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## Towards a standardized trans-epithelial electrical resistance measurement on *in vitro* cutaneous and ocular reconstructed models

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**Context:** The barrier function of epithelial tissues is well described with passive permeability assays using hydrophilic or hydrophobic markers. Two major routes are mainly involved in small molecules flux: while trans-cellular route of chemicals depends on their lipophilicity, paracellular route takes place into the intercellular spaces and is under tight junctions (TJs) control (Schäfer et al., 1996; Bazzoni et al., 2002). Together with the proteo-lipidic complex of the cornified layers, TJs are important effectors of the barrier function of tissues. Those junctions are found mainly in the upper layer of the epidermis, especially in the *stratum granulosum* (Furuse et al., 2002). When TJs are not mature or damaged hydrophilic compounds are able to diffuse from the upper layers to the basal one (for both skin epidermis and eye corneal epithelium). Consequently, modifications of barrier function linked structures can influence trans-epithelial electrical resistance (TEER) state of the tissue.

**Purpose:** Modifications and quality of the barrier function could be detected by using TEER measurements. This parameter could give some information about both the steady state of *in vitro* epidermis/epithelial models and the tissue integrity modifications after chemical treatments (*in vitro* toxicity testing system). We studied three commercially available *in vitro* epithelial engineered models: two reconstructed human epidermis models (EpiSkin<sup>LM</sup> large model, RHE small) and a human corneal epithelial model (RHCE) supplied by SkinEthic Laboratories. A comparison between models on TEER measurements is made before and after surfactant treatment.

**Material and Methods:** TEER was measured by using a specific epithelial tissue Volt-Ohmmeter in different conditions. Electrical resistance was measured during a time period in order to define acceptable and standardized steps where TEER could be regarded as stable prior to measurements.

**Results:** Comparisons between two electrolyte media were done in order to optimize measurements. Subsequently, TEER assays were carried out after topical surfactants treatment: SLS treated EpiSkin<sup>LM</sup> or RHE small and Triton X-100 treated RHCE. Results showed a sharp TEER decrease since the lowest concentrations tested reaching low resistance values at the highest surfactant concentrations. Complementary cellular viability assays showed clear effects only at the highest surfactant doses.

**Conclusion:** TEER standardized method could be a useful endpoint for quality control assessments and comparisons between 3-D models. In addition it could be used as a suitable easy to use tool, to describe barrier function, complementary to TEWL and other permeation studies.

### References

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