

Title: Synergic effect of microneedle and iontophoresis on transdermal delivery of human growth hormone

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The objective of this work was to evaluate the combined effect of microneedle and iontophoresis on transdermal recombinant human growth hormone(rhGH) delivery. rhGH was used as a model macromolecule. Methylene blue staining, stereomicroscope and SEM imaging were used to characterize the microchannels. The effect of molecular charge on transdermal delivery was evaluated by permeation study in two different buffer – PBS (pH 7.4) and citrate (pH 4.0). Since hGH is negatively charged at pH 7.4 and positively charged at pH 4.0, cathodal and anodal iontophoresis was applied respectively. And the effect of current density was evaluated in three different electrical densities of 0.125, 0.25 and 0.5mA/cm^2. With the optimized iontophoresis protocol, permeation studies were performed to evaluate combination effect of iontophoretic delivery through microchannels under three different settings : (a) iontophoresis alone, (b) microneedle pretreatment, (c) microneedle pretreatment with iontophoresis. The cumulative amount permeated and flux in all experiments reached a plateau in 1 hour. Anodal iontophoresis in citrate buffer showed about 10-fold higher flux of rhGH compared to cathodal iontophoresis in PBS. Also anodal iontophoresis with current density of 0.5mA/cm^2 showed the 2.32 and 1.11-fold higher flux compared to 0.125 and 0.25mA/cm^2 respectively. And compared to microneedle pretreatment and optimized iontophoresis alone, the combination of iontophoresis with microneedle showed 5.82 and 6.33-fold higher flux respectively. The result suggrest that anodal iontophoresis with higher current density enhance permeation of macromolecule through microchannels created by microneedles. In conclusion, combination of iontophoresis and microneedle is potential strategy for enhancing transdermal delivery of macromolecule..

Biography

Gyubin Noh completed his Bachelor course from Keimyung University, College of Pharmacy, Daegu, Republic of Korea on February, 2016. He started MS-PhD course at College of Pharmacy, Keimyung University, Daegu, Republic of Korea from September 2016 to till date. He is now studying in 3rd semester. He is interested on transdermal drug delivery, biopharmaceutical delivery, microneedle etc

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