Website address:
https://www.gesundheitsindustrie-bw.de/en/article/press-release/erc-funding-embryonet-ai

ERC Funding for „EmbryoNet-AI“

Konstanz biologist Patrick Müller receives a Proof of Concept Grant from the European Research Council for his project "EmbryoNet-AI". Its goal is the further development of an AI-supported platform for the automated evaluation of experiments – for example, in drug development.

The discovery and development of drugs in pharmacological research – including the risk assessment of active substances in the early phase of drug development – still largely relies on animal experiments. In addition to the ethical issues involved, animal studies are very expensive and time-consuming. They usually also require ongoing supervision and evaluation by highly-qualified staff. The development of automated evaluation methods that can be used in lieu of standard animal experiments would thus have a wide range of benefits for drug research.

The pursuit of these alternative methods is the focus of the project "EmbryoNet-AI" for which Patrick Müller was just awarded a Proof of Concept Grant from the European Research Council (ERC) amounting to 150,000 euros. Müller is a professor of developmental biology at the University of Konstanz and an affiliate member of the Konstanz Cluster of Excellence "Collective Behaviour". His project builds on findings that he and his team gained in the ERC-funded project "ACE-OF-SPACE" ("Analysis, control, and engineering of spatiotemporal pattern formation"). The goal of Müller's new project is to continue to develop his team's AI-supported image analysis software EmbryoNet that automatically detects defects that occur during the development of animal embryos.

EmbryoNet provides a fast, cost-effective and high-precision evaluation of a substance's effect on the development of biological systems. Negative effects, such as visible developmental defects are automatically detected and linked to the corresponding signalling pathway. EmbryoNet even surpasses human experts in accuracy. "We see great potential for applying the software to drug development, especially in the early phase of identifying potentially suitable substances – for conducting risk assessments and investigating the mechanisms of how fledgeling drugs work", Müller says.

Not just for embryos

Patrick Müller and his team first presented EmbryoNet in a 2023 study using zebrafish embryos that was published in the journal Nature Methods. Since then, the software has been expanded to work on organoids. "Organoids are artificial tissues produced in a lab using human stem cells. Their structures resemble small organs – such as a liver, kidney or brain – and they can be used as models for these organs in drug research", Müller explains.

As part of the Proof of Concept Grant, Müller and his team will continue to improve the AI models on which EmbryoNet is based in order to further increase its accuracy and, most importantly, its range of functions. At the same time, the team wants to create an online platform to make EmbryoNet available to users worldwide. To achieve this goal, Müller and his team will work hand in hand with other researchers, industry partners and key regulatory authorities to ensure the online platform fits the needs of its future users and fulfils regulatory requirements. The overarching goal is to develop EmbryoNet into a market-ready product.

The idea: As EmbryoNet is completely automated, pharmaceutical companies could fully integrate the platform into their research pipelines. They could use EmbryoNet, for example, to simultaneously test hundreds of substances in a high-throughput process for their effects on or risks for specific organs or developmental processes – without having to complete lengthy studies involving a large number of test animals for each individual substance. EmbryoNet also provides information on the mechanisms of how potential new drugs work. "In the longer term, EmbryoNet could then replace a large number of animal experiments in drug research and, through automation, speed up conventional processes immensely while reducing costs significantly", Patrick Müller concludes.

About the ERC Proof of Concept Grant:

The ERC Proof of Concept Grant provides 150,000 euros for an 18-month project period. The funding tool is exclusively

open to researchers with a prior ERC Grant who would like to exploit the corresponding research results in a follow-up project. The aim of Proof of Concept projects is to evaluate the market potential of research results and foster their readiness for application, commercialization and marketing.

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Further information

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