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## Minoxidil-containing dosage forms: skin retention and after-rinsing hair-growth promotion.

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### Abstract

Three kinds of topical dosage forms of minoxidil (MXD), namely vesicles, double emulsions, and an inclusion complex with hydroxypropyl-beta-cyclodextrin (HP-beta-CD), were prepared. The skin retention of MXD in the preparations was evaluated in vitro using hairless mouse skins. After applying the preparations onto the skin and rinsing it, the amount of the drug left on the skin was determined using HPLC. Retention was the highest when the drug was encapsulated in cationic vesicles. Nonionic vehicle, the double emulsion, and HP-beta-CD left no significant amount of the drug after rinsing the skin. Thus, an ionic interaction between the cationic vehicle and negatively charged skin is likely responsible for the relatively high skin retention. In vivo hair growth-promotion effect of each dosage form was investigated, in which the sample application onto the clipped backs of female mice (C57BL6) and the subsequent rinsing of the backs were done once a day for 30 days. Only MXD in the cationic vesicles had hair growth promotion effect, possibly due to significant skin retention.

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