

The effects of petrolatum and glycerin in acetone and tape stripping damaged canine skin barrier function

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Abstract: *Introduction* The recovery rate after induced damages such as acetone and tape-stripping were suggested for the predictive value of methods to test skin barrier function can be assessed by transepidermal water loss (TEWL) and skin hydration measurements. The purposes of this study are i) to investigate the effects of acetone damage and tape-stripping damage for skin barrier disruption dog model. ii) to investigate the effects of topically applied petrolatum and glycerin on the barrier repair of acetone-induced and tape-stripping induced skin damage in beagle dogs. iii) to investigate whether ruthenium tetroxide postfixation TEM, osmium tetroxide postfixation SEM were a suitable technique for visualizing skin ultrastructure to evaluate the outer and inner changed epidermis in canine skin.

Materials and Methods: In 6 healthy beagle dogs, transepidermal water loss (TEWL) and stratum corneum hydration measurements were carried out 3, 6, 12, 24, 48h after applying petrolatum and glycerin during recovery from acute disruption. MANOVA(SAS), A paired t-test (SPSS 12.0) were used to compare the effect of the different changes of TEWL and SC hydration to compare the effect of the difference between petrolatum and glycerin at each test time. For TEM observations, skin samples were postfixed in ruthenium tetroxide and examined on a Hitachi, H-7000 operating at an accelerating voltage of 80 kV. For SEM observations, the samples were postfixed in osmium tetroxide and examined with a Hitachi, S-2500.

Results: Acetone treatment has an impact on barrier function with a concurrent decrease in TEWL and SC hydration, while tape tripping affects barrier function and also increases TEWL and SC hydration. The statistically significant improvement of skin barrier parameter such as TEWL and SC hydration could be observed in glycerin (better than petrolatum) application after acetone- and tape stripping-damages. Ruthenium tetroxide postfixation TEM permitted the visualization of skin barrier ultra-structures (stratum corneum intercellular lipids as multilayered lamellae), osmium tetroxide postfixation SEM permitted the visualization of skin barrier surface-structures (skin surface, hairs and other materials such as glycerin, petrolatum) on canine skin.

Discussion and Clinical relevance: The investigative methods used in this study show that petrolatum and glycerin can improve barrier repair after acetone- and tape stripping damage. In addition, TEM and SEM can be a very useful and necessary diagnostic methods to identify internal and external skin structure characters. These dog models and methods in this study will be used for veterinary dermatology research such as skin barrier recovery shampoos, moisturizers and other products for various skin problems.

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