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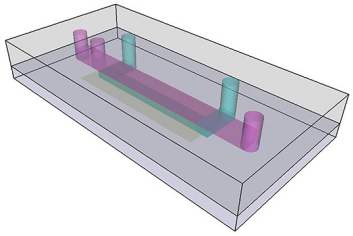
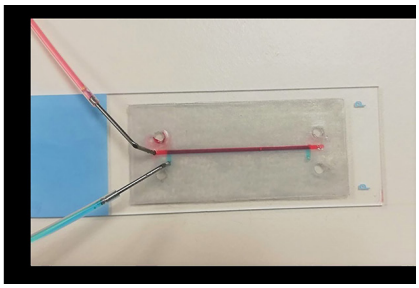
**Mimicking skin as a dynamic organ, microfluidic-based technology enables cost effective and high throughput testing.**







The demand for cosmetics not tested on animals and the realization only a small fraction of promising drug-screening results in animal models are successful in clinical trials encouraged the development of skin-on-a-chip (SOC), a microfluidic device containing a 3D vascularized skin model.

Risueño et al. highlight SOC advantages over conventional engineered-skin platforms and its future potential. Conventional skin models are typically cultured under static conditions that don't accurately represent normal human skin conditions. SOC platforms better mimic skin as a dynamic organ and permit a high throughput and less expensive evaluation of drug candidates in testing for toxicity, efficacy and delivery.

The researchers discuss three areas that will advance SOC technology into a viable alternative. They are the microfluidic platform to enable the replication of a realistic skin environment; scaffolding materials for controlled microvascular growth; and the integration of other components, such as biosensors, for more effective monitoring capability.

In their research to improve scaffolding for skin growth, the researchers used an adhesive vinyl instead of the typically used polydimethylsiloxane (a silicone) to replicate a dermo-epidermal construct inside microfluidic channels that included a fibrin gel with a keratinocyte layer on top of it. They found the vinyl is biocompatible and low cost, but it doesn't respond to mechanical deformation, limiting some testing applications.

Using more porous substrates in microchannel structure has become common practice for more effectively studying tissue barrier function and simulating tissue-tissue interfaces. One of the most exciting areas of SOC development is the use of electrochemical, optical and other types of biosensors to allow real-time monitoring, although integration of such external components has not been a primary focus.

**Source:** "Skin-on-a-chip models: General overview and future perspectives," by I. Risueño, L. Valencia, J. L. Jorcano, and D. Velasco, *APL Bioengineering* (2021). The article can be accessed at https://doi.org/10.1063/5.0046376.