Transdermal iontophoresis of sodium nonivamide acetate. III. Combined effect of pretreatment by penetration enhancers

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摘要

Abstract

The effect of iontophoresis combined with pretreatment of penetration enhancers such as benzalkonium chloride, cetylpyridinium chloride, sodium laurylsulfate and isopropyl myristate on the transdermal transport of sodium nonivamide acetate (SNA) and histologically structural properties of rat skin was undertaken. Cetylpyridinium chloride and isopropyl myristate showed the highest iontophoretic enhancement factor (E) and iontophoretic flux (J1) on the transdermal penetration of SNA after pretreatment with skin, respectively. However, because of the severe change on the histological structure of rat skin irritated by isopropyl myristate, its clinical use is limited. The iontophoretic flux of SNA of sodium laurylsulfate pretreatment group was lower than that of control group. The reason for this phenomenon was that iontophoretic transport of SNA would be restricted by the hindrance of sodium laurylsulfate molecules inhibiting entry into pores of the skin. In the study of the different pretreatment duration of penetration enhancer for time ranging from 6 to 24 h, the total enhancement factor over passive diffusion was decreased following the increase of pretreatment duration both in cetylpyridinium chloride- and isopropyl myristate-pretreated skin. This illustrated that penetration enhancers could largely influence the passive transport of SNA but only showed a minor effect on the iontophoretic transport of SNA. In the result for anatomical skin structures treated by current density, there was almost no change observed in the structure of skin after iontophoretic treatment as compared with the control group. Accordingly, iontophoretic delivery is a transdermal enhancement method with high safety. A combination of physical iontophoresis with the chemical enhancer may be a potential route for transdermal delivery of drugs as this present study indicates.