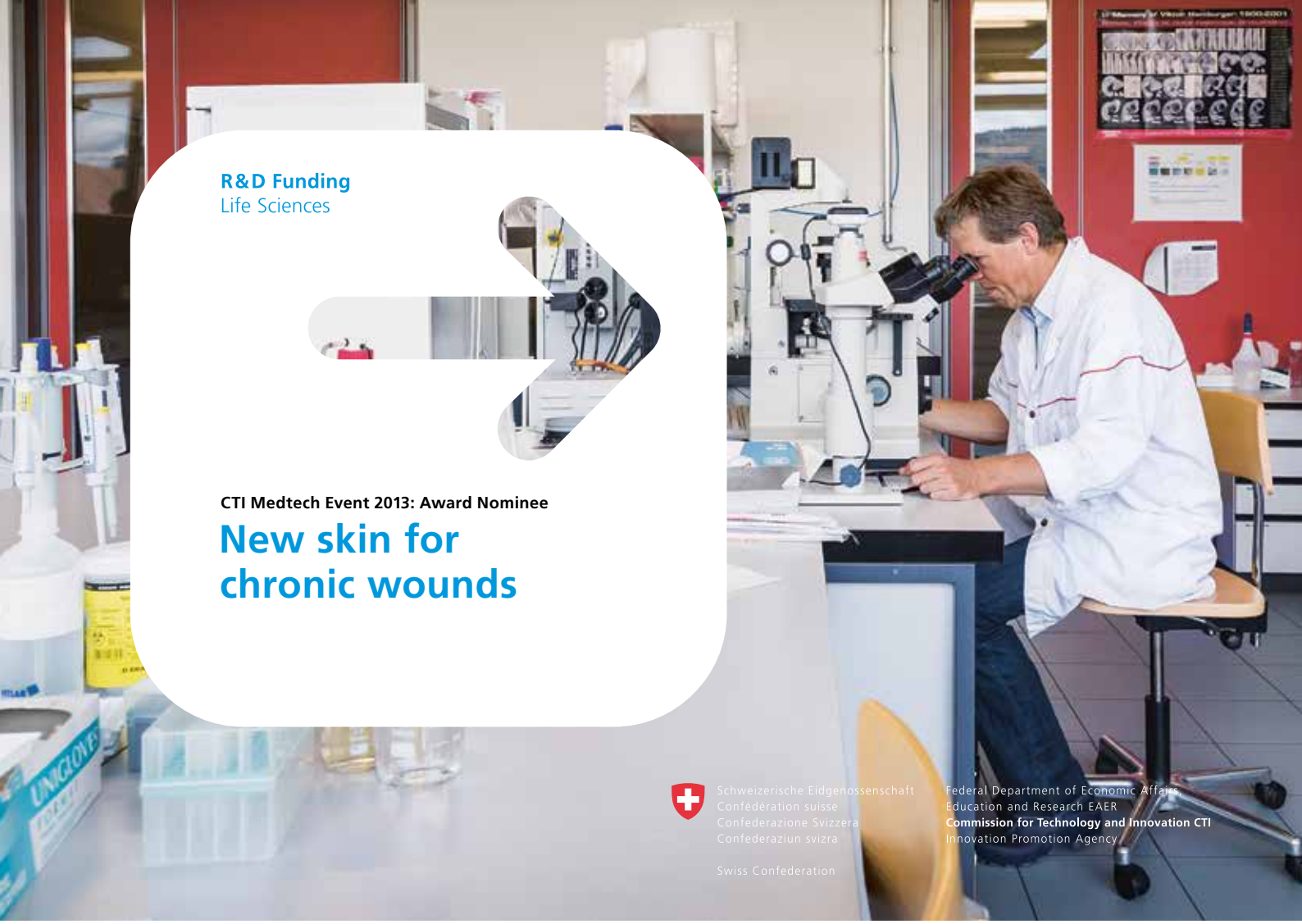

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CTI Medtech Event 2013: Award Nominee

New skin for chronic wounds

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The concept is amazing: a synthetic cell carrier is populated by skin cells and dissolves simultaneously. In just two years, the Lucerne-based company nolax and Empa have developed this project up to a first proof of concept stage.

