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HEALTH

Complete human skin grown in lab

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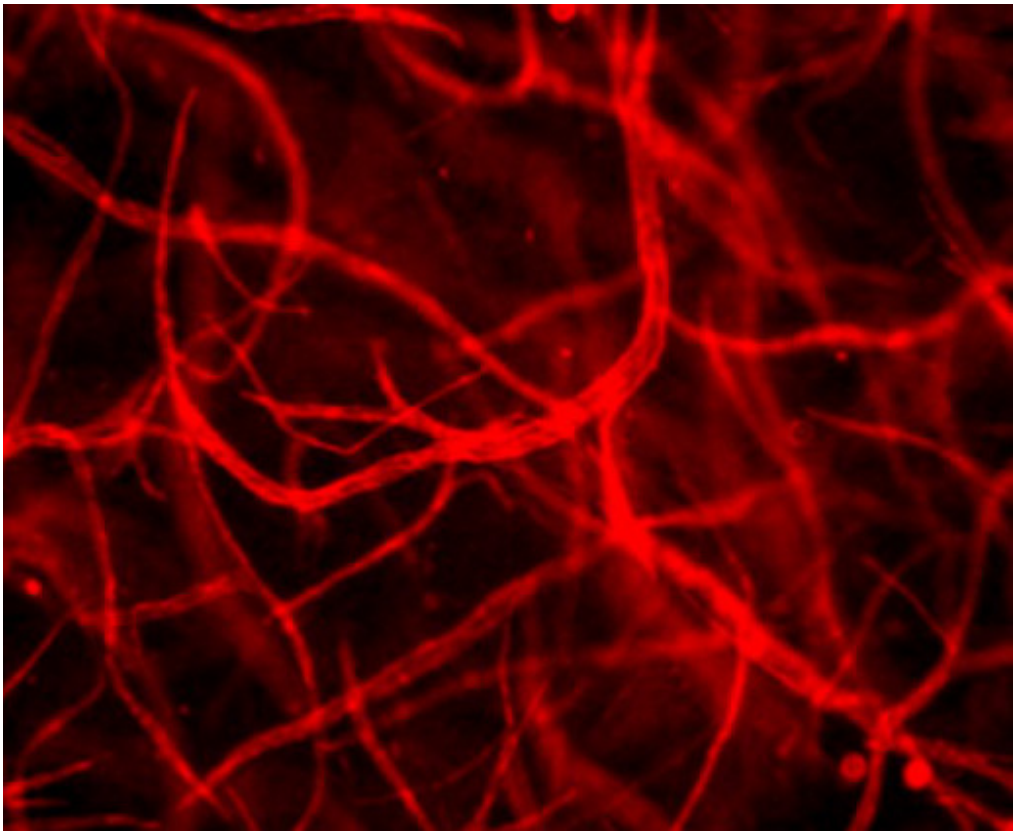

Artificial skin is being grown with blood vessels pre-formed inside it. Image copyright The Tissue Biology Research Unit (TBRU), University of Zurich.

Researchers are cultivating laboratory-grown human skin that can be grafted onto the body to repair defects caused by burns, surgery or disease.

While growing the thin outer skin is nothing new, the real challenge is growing the main inner skin which contains the connective tissue, including the blood vessels.

At the moment, researchers at the EU-funded EUROSKINGRAFT project can grow a seven centimetre square patch of this nearly full-thickness skin in two to four weeks.

> ‘The thing is we can currently do more in the lab than we are allowed to do on the patient.’
>
> *Professor Ernst Reichmann, University of Zurich, Switzerland*

They do it by taking a postage stamp-sized sample of skin from the patient that will receive the graft and then cultivating it in gel.

‘I would say that these kinds of grafts can be used everywhere,’ said project coordinator

Professor Ernst Reichmann, from the University of Zurich, Switzerland.

The technique has led to two potential products – denovoSkin, which contains the outer and inner layer of skin, and denovoDerm, which is just the inner layer.

Now the researchers are testing the lab-grown skin on 20 patients, and while they've not got the full results yet, so far the safety and clinical outcomes are 'excellent', according to Prof. Reichmann.

They're hoping to start larger trials at the end of 2015, which will involve patients recruited from medical centres in Switzerland, the Netherlands and Germany.

Natural skin

The point of the research is that burns, surgery and diseases can damage the outer and inner layers of skin, and current techniques mean the outer layer of skin – either lab-grown or taken whole from the patient – has to be grafted to a new inner layer, which is grown on the wound.

The resulting grafted skin is marked with a criss-cross of ridges because the outer layer has to be meshed onto the inner layer – a technique that involves inserting multiple holes into the skin graft to increase its surface area and improve fluid flow.

'With common methods the optical appearance and the pliability of the graft is not satisfying,' Prof. Reichmann said.

By growing nearly full-thickness skin in the laboratory, the EUROSKINGRAFT researchers hope they can create smooth, soft skin grafts that look natural.

It would also help reduce one of the biggest complications with skin grafts – bacterial infection. Currently, patients are vulnerable to infection while the new inner layer of skin is forming on the wound. Removing this step, by growing full-thickness skin in the laboratory, could significantly reduce infections.

At the moment, the skin is being used to treat burns and to reduce scar tissue, but the researchers hope to extend that.

'I think they will be beneficial for chronic ulcers and our technology can be used to help vitiligo (a disease that affects skin pigmentation) patients,' said Prof. Reichmann. 'There is a broad range of uses for this technology.'

In their laboratory-based work, scientists can produce skin grafts that contain pigmentation, enabling them to produce a skin colour that matches the patient, as well as a pre-formed network of capillaries.

In theory, the capillaries will increase the speed at which the skin graft connects to the underlying tissue, improving acceptance of the graft and reducing scarring.

'The thing is, we can currently do more in the lab than we are allowed to do on the patient,' Prof. Reichmann said.

More info

EUROSKINGRAFT