Letter of intent

File number 175.2021.047
Grant 2021/2022

Applicant

Title High-content live cell imaging platform for 2D/3D organoids and organ-on-a-chip models (ORGANSCOPE)

Abstract

NWO domain: Netherlands Organisation for Health Research and Development (ZonMw)

Relevant research field(s): 21.50.00 (Histology, cell biology), 23.20.00 (Organs and organ systems).

Brief explanation:

ORGANSCOPE will consist both of an imaging and a data analysis platform:

1) Imaging platform: A high-content multimodal live cell microscope that can be used for screening of events at super-resolution, at normal resolution of 2D cultures, and for the characterization and screening of 3D cell cultures, organoids, and organo-on-a-chip models. The platform will include a fully environmental-controlled multiwell-storage cage (an “organoid hotel”) for up to 44 multiwell-plates under stable physiological conditions. This will allow the platform set up small scale screening experiments, but will also allow multiuser access to imaging, in which the “organoid hotel” will host multiple plates from different researchers and the instrument can then be programmed for scheduled imaging of the different experiments. Deep image acquisition of thick specimens will be enabled by a multiphoton confocal scanner with a dual infrared (IR) laser excitation source to allow for deep penetrance of excitation and label-free imaging through second- and third-harmonic generation imaging. In addition, there will be a fast confocal resonant scanner, a spectral scanner, and a set of visible lasers to reduce light exposure for low phototoxicity and expand the application to standard and spectral confocal imaging.

2) Data analysis platform: Data storage will be handled on a dedicated 200 TB server allowing both simultaneous data acquisition and multiuser analysis. The data analysis solution will include an Artificial Intelligence-driven software package and will be operated under FAIR principles.

Embedding:

ORGANSCOPE will be embedded in the Microscopy and Cytometry Core Facility (MCCF) of the Amsterdam UMC – Location VUmc. The core facility is run by a team of experienced operators with many years of experience in advanced live cell imaging, artificial intelligence-based data analysis, and professional running of the core facility.

Researchers involved:

ORGANSCOPE is an initiative lead by Neuroscience expert Prof. Dr. Elga de Vries and Organ-on-a-chip expert Prof. Dr. Sue Gibbs from the Amsterdam UMC – Location VUmc. Together, they will join forces with the growing organoid community at the Amsterdam UMC as well as consortium members of the hDMT INFRA StemCells consortium. Our initiative is also open to other organoid and organ-on-a-chip researchers in The Netherlands.

Alignment with LSRI Roadmap group(s):

This application is officially supported by the Innovative Stem Cell Technology Infrastructure for human organ and disease models (hDMT INFRA StemCells), an LSRI Roadmap consortium lead by Prof. Dr. Christine Mummery (LUMC and hDMT) within the Medical Sciences (Advanced Personalized Therapies & human Model Systems; AT&MS) domain.
Organisation responsible for the application

Confirm letter of intent
With submitting this form via ISAAC I declare to have filled in this form completely and truthfully.

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Applicant