

Press release dated January 10, 2020

**+++ Hold publication until Monday, January 13, 2020, 5:00 pm (CET) +++**

## **World Premiere in Zurich: Machine keeps human livers alive for one week outside of the body**

***Researchers from the University Hospital Zurich, ETH Zurich, Wyss Zurich and the University of Zurich have developed a machine that repairs injured human livers and keep them alive outside the body for one week. This breakthrough may increase the number of available organs for transplantation saving many lives of patients with severe liver diseases or cancer.***

Until now, livers could be stored safely outside the body for only a few hours. With the novel perfusion technology, livers - and even injured livers - can now be kept alive outside of the body for an entire week. This is a major breakthrough in transplantation medicine, which may increase the number of available organs for transplantation and save many lives of patients suffering from severe liver disease or a variety of cancers. Injured cadaveric livers, initially not suitable for use in transplantation, may regain full function while perfused in the new machine for several days. The basis for this technology is a complex perfusion system, mimicking most core body functions close to physiology. The corresponding study was published on January 13 in the scientific journal Nature Biotechnology.

### **Offering what other machines cannot**

"The success of this unique perfusion system - developed over a four-year period by a group of surgeons, biologists and engineers - paves the way for many new applications in transplantation and cancer medicine helping patients with no liver grafts available" explains Prof. Pierre-Alain Clavien, Chairman of the Department of Surgery and Transplantation at the University Hospital Zurich (USZ). When the project started in 2015, livers could only be kept on the machine for 12 hours. The seven-day successful perfusion of poor-quality livers now allows for a wide range of strategies, e.g. repair of preexisting injury, cleaning of fat deposits in the liver or even regeneration of partial livers.

### **Liver4Life: A project from Wyss Zurich**

The Liver4Life project was developed under the umbrella of Wyss Zurich institute, which brought together the highly specialized technical know-how and biomedical knowledge of experts from the University Hospital Zurich (USZ), ETH Zurich and the University of Zurich (UZH). "The biggest challenge in the initial phase of our project was to find a common language that would allow communication between the clinicians and engineers," explains Prof. Philipp Rudolf von Rohr, Professor of Process Engineering at ETH Zurich and co-leader with Professor Clavien of the study now published in "Nature Biotechnology".

### **Technology with great potential**

The inaugural study shows that six of ten perfused poor-quality human livers, declined for transplantation by all centers in Europe, recovered to full function within one week of

perfusion on the machine. The next step will be to use these organs for transplantation. The proposed technology opens a large avenue for many applications offering a new life for many patients with end stage liver disease or cancer.

## Publication

*An integrated perfusion machine preserves injured human livers for one week*  
*Nature Biotechnology.*  
<https://www.nature.com/articles/s41587-019-0374-x>

## Contact for questions

*Pierre-Alain Clavien, Prof. Dr. med.*

Director of the Clinic for Visceral and Transplant Surgery at University Hospital Zurich

*Philipp Rudolf von Rohr, Prof. Dr.*

Department for Machine Engineering and Process Technology, Institute for Process Technology, Laboratory for Transport Processes and Reactions

Contact through the UHZ media office: [medien@usz.ch](mailto:medien@usz.ch), +41 44 255 86 20

## Images

Images for this topic can be downloaded at  
<https://usz.picturepark.com/Go/dnrR9rK0>

*Photo 1:* The perfusion machine in operation. The donor liver is connected in the white container in the upper left.

*Photo 2:* A surgeon connects the donor liver to the perfusion machine.

*Photo 3:* On the left a non-perfused liver, on the right a liver treated with the new machine.

*Diagram 1:* The perfusion machine replaces the functions of various organs in order to keep the donor liver alive outside of the body.

## ETH Zurich – Where the future begins

Freedom and individual responsibility, entrepreneurial spirit and open-mindedness: ETH Zurich stands on a bedrock of true Swiss values. Our university for science and technology dates back to the year 1855, when the founders of modern-day Switzerland created it as a centre of innovation and knowledge. At ETH Zurich, students discover an ideal environment for independent thinking, researchers a climate which inspires top performance. Situated in the heart of Europe, yet forging connections all over the world, ETH Zurich is pioneering effective solutions to the global challenges of today and tomorrow.

## University of Zurich

The University of Zurich (UZH) is a member of the League of European Research Universities and numbers among Europe's most prestigious research institutions. UZH's international standing is

reflected in the many renowned academic distinctions conferred upon its members, including twelve Nobel Prizes. As Switzerland's largest university, UZH has a current enrollment of over 25,000 students and offers the most comprehensive academic program in the country. Nearly 6,000 excellent members of staff teach and perform research at one of the University's 140 departments, including 675 professors. UZH also looks back on a rich history, having been founded in 1833 as Europe's first university to be established by a democratic political system.

#### **University Hospital Zurich**

University Hospital Zurich is one of Switzerland's largest hospitals. 8,400 employees in 43 clinics and institutes ensure comprehensive and top-quality care. Each year we treat over 42,000 inpatients and perform over 620,000 outpatient consultations. Thanks to our close collaboration with the University of Zurich and ETH, the hospital plays a leading international role in various fields of medical research. We focus on transferring the latest research results to clinical applications.

#### **Wyss Zurich**

The Wyss Zurich is a joint accelerator of the [University of Zurich](#) and [ETH Zurich](#) (Swiss Federal Institute of Technology Zurich), which was made possible by a generous donation from the Swiss entrepreneur and philanthropist Dr. h.c. mult. Hansjörg Wyss. It was established to foster translational research focused on developing treatment protocols and clinical therapies, as well as novel technologies and intelligent systems, in the emerging fields of Regenerative Medicine and Robotics, and hybrid technologies thereof. Wyss Zurich unites world-leading experts from both institutions in multidisciplinary teams, pooling their knowledge and expertise. Our mission is to drive the translation of outstanding scientific discoveries into new therapies for patients and breakthrough innovations in the fields of Regenerative Medicine and Robotics. [www.wysszurich.uzh.ch](http://www.wysszurich.uzh.ch).

Visit us at:

