

R&D Funding
Life Sciences

Nominated for the CTI Swiss Medtech Award 2015

Fresh skin from the 3-D printer



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Research into producing human tissue artificially is currently very popular. Thanks to a CTI-funded interdisciplinary project between the ZHAW and the biomedical company regenHU Ltd., Switzerland is one of the world leaders in bioprinting.

Ursula Graf-Hausner is a biologist and chemist with many years of experience in biotechnology. For a long time she was part of the group specialising in tissue engineering cell culture technique at the Zurich University of Applied Sciences (ZHAW), working with primary human cells and creating human tissue. Graf-Hausner built up the competence centre for artificial tissue, drug testing and drug development – TEDD (Tissue Engineering for Drug Development) – at the university.

Overcoming initial scepticism

When a young engineer rang up wanting to print out cells with a biological printer, Graf-Hausner first turned him down. "Cells are very sensitive, so I was sure that you couldn't just print them," she remembers, expressing her initial scepticism. But Marc Thurner from regenHU in Villaz-St-Pierre FR insisted, and so they arranged to meet. Graf-Hausner did not regret the decision. She and her team looked at various printing technologies and realised that cells are not so sensitive after all. Her interest was really aroused.

When Graf-Hausner and Thurner came to the CTI looking for funding, here too they initially met with scepticism. They had to do more preliminary tests to show that cells remain alive. Finally Ruth Freitag, CTI expert and professor for chemical biotechnology at the EPF Lausanne, warmed to the idea of developing a 3-D printer for cells.

The first printer was not sterile and printed onto a slide which was placed by hand onto the machine. But the partnership between biologists and engineers was constructive and bore fruit. When the first CTI project came to an end



The regenHU 3-D printer in use in the laboratory.



Ursula Graf-Hausner, lecturer and head of research into Cell Culture Technology and Tissue Engineering at the ZHAW; Marc Thurner, CEO regenHU.

in November 2011, the technology had been mastered but the biology was still a problem. Layering printed cells three-dimensionally either meant the cells did not survive or it proved too expensive.

In a second CTI project a sterile cover and standardised plates were added, familiar to any cell biologist and cheaply available. But one problem remained: although there were

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Ursula Graf-Hausner, lecturer and head of research into Cell Culture Technology and Tissue Engineering at the ZHAW

many cell-compatible biomaterials on the market, none of them solidified fast enough after printing and so the printed form was lost.

Biologist Markus Rimann then had the idea of developing a chemically defined bio-ink with the ZHAW’s organic chemistry expert group – with success. It is now possible to fill cartridges with the material, almost like a normal ink-jet printer. “This led to an interesting business model – our partner regenHU does not only sell printers as a one-off investment, but the accessories as well.”

Large pharmaceutical companies show interest

Meanwhile, some large pharmaceutical companies, including Roche and Novartis, have become involved in several bioprinting projects currently underway at the ZHAW. “The CTI showed confidence in us at a time when no-one believed that bioprinting was possible,” says Graf-Hausner. “Thanks to the funding we received we are now up there with global leaders in the field.”

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