

## Reconstructed human skin as disease models

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Tissue engineering has been used to generate human skin equivalents that represent epidermis or epidermis plus dermis (full-thickness skin) in vitro. Several test methods using commercially available reconstructed human epidermis have been validated and adopted by the OECD. Beyond this, advances in biotechnology enabled generation of in vitro models for human skin diseases, in particular to promote dermatological drug research while reducing animal experimentation. Models are available for a wide range of skin disorders including infectious and inflammatory diseases, keratinization disorders and cancer. More complex tissue models have been developed by supplementation with immune cells, such as neutrophils and dendritic cells. This approach allows a detailed dissection of the interaction between the skin barrier and immune cells during the course of infection and inflammation. The availability of human-based skin disease models offers new opportunities for future reduction of animal testing in fundamental research and preclinical drug development. Hopefully, the progress obtained in the field of reconstruction of diseased skin may be a role model in the set-up for models of diseases for other organs.

