

## Importance of The Type of Oral Mucosa Model in The *In Vitro* Studies of Oral Drug Delivery

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Oral mucosa drug delivery has attracted the attention of researchers [1] because it offers several advantages respect to peroral route (the avoidance of liver detoxification and presystemic drug elimination within the gastrointestinal tract that inhibit oral administration peptides and proteins) [2-3]. Drug transport across oral mucosa can occur by paracellular or transcellular way. The first one is utilized from hydrophilic compounds and the latter from lipophilic molecules. However, considering that the oral epithelium is stratified, drug permeation involves a combination of these two ways [4].

Two layers, in fact, compose the oral mucosa: the surface epithelium (supported by connective tissue layer) and the lamina propria. The first one is a stratified squamous epithelium, which may be keratinized or non-keratinized depending from the area of the mouth [5].

The lamina propria contains fibroblasts and is composed by a network of type I and III collagen fibers and elastic fibers. Moreover, the lamina propria contains vascular and lymphatic components [5].

Nevertheless, this type of drug delivery is not yet widely used, for various reasons. One of these is the absence of standardized methodologies for the *in vitro* evaluation of buccal drug delivery systems. Hence the need to validate *in vitro* models of oral mucosa on which to perform (among others) cytotoxicity and mucoadhesion tests of the delivery system and release and permeability tests of the drug [2,6].

During the time, various *in vitro* models of the buccal mucosa were used in oral drug delivery studies. Since 1975, is known that human keratinocytes can growth, *in vitro*, on a 3T3 mouse fibroblasts monolayer [7]; however, because the oral epithelium is a complex multilayer structures, only a 3D multilayer culture system can represent a good model of oral mucosa [5].

Multilayer sheets of non-keratinizing oral epithelium, commercially available, is constituted by TR146 keratinocyte cell line [5,8] but, due to cancer origin of these cells, the permeability is not conform to normal keratinocytes. For this type of studies is available a keratinized stratified epithelium produced by air-liquid interface culture of normal gingival keratinocytes [5].

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Obviously, to obtain an oral mucosa model similar to normal mucosa, lamina propria, basement membrane and stratified squamous epithelium are necessary and, to this purpose, researchers work to develop new type of scaffolds (also utilizing the new generation of 3D bio-printer) to reach this result [5,9]. Until this goal is achieved, it is important to keep in mind the limitations of the model used to interpret the experimental results obtained.

### References

1. Rathbone M., *et al.* "The oral cavity as a site for systemic drug delivery". *Advanced Drug Delivery Reviews* 13.1-2 (1994): 1-22.
2. Patel VF., *et al.* "Modeling the oral cavity: In vitro and in vivo evaluations of buccal drug delivery systems". *Journal of Controlled Release* 161.3 (2012): 746-756.
3. Shojaei AH., *et al.* "Systemic Drug Delivery via the Buccal Mucosal Route." *Pharmaceutical Technology* (2001): 70-81.
4. Hooda R., *et al.* "A Review on Oral Mucosal Drug Delivery System". *The Pharma Innovation* (2012): 14-21.
5. MoharamzadehK., *et al.* "Tissue-engineered Oral Mucosa: a Review of the Scientific Literature". *Journal of Dental Research* 86.2 (2007): 115-124.
6. Zhang H and Robinson JR. In vitro methods for measuring permeability of the oral mucosa, In: *Oral Mucosa Drug Delivery*, Marcel Dekker, Inc., (1996): 85-100.
7. Rheinwald JG and Green H. "Serial cultivation of strains of human epidermal keratinocytes: the formation of keratinizing colonies from single cells". *Cell* 6.3 (1975): 331-343.
8. Jacobsen J., *et al.* "Filter-grown TR146 cells as an in vitro model of human buccal epithelial permeability". *European Journal of Oral Sciences* 107.2 (1999): 138-146.
9. Wertz PW and Squier CA. "Cellular and molecular basis of barrier function in oral epithelium". *Critical Reviews in Therapeutic Drug Carrier Systems* 8.3 (1991): 237-269.

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