

Reconstructed human epidermis : a model to study the barrier function

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Freeze-dried thin sections of human native skin obtained from surgery or punch biopsies have proved to be an efficient model for penetration studies in dermatocosmetic or pharmacology applications, especially when exogenous substances are under investigation. However, the physiological status of native skin is suffering from large inter-individual variations, especially in terms of mineral elements content. For this reason, together with the advent of ethic laws on animal experimentation, reconstructed skin or epidermis model have recently emerged. Their advantages are : (i) an excellent reproducibility of their trace elements and inorganic ions, (ii) an easy procurement.

We have launched a research programme aiming at characterizing a model of human reconstructed epidermis in terms of trace elements, mineral ions and their distribution in the outermost layers of the skin. Nuclear microscopy was carried out to provide elemental maps and quantitative data of those elements. STIM was also employed to elucidate the epidermis structure on a microscopic scale.

The reconstructed epidermis appeared as an excellent model for studying physiological and biochemical mechanisms more particularly involved in the barrier role. Minerals were found compartmentalized in the different functional epidermis strata with similar distribution than in native skin. In particular, a clear calcium gradient was demonstrated between corneum and spinosum. In this paper, we will describe the model structure and its elemental content with reference to native skin. Methodological points will be also discussed, more especially those concerning the sample preparation and the reproducibility of the model.