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A portable near infrared (NIR) system which was newly integrated by our lab has been used to develop a non-invasive blood glucose monitoring. The portable NIR system includes a tungsten halogen lamp, a photo diode array type-InGaAs detector, and specialized reflectance fiber optic probes. The shape of probes is composed of two parts, one for illumination into sample and the other for receiving the radiation from sample. Three kinds of probes with different distance between illumination and receiving part, such as 0.03, 0.1, and 0.5mm, were investigated for optimization. The spectra were collected over the spectral range 1100~1730 nm. Partial least squares regression (PLSR) was applied for the calibration and validation for the determination of blood glucose levels. NIR reflectance spectra of different parts of human body (finger tip, earlobe, and inner lip) were acquired and showed a specific trend by the distance of fiber optic probe. This trend indicated that the distance of fiber optic probe had an effect on penetration depth into skin tissue of human body and the optimum distance of fiber optic probe according to the parts of human body should be considered. Calibration modeling results were compared based on the kinds of probes and the measured human body parts. This study provided the useful information concerning sample presentation for non-invasive blood glucose monitoring.

Poster Presentations - Field E1. Pharmaceutics

[PE1-1] [10/18/2002 (Fri) 13:30 - 16:30 / Hall C]

Mucoadhesive Drug Carrier Using Poly(acrylic acid)/poly(vinyl alcohol) Interpolymer Complexes by Template Polymerization

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A interpolymer complexes composed of poly(acrylic acid)(PAA) and poly(vinyl alcohol)(PVA) were prepared by template polymerization of acrylic acid in the presence of PVA for mucoadhesive drug delivery. FT-IR results showed that the PAA/PVA interpolymer complex was formed by hydrogen bonding between the carboxyl groups of PAA and the hydroxyl group of PVA. The dissolution rate or the swelling ratio of the PAA/PVA interpolymer complexes was dependent on the pH and molecular weight of PVA that was used as a template. The adhesive force of the PAA/PVA mucoadhesive polymer complex with a plastic plate(poly propylene) was usually stronger than that of commercial Carbopol 971P. The adhesive force of the PAA/PVA interpolymer complex increased as the molecular weight of PVA increased.

[PE1-2] [10/18/2002 (Fri) 13:30 - 16:30 / Hall C]

Surfactant-free microspheres of poly(ε-caprolactone)/poly(ethylene glycol)/poly(ε-caprolactone) triblock copolymers as a novel protein carriers

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The aim of this study is to prepare biodegradable microspheres without use of any kind of surfactants or emulsifiers for a novel sustained delivery carriers of protein drugs. Poly(e-caprolactone)/poly(ethylene glycol)/poly(e-caprolactone) (CEC) triblock copolymer was synthesized by ring-opening of e-caprolactone with dihydroxy poly(ethylene glycol) and was used to make surfactant-free microspheres. When DCM or EF were used, microspheres was not formed at any formulation conditions and resulted in disintegrated form or irregular microparticles after lyophilization. Athough microspheres could be formed before lyophization at certain conditions, morphology of microspheres was not maintained during filtration and lyophilizatiion process. Surfact-

free microspheres was only formed when EA was used as a organic solvent and showed nice spherical microspheres although surfaces was still rough. Protein contents was lower than our expectations and reason of low protein contents was thought to the easier formation of water channel and pores. Protein release kinetics showed burst release until 2 days and after that sustained release pattern was showed.

[PE1-3] [10/18/2002 (Fri) 13:30 - 16:30 / Hall C]

Preparation of polymeric nanoparticles from hydrophobically modified pullulan for hydrophobic drug carrier

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For the development of a biocompatible nano-scale drug carrier, hydrophilic polysaccharide pullulan was hydrophobized by the conjugation with fatty acid. The synthesized polymers were characterized by the measurements of fourier transform infrared (FT-IR) spectroscopy and 1H-nuclear magnetic resonance (NMR) spectroscopy. In aqueous solution, hydrophobically modified pullulan was self-assembled and structured into the core-shell type nanoparticles. The self-assembling characteristics of the hydrophobically modified pullulan were confirmed by the measurement of fluorescence spectroscopy. Critical association concentration (CAC) was calculated by the intensity ratios of the excitation spectra with various concentrations of nanoparticle suspension. Morphologies of the nanoparticles were observed by the transmission electron microscope (TEM). Particle size distribution was measured by photon correlation spectroscopy (PCS). By the control of the amount of fatty acid, the hydrophobicity changes of the polymers were measured by x-ray diffractometer. The possibility as hydrophobic drug carrier was evaluated with a model drug in vitro.

[PE1-4] [10/18/2002 (Fri) 13:30 - 16:30 / Hall C]

New Formulation of Vitamin A Transdermal Therapeutic System

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Retinol is widely used for skin care, the improvement of the appearance of aging, photo-damaged or oxidatively stressed skin, and especially for the improvement of the appearance of wrinkled skin. Retinol, however, is extremely sensitive to atmospheric oxygen, and easily decomposed by exposure to air. Retinol is commonly formulated as the ointments or creams for cosmetic preparations. However, they have several disadvantages, such as chemical and thermal instability, skin irritation, inflammation by vehicles. in order to reduce these disadvantages, especially, to enhance the stability of retinol in the preparation, it was formulated as the matrix patch using hydrophilic polymer matrix.
PEG 400 and glycerin (50/50) were used as plasticizers in the preparation of retinol patches. The effects of plasticizers concentrations on adhesive force of retinol matrix patch were evaluated using peel adhesion and loop tack. The carbomer matrix containing a total of 2.0-4.0% plasticizers represented the strongest adhesion force. And the effects of hydrophilic polymers on release of retinol were evaluated using Franz diffusion cells fitted with cupropane membrane. The release of retinol from carbomer matrix followed Higuchi's equation. Retinpl in N-AA1 matrix showed the highest release profiles among various hydrophilic polymeric matrix. The effects of stabilizers on stability of retinol were also evaluated at accelerated condition. The degradation of retinol in carbomer matrix followed the Arrhenius equation of first order kinetics. The combination of BHA/BHT was the stabilizer of choice and their effect was concentration dependent. PEG 400/Glycerin (50/50) was the best plasticizers to improve the stability of retinol in carbomer matrix and their effect was also concentration dependent.

[PE1-5] [10/18/2002 (Fri) 13:30 - 16:30 / Hall C]

Preparation and Evaluation of Methacrylate copolymer Microspheres of Piroxicam