Swiss 3R Competence Centre

July 1st 2020

Animal experiments

3RCC funds 3Rs projects worth CHF 1.3 million at Swiss universities

The Swiss 3R Competence Centre (3RCC) will fund four projects that replace, reduce and refine animal experiments with CHF 1.3 million. Researchers at the ETH Zurich will receive a grant to develop tools to analyse the behaviour of laboratory rodents, which will improve animal welfare and reduce animal numbers. At the University of Bern, the 3RCC will fund three groups developing human-based models to study cancer, lung fibrosis and drug transfer between mother and child. In three of four projects researchers aim to replace approaches using living animals with methods based on cultured patient cells. Such novel non-animal methods promise to be more reliable, reproducible and relevant to humans. Due to its limited funding budget the 3RCC had to reject many promising proposals for innovative solutions to improve or replace animal experiments.

3RCC call

The 3RCC, which is supported by universities, industry, the government and animal welfare groups, received 96 outline applications for its second call for projects. The applicants from more than 20 different Swiss institutions requested a total of CHF 29 million. Half of the projects related to replacement, 30% to refinement, and 20% to reduction. The 26 projects invited for a full submission required a total of CHF 8 million and were of excellent quality. From these proposals, the 3RCC selected four projects, which promise to have the largest impact on the implementation of the 3Rs principle, while at the same time offering the highest quality of science and benefit over current methodologies.

"The number of applications, level of requested funding and quality of projects reflect the strong need for funding to develop new approaches to improve animal research and promote the development of non-animal methods," said 3RCC interim Director Rolf Hanimann. "The full applications we reviewed scored 4/5 on average, which reflects the outstanding quality of projects developed by researchers at Swiss institutions. Unfortunately, the 3RCC was only able to fund a handful of projects due to the still relatively modest resources available in this area."

Lung-on-a-chip

Olivier Guenat at the University of Bern's ARTORG Center for Biomedical Engineering Research and Thomas Geiser from the Pneumology Department of the Inselspital, Bern University Hospital, grow human lung cells in a new generation of *in vitro* models, called organs-on-chip. They plan to develop a new model for idiopathic pulmonary fibrosis (IPF), a fatal lung disease that results in the scarring of the lungs. The standard model to study lung fibrosis is to trigger inflammation and fibrosis in the lungs of mice. But many promising drug candidates successfully tested in these preclinical models have failed when tested in humans due to interspecies differences

and difference between IPF. ARTORG's lung-on-chip technology uses patient cells cultivated on a microchip to generate relevant clinical information about the fibrotic process. This will allow researchers and clinicians to test experimental drugs and optimise existing treatments in a more patient-relevant and personalized way.

Drug transfer model

Christiane Albrecht at the University of Bern's Institute of Biochemistry and Molecular Medicine (IBMM) and colleagues at Charles University in the Czech Republic and Curio Biotech SA, will engineer a cell-based model to screen if drugs can pass from the mother to the child during pregnancy. The researchers will develop and validate a three-dimensional system consisting of cells of the mother's placenta and the child's umbilical vein. The cells harvested directly from the patients are more relevant to the human body than immortalised cells. This method will be a cheap and fast way to safely screen if new drugs reach the foetus and have toxic effects on the unborn child.

Cancer organoids

Marianna Kruithof-de Julio and Mark Rubin at the Department for BioMedical Research (DBMR) at the University of Bern plan to develop organoids, small three-dimensional cell structures, to study how tumours grow, respond to drugs and develop resistance to therapies. The scientists want to optimise and standardise procedures to generate reliable patient-derived organoids (PDOs) based on tissue taken from bladder and prostate cancer patients. The Organoid core of the University of Bern will generate stable PDOs, accessible for researchers in an organoid biobank with genomic and functional characterization and clinically relevant information. This will allow the team to shed light on molecular mechanisms of tumour formation and progression and help scientists develop novel treatment approaches.

Behaviour analysis tools

The team of Johannes Bohacek from the Department of Health Sciences at the ETH Zurich will develop machine-learning tools to improve the analysis of laboratory rodent behaviour. Behaviour tests, where neuroscientists study how animals respond to diseases and treatments, often are difficult to reproduce and too superficial to reveal the true complexity of animal behaviour. Together with the ETH neurotechnology group of Fatih Yanik, the scientists will develop and validate analysis and visualisation tools that can help reliably detect and quantify complex animal behaviours. The goal is to provide software solutions that allow researchers to extract more detailed behavioural data and re-analyse existing datasets. This increased power will enable the use of fewer, less stressful tests, reduce the number of animals used, and thus improve animal welfare of thousands of experimental mice every year.

--End--

References:

You may find a synapsis and more detailed information on the projects on the 3RCC website https://www.swiss3rcc.org/en/funding-awards/research-funding/funded-projects

OC-2019-009: ***BEHAVE: A toolkit for deep-behavior profiling of laboratory rodents***, *Johannes Bohacek*, Department of Health Sciences and Technology, ETH Zurich

OC-2019-025: ***IPF-on-Chip: Replacing the bleomycin induced lung injury and fibrosis model with lung-on-chip technology***, *Olivier Guenat*, ARTORG Center for Biomedical Engineering Research, University of Bern; *Thomas Geiser*, Pneumology Department, Inselspital, Bern University Hospital

OC-2019-003: ***Development of a platform for GU cancer patient-derived organoids***, *Marianna Kruithof-de Julio, Mark Rubin*, Department for BioMedical Research (DBMR), University of Bern

OC-2019-019: ***Engineering a novel cell-based model for assessing materno-fetal drug transfer during pregnancy***, *Christiane Albrecht*, Institute of Biochemistry and Molecular Medicine, University of Bern; *František Štaud*, Pharmaceutical Faculty, Charles University, Hradec Kralove, Czech Republic; *Chennakesava Cuddapah*, Curio Biotech SA, Visp, Switzerland

About the 3RCC

The Swiss 3R Competence Centre, founded in March 2018, is a non-profit association with representatives from 11 universities working in the life sciences in Switzerland, the Swiss Federal Food Safety and Veterinary Office (FSVO), the Swiss association of the pharmaceutical industry, Interpharma, and the Swiss Animal Protection (SAP). The mission of the 3RCC is to promote the principles of the 3Rs (reduction, refinement and replacement of animal experimentation) in Switzerland and to facilitate their implementation in life sciences, focusing on research, education and communication.

3RCC Contacts:

General enquiries: Chantal Britt, Communications, +41 76 588 08 24; chantal.britt@swiss3rcc.org

Questions about the 3RCC: Rolf Hanimann, Director ad interim, +41 79 218 29 80; rolf.hanimann@swiss3rcc.org

Questions about the funding programme: Armand Mensen, Scientific Officer, +41 78 890 89 86; armand.mensen@swiss3rcc.org