

Human Skin Equivalents

Market Sector: Dermatology, food-, cosmetic-, chemical-, and pharmaceutical industry,

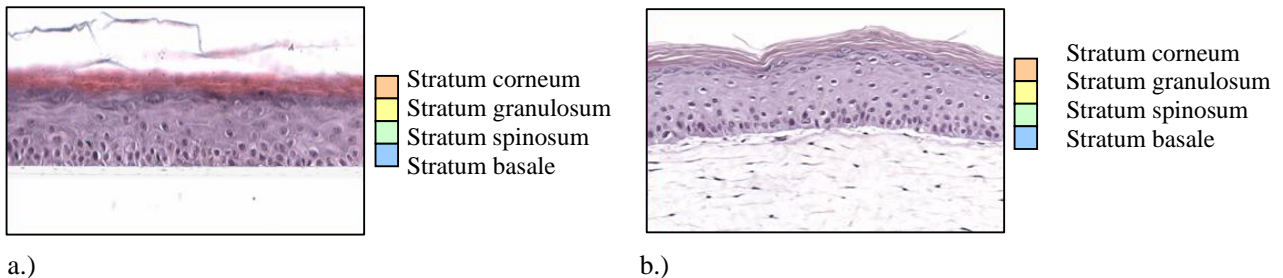


Fig. 1 Skin models: Epidermal and Full Thickness skin equivalents. (a) The reconstructed epidermis consists of keratinocytes seeded on a non-cellular matrix (e.g. inert filter membrane or de-epidermized dermis). These epidermal models are suitable for e.g. skin corrosion, skin irritation or skin penetration tests. (b) The reconstructed three-dimensional full-thickness model consists of keratinocytes, melanocytes and a fibroblast-populated three-dimensional matrix. This model closely resembles native human skin.

Scientists from Leiden University Medical Center (LUMC) have developed a novel robust method permitting functional screening of dozens of individual genes. The scientists have constructed epidermal and full-thickness skin models that can be used for tests, predictive screening and research on for example wound healing, that require the complexity of human skin, i.e. where the interaction between epidermal and dermal cells is crucial.

In vitro modeling of human skin, an extremely complex organ is a technical challenge. This new generation of skin models can be transfected with a single gene, but also with several genes in the same skin model. Furthermore, this invention may allow reconstruction of complete tissues/organs with transfected cells. One of the problems that are being solved by the invention is that tissues that are difficult to transfect (e.g. skin, cartilage, bone) can now be transfected and studied. The scientists anticipate that this technology is equally applicable to other organs and provides a platform for functional studies in a broad range of (human) tissues.

Other problems that can be solved by the invention is that human organs are not amenable to large scale gene function studies, because of the complexity of tissues in human organs. This invention allows large scale gene function studies in different tissues, such as the cornea, lung epithelium and bone. Cells are transfected and then cultured under optimised conditions allowing full reconstitution (including differentiation) of tissues under study. In this way, the invention allows high throughput gene function studies within an organ context.

Keywords

High-through put screening, gene function screens, reconstructed organ, skin models

Applications

- High-through put gene function studies within a human tissue/organ context
- Transplantation of skin tissue for (severe) burns
- Assessment of skin penetration of all kinds of substances and organisms, toxicity, corrosivity, irritation, photo toxicity, pigmentation capabilities, bleaching properties, wound healing, scar formation, skin cancers and other skin diseases.

Key Benefits

- The skin model is stable, uniform and reproducible
- Long term (the skin can be cultured for up to 20 weeks, allowing the use for chronic testing and repeated dosing)
- Easy transfection of all kinds of tissues
- Functional studies take the architecture and specialization of tissues and cells within an organ fully into account
- Alternative for animal skin testing (increasing public pressure)

Current study

Mimicking of other epithelial diseases than skin diseases.

Patent / IP Status

Patent filed in 2008.

Commercial Partner Sought

Biotechnology company that has extensive experience in skin/organ models and/or array technology and who have knowledge of automation and miniaturization or company that is interested in skin and organ testing models.

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Leiden University Medical Center (LUMC) is strongly committed to the advancement of health care, through research and innovation. In particular, the focus is on translational research, with the overall aim to accelerate transfer of findings from the laboratory to clinical application, and to the market.

LUMC has a reputation as a pioneering institute in its field, both nationally and internationally.