

New EU-funded Research Project “HCA|Organoid”: Toward a Single-Cell Atlas of Human Organoids for Biomedical Research

- *The HCA|Organoid project is one of six pilot actions funded by the European Commission to contribute to the worldwide Human Cell Atlas initiative*
- *An “Organoid Cell Atlas” will combine single-cell profiling and organoid technology*

Vienna, Austria, 31 August 2020 – HCA|Organoid is a new EU research project that combines single-cell profiling and organoid technology to validate organoids as faithful models of human biology. The project seeks to kickstart the development of an open access “Organoid Cell Atlas”. By creating well-characterized *in vitro* models of human organs, this resource will enable future discovery-driven and translational research on rare genetic diseases, complex multifactorial diseases, and on cancer. Toward this goal, Europe’s leading organoid researchers as well as experts in single-cell sequencing, single-cell imaging, and computational data integration have teamed up. The HCA|Organoid project is one of six pilot actions funded by the EU Horizon 2020 Framework Program that will constitute European contributions to the “Human Cell Atlas” – an ambitious global initiative striving to advance biomedical research and therapy using single-cell technologies. The HCA|Organoid consortium comprises eight partners and will receive EUR 5 million in EU funding.

Single-cell technologies provide a fundamentally new perspective for understanding biology, with profound potential to enable therapeutic advances and to put Europe at the forefront of personalized medicine and regenerative biology. In order to streamline research and accelerate scientific progress in this area, the Human Cell Atlas (HCA) initiative provides worldwide coordination toward the goal of establishing comprehensive reference maps of all cell types in the human body.

Within the global context provided by the HCA, the new European research project HCA|Organoid has set out to establish an “Organoid Cell Atlas”. This initiative will firmly establish single-cell analysis of human organoids within the HCA and thereby advance biomedical research. This vision is outlined in a strategy paper that is publicly available as a preprint (DOI: [10.5281/zenodo.4001718](https://doi.org/10.5281/zenodo.4001718)). In a nutshell, researchers will use single-cell data as a “Rosetta stone”, helping to translate between results obtained from tissue samples of patients and analyses of the experimentally more flexible organoids grown *in vitro* (which constitute “patient avatars” in the laboratory). For example, researchers may identify a novel disease-associated cell type in primary patient samples, create equivalent cells in human organoids, and then investigate potential therapeutic strategies *in vitro*.

Toward realizing this vision, HCA|Organoid project will initially focus on establishing single-cell transcriptomes, epigenomes, and time-series imaging of human organoids and matched primary tissue from healthy donors. The project will derive and comprehensively characterize human brain and colon organoids from 100 individuals each, in order to capture population variation and to establish a comprehensive reference for disease-centric research. The single-cell maps will be integrated into a public Organoid Cell Atlas Portal, which will provide user-friendly access to single-cell data of organoids in connection to human primary samples. This scientific resource will support several proof-of-concept studies, for example focusing on disease modeling for genetic epilepsy in brain organoids, on organoid cancer models, and on the characterization of disease-linked genetic variants in colon organoids.



The HCA|Organoid project brings together a consortium of eight partner institutions including experts in organoid technology, single-cell profiling, advanced imaging, and bioinformatics from Austria, Germany, the Netherlands and Switzerland. In addition to its initial focus on single-cell profiling of brain and colon organoids, the project seeks to initiate an open, collaborative network of researchers and initiatives aimed at the single-cell characterization of a diverse set of human organoids.

“We are excited to combine single-cell profiling with organoid technology, and to contribute a focus on human organoids to the Human Cell Atlas. These are complementary technologies that together will bring us an important step closer to the rational development of future therapies for a wide range of diseases”, said Christoph Bock, project coordinator and principal investigator at the CeMM Research Center for Molecular Medicine of the Austrian Academy of Sciences.

More information about the HCA|Organoid project: www.hca-organoid.eu

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About the Human Cell Atlas

The Human Cell Atlas (HCA) initiative aims to create molecular reference maps of all human cells to pool and expand knowledge of the diverse cells found within the human body. The goal is to better understand human health, but also to improve diagnosis, monitoring and treatment of diseases. As a contribution to this global initiative, the European Commission is funding six pilot actions within the Horizon 2020 Research and Innovation Framework Programme (www.humancellatlas.org/euh2020). Each of those projects has been designed to characterize single cells or their nuclear components, their interactions and/or spatial location in tissues from one human organ, using state-of-the-art single cell technologies, analytical methods and computational tools, and brings together European experts in the respective fields who are joining their efforts to support the creation of the HCA.

Project Partners

- CeMM Research Center for Molecular Medicine of the Austrian Academy of Sciences, Austria
- Institute of Molecular Biotechnology of the Austrian Academy of Sciences (IMBA), Austria
- Princess Máxima Center for Pediatric Oncology BV (PMC), The Netherlands
- Hubrecht Organoid Technology (HUB), The Netherlands
- Friedrich Miescher Institute for Biomedical Research (FMI), Switzerland
- German Cancer Research Center (DKFZ), Germany
- European Bioinformatics Institute (EMBL-EBI), United Kingdom
- European Research and Project Office GmbH (EURICE), Germany

Contact

Project Coordination:

Christoph Bock, Principal Investigator

CeMM Research Center for Molecular Medicine of the Austrian Academy of Sciences

Phone: +43 140 160 700 70

E-mail: cbock@cemm.oeaw.ac.at

Further Information:

Laura Alvarez, Social Media and Communications Manager

CeMM Research Center for Molecular Medicine of the Austrian Academy of Sciences

Phone: +43 140 160 700 57

E-mail: lalvarez@cemm.oeaw.ac.at

