
The 'Open Source' Reconstructed Epidermis (OS-REp): towards the global harmonization of reconstructed epidermal tissue models as alternatives to animal methods in regulatory, industrial and academic testing.

Executive Summary

Background of the concept

Today in vitro reconstructed human epidermal tissues are widely being used in cosmetic, pharmaceutical and chemical industry as alternatives to animal testing for a variety of testing applications including toxicity, efficacy, pharmacology and absorption studies. Various epidermal models passed successfully scientific validation at ECVAM (European Centre for the Validation of Alternative Methods to Animal Testing) to predict skin irritation and are accepted for regulatory purposes to predict skin corrosion (OECD 431) and skin permeation (OECD 428, technical guidance document No. 28).

However, all models currently validated are either protected by patents and/or are being commercialized using proprietary tissue culture procedures by only a few private companies; hence their continued availability is dependent only and entirely on the corporate strategies of these companies and therefore might not be guaranteed for the long term future. In addition, although it is generally accepted that the reconstructed epidermal models currently available are all 'comparable', intrinsic differences inherent to their proprietary manufacturing procedures have been causing reasonable concern in the scientific community: for instance the test protocol transferability from one model to another is often limited and considered a bottleneck for method acceptance both at industry and regulatory levels.

Vision

Phenion and its partners want to set a *new golden standard* in epidermal tissue reconstruction as a basis for alternatives to animal testing by insuring the development, production, validation and technology transfer of an 'Open Source' Reconstructed Epidermis (OS-REp). This OS-REp model, of which the intellectual property and the tissue production protocol are available to anyone, independent of use or party whatsoever (the true definition of 'open source'), will eventually become the global standard for epidermal based toxicity testing worldwide, and will consequently guarantee the continued implementation of such models in regulatory testing as well as academic and private research [Ref. 1].

Technology

The OS-REp technology was originally developed and published by Prof. Yves Poumay, University of Namur, Belgium in 2004. It is based on simple serum-free and chemically defined tissue culture techniques that allow any regulatory, academic and/or industrial laboratory, institution???, to reconstruct human epidermis from primary human keratinocytes with the resulting tissue models featuring basic epidermal characteristics [Ref 2, 3]. A protocol for continuous production is currently being developed by Phenion and will be published soon.

Key Success Factors for implementation of the OS-REp technology

Successful implementation of the OS-REp technology as a global standard for production is depending on several important key factors, including but not limited to:

- Global industrial and regulatory acceptance of the OS-REp principle
- Global industrial availability, independent of one single tissue supplier
- Production according to published protocols and well defined but manageable quality control criteria, which ideally should be object of an auditing process
- Proof of equivalence (cross-validation) to currently existing models in terms of model performance and consequent regulatory acceptance

Objectives

Phenion and its partners commit to the development of the OS-REp concept and will define the tissue culture parameters that will allow the production of reproducible epidermal skin equivalents of constant high quality in independent laboratories.

In addition, Phenion and its partners will put this technology to the public domain and thus will make the OS-REp models available to anyone interested.

Phenion and its partners will organise the (catch-up) validation of the OS-REp tissues, in accordance to OECD and/or ECVAM guidelines, so they will be compliant for regulatory testing.

Finally, Phenion will serve as Centre of Excellence for technology transfer, technical training and dissemination of information related to the use of the OS-REp technology as a basis for alternatives to animal testing.

References

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2. Poumay Y., Dupont F., Marcoux S., Leclercq-Smekens M., Hérin M. and Coquette A. A simple reconstructed human epidermis: preparation of the culture model and utilisation in in vitro studies. Arch. Dermatol. Res. 296, 203-211, 2004.
3. Poumay Y. and Coquette A. Modelling the human epidermis in vitro: tools for basic and applied research. Arch. Dermatol. Res. 298:361-369, 2007.