

The effects of age, gender and anatomical site on the barrier properties of third degree burn eschar toward hydrophilic and lipophilic drugs

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Background and Aims: After thermal injuries, most of the normal functions of skin are changed and a new barrier, named eschar, is formed instead. As the topical antimicrobial therapy is the main method of wound infection treatment, and the effects of factors like patient age, gender and anatomical site are usually of biopharmaceutical concerns for permeation through any biological barrier, it was decided here to investigate the effects of such variables on barrier performance of burn eschar toward permeation of drugs.

Methods: Clindamycin phosphate and diazepam were chosen as the hydrophilic and lipophilic model drugs respectively and their permeation through fully hydrated human third-degree burn eschars were investigated in-vitro using static diffusion cells at 32°C for 25 hours. Eschar samples with post burn ages of 3, 4, 6, 12 and 22 days were obtained from different burn patients (29 male and 18 female, aged 16-80 years) at the time of surgical debridement. Drug determinations in the receptor phase for both drugs were by HPLC.

Results: Permeability coefficients of all studied groups were found to be in the ranges 0.008-0.061 (cm h⁻¹) for diazepam and 0.005 - 0.036 (cm.h⁻¹) for clindamycin. Statistical analysis (ANOVA, P=0.05) showed no significant effect of gender, anatomical site and post burn age on permeability of these drugs. Clindamycin absorption was increased significantly in peoples over 60 years old in comparison to lower ages, but, absorption of diazepam was not affected by age.

Conclusions: Present data revealed that for fully hydrated eschar, the same drug formulation or regime might be suitable for both genders and different anatomical sites. In the case of age, increased age should be considered as an important parameter in drug therapy. Further works are required for other conditions and are in progress in our laboratories.

Keywords: Burn eschar; Absorption; Age; Gender; Clindamycin phosphate; Diazepam