrix tablets with poly (DL-lactide-co-glycolide) (PLGA) particles and drug by direct compression and to evaluate the effects of altering the PLGA particle size, compression pressure, drug species and the PLGA nanoparticle content on compressibility and compactibility. In addition, the release rates of drugs from matrix tablets were evaluated and the release mechanism will be discussed. PLGA nanoparticles were prepared by the modified spontaneous emulsification solvent diffusion method. The compressibility of PLGA particles tended to become slightly poorer with decreasing particle size, while the nanoparticles gave significantly better compactibility compared to microparticles. The incorporation of nanoparticles was more effective in retarding drug release than microparticles. At low nanoparticle content (20%), the drug was completely released within a period of 20 h, while the drug release showed a biphasic release pattern at higher nanoparticle contents.

[*Chem. Pharm. Bull.*, **48**, 617-622 (2000)]

[Lab. of Pharm. Engineering]

Modification of the Physicochemical Properties of Minocycline Hydrochloride Ointment with Cyclodextrins for Optimum Treatment of Bedsore.

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Modification to find the best physicochemical properties of minocycline hydrochloride ointment for optimum treatment of bedsore was investigated by coformulating various types of cyclodextrins (CyD) in the ointment base. It was found that the drug release rate from the ointment base was modified according to the preparation method of ointment base and the type of CyD admixed. The viscosity, elution volume and water absorption of ointment base were also modified by those factors. The mechanism of physicochemical modification with CyD was explained by the structural change of ointment base and the change of surface tension. The stability of ointment was investigated by confirming the reproducibility of drug release rate after storage at ambient and cooled temperature conditions. A fused mixed ointment with p-CyD was found to be preferable for treatment of bedsore due to the improved drug release rate, lowered viscosity and increased elution volume of the ointment.

[*Powder Technol.*, **107**, 137-143 (2000)]

[Lab. of Pharm. Engineering]

Further Application of a Modified Spontaneous Emulsification Solvent Diffusion Method to Various Types of PLGA and PLA Polymers for Preparation of Nanoparticles.

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The purposes of this study were to expand the application of a new spontaneous emulsion solvent diffusion (modified-SESD) method. The phase separation points of PLGA and poly (vinyl alcohol) (PVA) were examined by cloud point titration to clarify the effect of the affinity of solvent used in the system to polymers on nanoparticle productivity. The combination of acetone/alcohol enabled the production of nanoparticles with good productivity. All of the nanoparticles could be powderized via freeze-drying, and they showed narrow size distributions. The phase diagram study indicated that the balance of the affinity between binary organic solvents and each polymer had a very important role in the productivity of nanoparticles. It was found that the modified-SESD method was widely applicable to various types of PLGA polymers, by choosing optimal combination of binary organic solvents.

[*J. Controlled Release*, **68**, 195-205 (2000)]

[Lab. of Pharm. Engineering]

Polymer Coating of Liposomes with a Modified Polyvinyl Alcohol and Their Systemic Circulation and RES Uptake in Rats.

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The objective of this study was to evaluate the in vivo characteristics of liposomes coated with a polyvinyl alcohol having a long alkyl chain at the end of the molecule (PVA-R) as an injectable drug carrier for passive targeting of drugs. The small unilamellar liposomes (100 nm in diameter) with various lipid compositions were prepared by the hydration method and coated with PVA or PVA-R by just mixing. The circulation and distribution of the liposomes were tested with their intravenous administration in rats. The PVA-R-coated liposomes showed significantly higher circulation compared to that of non-coated ones in any liposomal formulation. The prolonged circulation of PVA-R-coated liposomes was attributed to their fewer uptake in liver and spleen. The extent of improvement in the in vivo characteristics were well interpreted by the hydrophobicity of liposomes and their coating amount of PVA-R.