

## **Barrier Function Comparison Between In Vitro Skin, Oral (Buccal), and Ocular Tissue Models – Implications For Drug Delivery Studies**

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### **Purpose:**

Due to the barrier properties of skin, transdermal delivery of therapeutic compounds is often not feasible. As an alternative, delivery through buccal or gingival tissues has been investigated. The current presentation involves use highly differentiated, in vitro tissue models of the epidermis (EpiDerm<sup>TM</sup>), oral tissue (EpiOral<sup>TM</sup>), and cornea tissue (EpiOcular<sup>TM</sup>). The purpose of the current study was to compare the barrier function characteristics of these tissues in order to assess their utility for drug delivery studies.

### **Methods:**

The permeability of EpiDerm, EpiOral, and EpiOcular to three model drugs (caffeine, hydrocortisone and tamoxifen) was compared. The three drugs were chosen to span the range of lipophilicity. For permeability measurements, Franz diffusion cells were used and temperature was maintained at 37°C. A 5.01 $\mu$ l (25.5 $\mu$ l/cm<sup>2</sup>) saturated suspension of model drug in propylene glycol was applied to each sample. The samples were taken over 24 hours and analyzed by HPLC.

### **Results:**

For the three compounds studied, in all cases the barrier function of skin > oral > corneal. However, the permeability for the least polar material, tamoxifen, was only 1.1 and 1.3 fold greater through the oral and corneal tissue, respectively, versus through skin. The greatest differences were observed for hydrocortisone for which permeability rates were 100 and 344 fold greater for the oral and corneal tissue. Finally, caffeine permeated at rates which were 25 and 27 fold higher than skin.

### **Conclusions:**

As expected, permeability through the non-keratinized oral and corneal tissues dramatically exceeded the transdermal (skin) absorption rate, although the magnitude of the differences was dependent on the permeant. As such, these tissue models will likely be useful as a first order approximation for permeability characteristics of drugs delivered through oral, corneal, and/or epidermal tissue.

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