

Press Release

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AIT SPIN-OFF CELLECTRIC REVOLUTIONIZES DIAGNOSIS OF BLOOD POISONING

CellElectric wins the PHÖNIX Founder Award 2022 in the Prototype category

The Viennese company CellElectric Biosciences has developed a method for the rapid, specific and automated detection of pathogenic microorganisms, thus accelerating the diagnosis of blood poisoning by a factor of ten. For this, they have now been awarded the PHÖNIX Founder's Prize in the Prototype category.

Sepsis (blood poisoning) is a severe infection of the body caused by microorganisms, e.g. bacteria, fungi or viruses. It occurs when an infection is not only localized but spreads through the blood in the body. As a result of organ dysfunction, life-threatening situations (septic shock) often occur. In Austria alone, about 28,000 patients are affected annually, and 6700 deaths are reported each year. Sepsis is one of the most frequent causes of death.

Treatment with the aid of antibiotics is complicated by the fact that the causative pathogens must be identified beforehand and this investigation requires elaborate laboratory tests and cell cultures. This wastes valuable time, which is often lacking in the end.

In recent years, the Viennese company CellElectric Biosciences - a spin-off of the AIT Austrian Institute of Technology - has developed a method that enables rapid, specific and automated characterization of pathogenic microorganisms in blood. This microfluidic procedure, which is carried out on a chip ("lab on a chip"), requires only a few milliliters of blood.

The company has now been awarded the PHÖNIX Founders' Prize in the Prototype category for this process. The prize is awarded on behalf of the Federal Ministry of Education, Science and Research and the Federal Ministry for Digitization and Business Location and is organized by Austria Wirtschaftsservice (aws) in cooperation with the Austrian Research Promotion Agency (FFG) and the Federation of Austrian Industries (IV). There were a total of 205 submissions for the award. 20 companies were nominated, from which the winners were finally selected by a jury. The PHOENIX Start-up Award shows how essential the successful transfer of knowledge is for Austria as a location for innovation.

Electric fields enable acceleration

At the heart of the CellEctric process is an electrodynamic cell manipulation system: here, electromagnetic fields ensure the targeted removal of unwanted cells, which often make it difficult to identify the relevant cells. The technology was developed at the AIT Center for Health & Bioresources (Molecular Diagnostics Competence Unit): Under the direction of Klemens Wassermann, an entire patent portfolio was developed around the new technology, which CellEctric, the company founded by Wassermann and his colleague Terje Wimberger at the beginning of 2021, is now using under an exclusive licensing agreement.

"By isolating viable pathogens from a patient sample, current sepsis diagnosis can be accelerated tenfold, allowing physicians to initiate life-saving therapy much sooner than with current technologies," Wassermann explains.

"The newly developed process is a flexible platform technology for highly specific biological sample preparation that can also be used for other analytical tasks," explains Elke Guenther, Head of Center Health & Bioresources. *"As a first example, the CellEctric technology is being used to establish an innovative solution for sepsis diagnostics,"* adds Martin Jung, Head of the Molecular Diagnostics Competence Unit.

Ten years of research

Wassermann began developing the "Lab on a Chip" for sepsis diagnosis in 2012 as a doctoral student in the DNautomat project. The main problem was the preparation of samples for the isolation of pathogens. Under the supervision of Christa Nöhammer and Johannes Peham, the focus soon shifted to the use of electric fields for cell-specific isolation - a method that allows, among other things, the targeted disruption of blood cells without thereby damaging the bacteria that are, after all, to be detected. Specifically, this involves a method called "Pulsed Electric Field" (PEF) and the concept of a "Smart Electrodynamic Filter" (smartEDF). This fast and automated filter technology for cells along electrodes can exclude non-specific interferences - the analysis results are thus of very high specificity with simultaneously high throughput.

This eliminates the need for costly cultures of the microorganisms in the laboratory.

A first patent was already filed in 2013 - Wassermann also won the "Innovator of the Year Award" at the internationally renowned science festival with this idea.

"Falling Walls Lab" in Berlin. It then took several years until the method could be reliably controlled. To acquire the relevant knowledge and understand the technology in depth, Wassermann also enrolled in electrical engineering at the Vienna University of Technology. In 2015, CellEctric co-founder Terje Wimberger began his PhD project in this field. That same year, the work was recognized by the community with a Young Investigator Award. After further years of refinement, the FFG spin-off fellowship project "CellEctric Biotech" was approved in 2018 to transfer the technology from laboratory scale to industrial scale. After experimental physicist Michael Holler and biotechnologist Julia Dolezel also joined the team, it was decided in 2020 to establish the company CellEctric Biosciences with strong support from AIT. A pre-seed

Austria Wirtschaftsservice (AWS) project was successfully completed and a broad network of supporters and experts was formed. Since then, the number of CellEctric employees has increased by leaps and bounds to the current eight.

Successful financing round

"We are convinced that our technological approach will be a first step into a new era of handling cells and biological material that is designed for the long term," says Klemens Wassermann. And co-founder and CEO Terje Wimberger emphasizes, *"Our entire team is highly motivated to accelerate sepsis diagnosis and provide patients with life-saving therapies much earlier than before."*

In addition to ongoing support from AWS and FFG, a first round of funding was successfully completed this year in February with IST cube as lead investor and other private partners.

"AIT has supported the development of CellEctric literally from the very beginning and accompanied the technological development in all phases. We are pleased to have another successful example of the entrepreneurial spirit we value at AIT," explains Alexander Svejovsky, CFO of AIT. The company founders received significant support from AIT startup coach Hans-Peter Blahowsky: *"We are delighted with the success of the CellEctric founding team and hope that this will motivate other AIT scientists to position exciting technologies on the market themselves within the framework of the AIT Startup Program."*

More information about the AIT: <https://www.ait.ac.at/>

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