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## **QUICKSTEP: Tackling drug development for heart disease with organ on a chip technology**

**German-Dutch consortium receives round about 1 Mio € in funding from the ZIM-IraSME program for developing an automated screening and test platform for atrial fibrillation**

Cardiovascular disease is one of the leading causes of death worldwide. In many cases, heart transplantation is the only way to save lives. New findings on genetic factors of heart disease suggest, however, that many of these seriously ill patients could also be helped by medication with target-specific, therapies. Organ-on-a-chip technology, using primary human cells cultured in perfused microfluidic systems, promises to revolutionize pharmaceutical drug testing for heart disease, but up to date are not yet suitable for large-scale application in the market due to technological hurdles. The German-Dutch consortium "QUICKSTEP" now sets out to tackle this challenge, and to develop a screening platform tailored to the needs of the pharmaceutical industry.

The QUICKSTEP project will address atrial fibrillation as a reference system and disease. Atrial fibrillation is the most common cardiac tachyarrhythmia that contributes significantly to patient morbidity and mortality. Atrial fibrillation causes specific changes in the electrical, contractile and structural properties of heart muscle cells (cardiomyocytes), which is commonly referred to as "remodeling" and is at the root of the cardiomyocyte dysfunction and the ever-increasing nature of this arrhythmia. Therefore, there is currently a great interest in therapeutic approaches targeting the mechanisms underlying atrial fibrillation remodeling.

The core of this project is funded by the German Ministry of Economics and Energy. The objective is the development of the compact and automated QUICKSTEP test platform for miniaturized tests on heart muscle cells as well as applications of the platform in drug screening and precision medicine. The test platform (method and device) is to be developed in this project under the leadership of Ionovation GmbH (DE) in collaboration with experienced project partners Saxion University and Micronit Microtechnologies (both NL) in the field of microfluidics, LocSense (NL) in impedance spectroscopy for organs-on-chip, Westfälische Wilhelms-University, Biomedical Technology Center (DE) in quantitative digital holographic phase contrast

microscopy for high-resolution 3D visualization of cell clusters, Kapelan Bio-Imaging (DE) in software development, Vrije University Medical Center Amsterdam (NL) in physiology of cardiac diseases and TU Ilmenau (DE) and BiancoGMP (DE) in genetic tools and their implementation in bioreactors. The project idea was developed in the context of the German-Dutch ZIM Network for Lab on a Chip Technologies. The network, which was founded in 2017, is coordinated by innoS-Sperlich GmbH, a recognized specialist in network and cluster management. On November 1st, 2018 the network received the grant decision of the BMWi for the international phase 2. The cooperation partner and central point of contact on the Dutch side is Saxion University in Enschede, which in turn coordinates a network of Dutch companies and research institutes which jointly develop a standardized heart-on-a-chip demonstrator for the investigation of cardiotoxicity of new active substances.

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**Following partners are involved in the QUICKSTEP project:**

Micronit Microtechnologies B.V.

Saxion University of Applied Sciences

LocSense B.V. (NL)

Westfälische Wilhelms-University, Biomedical Technology Center (DE)

Kapelan Bio-Imaging GmbH (DE)

Vrije University Medical Center Amsterdam (NL)

TU Ilmenau (DE)

BianoGMP GmbH (DE)

**About the Network for Lab-on-a-Chip technologies:**

The following companies and research institutions are represented in the ZIM network for lab-on-a-chip technologies:

AMO GmbH (DE)	PreSens GmbH (DE)
Ibidi GmbH (DE)	42 life Sciences GmbH (DE)
Ionovation GmbH (DE)	Dynamic Biosensors GmbH (DE)
Inno-spec GmbH (DE)	The Leibniz Institute of Surface Engineering (IOM) (DE)
microFab Service GmbH (DE)	Bremen Institute for Metrology, Automation and Quality Science (BIMAQ) (DE)
Miprolab GmbH (DE)	Coburg University, Institute for Sensor and Actuator Technology (DE)
Sciomics GmbH (DE)	NMI Reutlingen
HNP Mikrosysteme GmbH (DE)	Saxion University (NL)
PreciPoint GmbH (DE)	Artecs B.V. (NL)
BianoScience GmbH (DE)	CE-Mate B.V. (NL)
Lightfab GmbH (DE)	Micronit Microtechnologies B.V. (NL)
Center for Research Promotion in Paediatrics (Zentrum für Forschungsförderung in der Pädiatrie GmbH) (DE)	Tide Microfluidics B.V. (NL)
PolyAn GmbH (DE)	

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**About the Heart on a Chip Network:**

Organ-on-a-chip technology that uses human heart cells has tremendous potential to revolutionize the drug testing of heart disease drugs. Animal experiments are thus avoided.

The main goal of this project is to produce standardized heart-on-a-chip demonstration devices that will be further optimized than new physiologically relevant models for investigating cardiotoxicity of drugs.

This Saxion University of Applied Sciences project involves the collaboration of various Dutch and German industrial partners (SMEs) and leading academic research institutes.



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