system. In this study, the better loading efficiency and more spherical particles were shown when using concentration of sodium alginate 1%(w/v).

[PE1-28] [04/21/2000 (Fri) 10:30 - 11:30 / [1st Fl, Bldg 3]]

Formulation of PLGA microspheres containing ovalbumin and their immunogenicity in BALB/c mice

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A model protein, ovalbumin(OVA), was entrapped in poly(lactide-co-glycolide) polymers to demonstrate the effect of formulation conditions and the microparticles were administered subcutaneously to female BALB/c mice as a single dose. Microspheres were prepared by a W/O/W multiple emulsion solvent evaporation method and their in vitro characterization was performed. The same microspheres were used in a series of in vivo studies to evaluate the immune response after single subcutaneous injection. Microspheres were characterized for particle size, encapsulation efficiency, morphology, gel permeation chromatography and in vitro drug release in a PBS solution (pH 7.4, 37 ℃). Protein denaturation was evaluated by size exclusion chromatography, SDS-PAGE and isoelectric focusing and circular dichroism. The primary IgG antibody responses obtained with OVA microparticles were compared to those obtained with OVA solution and OVA absorbed to alum. Low loading efficiencies of less than 20% were observed and in vitro release of OVA showed the burst effect in all batches of different microspheres, followed by gradual release over the next 6 weeks. The structural integrity of OVA was unaffected by the formulation process by this method and enzyme-linked immunosorbent assays demonstrated that the single subcutaneous administrations of ovalbunim-loaded PLGA microspheres induced good antibody responses. These microcapsules providing the controlled release of antigens may be valuable in advanced vaccine formulations for the parenteral protein drug delivery.

[PE1-29] [04/21/2000 (Fri) 10:30 - 11:30 / [1st Fl, Bldg 3]]

Effect of temperature and oleic acid on the electrical properties of skin

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Electrically, skin is usually represented as a parallel combination of capacitance and resistance. From the stripping experiments, it has been shown that the stratum corneum is mainly responsible for the electrical properties of the skin. The capacitance is believed to originate from the lipid matrix-keratin cell complex of the stratum corneum; the resistance appears to be primarily associated with the ion conducting pores in the skin. These pores are mainly locating at appendages on skin, such as hair follicles and sweat glands, though there are some unidentified pathways whose contribution to the flow of current is dependent on the magnitude of current. Impedance measurements have shown that resistance and/or capacitance may be affected by various factors such as ionic strength of the skin-bathing medium, pH and chemical treatment. The effect of iontophoresis on resistance and capacitance has also been studied.

In order to optimize or maximize the benefits from iontophoresis, it is very important to understand the electrical properties of the skin. In this work, we have measured the electrical impedance of skin as a function of frequency and the Nyquist plot was carried out. Resistance (R) of skin was determined from this plot by multiplying the real part value at frequency (f_c) giving the highest imaginary part value by two. The capacitance (C) was calculated from the equation $C=\tan\Theta/(2\pi f_c R)$, where Θ is shift in phase of the sinusoidal current. Using hairless mouse skin, the effect of temperature (between 5 and 30 ℃) and oleic acid treatment on these properties were evaluated.

Treatment of skin with a permeation enhancer, oleic acid, decreased the resistance about 30 folds, and increased capacitance about 2 folds. In both the control and neat oleic acid treated skin, the resistance decreased as the temperature increased. The capacitance, on the other hand, increased as the temperature increased. We could not observe any phase transition type resistance and capacitance changes at around 8 ℃, due to the melting of oleic acid in the skin at this temperature. The results provide further mechanistic insight into ion conduction through the skin and into the role of stratum corneum lipids in skin capacitance.

[PE1-30] [04/21/2000 (Fri) 10:30 - 11:30 / [1st Fl, Bldg 3]]

DRUG LOADED POLY (ε-CAPROLACTONE)-CHITOSAN POROUS MATRICES AS BONE SUBSTITUTES

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With an aim of obtaining high efficacy in bone regeneration, drug releasing porous poly (ε-caprolactone)(PCL)-chitosan matrices were fabricated. These matrices were anticipated to perform structural tissue supporting activity and enhance tissue formation by releasing active agent in controlled manner. PCL-chitosan scaffolds were fabricated by freeze-drying PCL-chitosan solution mixture. Chitosan solution was added to enhance hydrophilicity of PCL and improve biocompatibility of the matrices. In addition, incorporation of tetracycline may be beneficial for obtaining improved efficacy especially in bone regeneration therapy. It was reported that tetracycline increased osseous regeneration when applied in local bone defect. Thus, if tetracycline can be loaded within these matrices and released in controlled rate, synergic effect by both scaffolding activity and tetracycline activity would be expected. This drug delivery system can maintain therapeutic concentration at the application site over therapeutic period. Fabrications of PCL-chitosan matrices, release kinetics of tetracycline, in vitro biodegradation test, and cell attachment test were investigated in this study. PCL-chitosan scaffold demonstrated porous structure and proper release profile to obtain effective drug concentration. Therefore, PCL-chitosan scaffold might be an effective device in obtaining tissue regeneration efficacy.

[PE1-31] [04/21/2000 (Fri) 10:30 - 11:30 / [1st Fl, Bldg 3]]

Biodegradable Injectable Particulate Systems for Controlled Drug Release using Poly (Lactic-co-glycolic) Acid Copolymers

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For the purpose of controlled local drug release, drug loaded injectable poly (lactic-co-glycolic) acid (PLGA) (75 : 25), (50 : 50) particulates were developed. The advantages of these particulate local drug delivery system include increase efficiency in localized drug release, extension in maintaining local concentration, which may induce optimum therapeutic efficacy. In this study, polymer solution was prepared by dissolving PLGA in methylene chloride. Subsquently, NSAIDs (piroxicam, flurbiprofen) were loaded into the PLGA solution, and mixed homogenously. The mixtures of polymer-drug-solvent were freeze dried, followed by being ground with micromill. Release profiles of PLGA particles and morphologies of the matrices and particulates were examined by scanning electron microscope (SEM) (JEOL, JSM 5200, JEOL Ltd., Tokyo, Japan). This method could minimize drug loss and maximize reproducibility of constant loading efficiency. Moreover mixed solvent system can permit generation of pores within the particles. These particulates had porous structures and proper release profiles to obtain effective drug concentration. Therefore, this particulate system might be an useful tool for effective local drug delivery system.