Over 50 million people worldwide suffer from chronic wounds. The number is steadily growing. Most frequently affected is the growing group of older people who are weakened by diseases such as diabetes.

In the framework of a CTI project the Lucerne-based company nolax and Empa have taken a major step towards solving this problem. They have developed a cell carrier or 'scaffold' from bio-compatible, degradable plastic material that should help wounds to heal. This scaffold – a spongy-like foam made of flexible polyurethane – can be adapted to the exact shape of the wound. Over time, the scaffold should be populated by connective tissue cells. At the same time the body breaks down the foam. All that should remain is a newly formed layer of skin. There are already cell scaffolds on the market, but they are made of products of animal origin, which not only makes them expensive, but also carries the risk of transmitting animal diseases. There are no such disadvantages when synthetic materials are used as wound healing support materials.

An experienced team

nolax has decades of experience with synthetic materials for technical and medical applications. In 2009 the Lucerne-based SME had its scaffold concept patented. "However, we needed a partner if we were to move from the idea to the proof of concept stage," explains nolax's Stephan Häfner. The perfect partner was found in Empa. The project was managed by the research institute's Arie Bruinink, a cell biologist and toxicologist with a broad experience in cytocompatibility testing.

The scaffold: a flexible pad made of biocompatible plastic

This expertise was needed. Tests with cell cultures were designed to improve the material composition and structure of the scaffold to make it non-toxic, create an environment that cells would be willing to populate and ensure that it dissolves completely without side effects.

More than a hundred tests

The tests developed by the Empa team mimicked realistic conditions as far as possible. In a highly complex process, Bruinink's team created three-dimensional cell clusters from human cells and observed whether cells from these clusters were able to colonise the scaffold. "This corresponds to the conditions in a wound much better than the usual tests with single cells," explains Bruinink.

"On the basis of the test results, we continued to adapt the formula and improve the structure of the scaffold," says Stephan Häfner, Project Manager at nolax. Both teams worked tremendously quickly. A total of over a hundred experiments were performed.

"In the animal model the closure of the wound with the scaffold was even better than we had hoped at the start of the project."
Arie Bruinink

Arie Bruinink
Project Manager Empa

Stephan Häfner
Project Manager nolax

The results were finally evaluated in an animal model by Brigitte von Rechenberg and Katja Nuss at the University of Zurich. Arie Bruinink is pleased with the results: "In the animal model the closure of the wound with the scaffold was even better than we had hoped at the start of the project." In addition, there were initial signs that scarring would be reduced.

In parallel to further optimising the scaffold, nolax is working on a production concept for the next stage of clinical trials. Andreas Dobmann, deputy project manager at nolax, is expecting great things to come of it: "Besides the treatment of chronic wounds, other fields of application are already emerging."

Contacts

nolax AG
Dr. Stephan Häfner
Eichenstrasse 12
CH-6203 Sempach-Station

+41 (0)41 469 92 58
stephan.haefner@nolax.com
www.nolax.com

Empa
Materials Biology Interactions Lab
Dr. Arie Bruinink
Lerchenfeldstrasse 5
CH-9014 St. Gallen

+41 (0)58 765 76 95
arie.bruinink@empa.ch
www.empa.ch

Commission for Technology and Innovation CTI
Innovation Promotion Agency
Ingrid Nyfeler
Effingerstrasse 27
CH-3003 Bern

+41 (0)31 324 19 85
life.sciences@kti.admin.ch
www.kti.admin.ch

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Innovation Promotion Agency
Effingerstrasse 27
CH-3003 Bern

www.kti.admin.ch