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TRANSDERMAL DELIVERY OF HEPARIN BY MEANS OF ALTERNATE CURRENT SKIN ELECTROPORATION

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Introduction. Heparin is a glycosaminoglycan with different biological activities that are exploited for treatment of thrombo-embolic diseases (1). Different molecular species of heparin (high- low- and very low-molecular weight) are present in commercial preparation (2). Since heparin has to be administered by injection, skin electroporation could be proposed as a safe alternative for the administration of heparin (3).

Aims. In this study we evaluated the efficiency of an alternate current skin electroporator that uses an inductor instead of a conventional capacitor, in delivering heparin through rat skin.

Materials and Methods. Purified high- and low-molecular weight fraction pools obtained by fractionating ^{35}S-heparin on Sephadex G-75 column were separately tested. Experiments were performed on the skin of nine male Wistar rats by the application of a 5mA current for 8 minutes by the electroporator and in presence of the different species of heparin. Then full thickness skin biopsies were taken both from treated and from untreated, control skin areas. Half of the specimens were treated for light microscopy, while the other part underwent standard methods for measuring radioactivity by liquid scintillation.

Results and Conclusions. Electroporation significantly increased the transdermal transport only of low-molecular weight heparin. Thus, skin electroporation of commercially available heparin preparations, using an alternate current equipment, would result in the passage of low-molecular weight species as if the electroporated skin functioned as a molecular sieve. Given that low-molecular weight heparin has significant pharmacological advantages over the high-molecular weight or un-fractionated heparin preparations, we hypothesize that alternate current skin electroporation could be used to deliver low-molecular weight heparin by administering commercially available, low-cost, un-fractionated heparin preparations.

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