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IMPROVEMENT OF THE EXPERIMENTAL SETUP TO ASSESS CUTANEOUS BIOAVAILABILITY ON HUMAN SKIN MODELS: DYNAMIC PROTOCOL. Dreher F., Patouillet C., Fouchard F., Zanini M., Messager A., Roguet R., Cottin M., Leclaire J., Benech-Kieffer F. L'Oreal Research, Aulnay-sous-Bois, France. Skin Pharmacology and Applied Skin Physiology, 15, (Suppl 1), 31-9(2002).

Keywords: Bioavailability, Cutaneous bioavailability, Dynamic diffusion cell, EpiDerm, Human skin model, In-Line cells, Percutaneous absorption, PermeGear, Vertical diffusion cells

Materials Tested: Benzoic acid, Caffeine, Mannitol

Summary: Human skin models, such as EpiDerm® and Episkin® are not easily mounted into static or dynamic diffusion cells that are commonly used to perform bioavailability studies with human skin ex vivo. For various reasons, such as fragility, small sample size, and other morphological constraints, skin absorption studies with human skin models are often carried out on the delimited skin surface obtained by gluing a ring onto the reconstituted epidermis and manually exchanging the receptor solution. However, such an experimental setup is prone to artifacts. Discontinuous removal of the receptor fluid leads to alternating sink conditions, and an area of application smaller than the area in contact with the receptor fluid, as well as imperfect seal of the glued ring, may result in inaccurate penetration rates. Human skin models were shown to be relatively easily mounted into In-Line cells (PermeGear Inc.), vertical diffusion cells which appear to be appropriately designed for such a purpose. In-Line cells allowed accurate determination of solute penetration as well as automated sampling of receptor fluid. Excised human skin can be mounted into these cells as well, making it possible to compare penetration rates through different types of skin samples under identical conditions. Using mannitol as a reference compound, penetration profiles and epidermal distribution similar to those obtained with human skin ex vivo were obtained both with EpiDerm and Episkin. Under the present conditions, human skin models were more permeable to mannitol than excised human skin, which was only slightly permeable to mannitol. Due to these experimental innovations and to the good agreement with the absorption characteristics through human skin ex vivo, EpiDerm and Episkin seem to be promising human skin models for testing the cutaneous bioavailability of topical products in vitro.

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