Modeling vascular inflammation with immune cell-vessel crosstalk in hiPSC-derived 3D vessels-on-chip

Bulut, M.

Curriculum Vitae

Merve Bulut was born on August 13th, 1993 in Yenimahalle, Ankara, Türkiye. She obtained her Bachelor's degree in Molecular Biology and Genetics from Middle East Technical University in 2016. During her undergraduate studies, she also completed a minor degree in Chemistry. She carried out her dissertation project in the group of Prof. Dr. Miguel Beato del Rosal at the Centre for Genomic Regulation (CRG) in Barcelona, Spain, focusing on hormone-dependent gene regulation in breast cancer. She then moved to Germany to pursue a Master's degree in Regenerative Biology and Medicine at the Center for Regenerative Therapies (CRTD), TU Dresden. Her studies were supported by Deutscher Akademischer Austauschdienst (DAAD) scholarship. During this time, she completed internships in several research groups focused on immunology and stem cell research. Her involvement in the Organ-on-Chip field began during her Master's thesis in the group of Prof. Dr. Olivier T. Guenat at the University of Bern, Switzerland, where she worked on developing a Vessel-on-a-Chip (VoC) platform to study the effect of respiratory cyclic stretch on *in vitro* pulmonary vascularization.

In 2019, she started her PhD in the Department of Anatomy and Embryology at Leiden University Medical Center (LUMC) under the supervision of Dr. Valeria Orlova and Prof. Dr. Christine Mummery. Her research focused on combining human induced pluripotent stem cell (hiPSC)-derived vascular and immune cells with Organ-on-Chip (OoC) technology to engineer and validate functional vascular microenvironments for disease modeling. In particular, she developed multicellular hiPSC-derived 3D Vessel-on-Chip (VoC) models to investigate immune–vascular interactions under inflammatory conditions. These models integrated endothelial cells, mural cells, and monocytes/macrophages differentiated from both healthy donors and patients with vascular pathologies, enabling the study of disease-specific inflammatory responses. During her PhD, she participated in numerous international conferences, presenting her work through abstract-selected oral and poster presentations. Her research was supported by the Marie Skłodowska-Curie Innovative Training Network (MSCA-ITN) as part of the European Organ-on-Chip Consortium (EUROoC), the LymphChip consortium, and the Novo Nordisk Foundation Center for Stem Cell Medicine (reNEW).

List of publications

Bulut, M., Cao, X., Wiendels, M., van den Hil, F. E., Mei, H., Mummery, C.L., & Orlova, V.V. (2025). 3D hiPSC-Derived Vessels-on-Chip Reveal Insights into Inflammatory Responses in Healthy and Disease States. *iScience*, *Under Revision*.

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Bulut, M., Cuenca, M. V., de Graaf, M., van den Hil, F. E., Mummery, C. L., & Orlova, V. V. (2022). Three-dimensional vessels-on-a-chip based on hiPSC-derived vascular endothelial and smooth muscle cells. Current Protocols, 2, e564. doi: 10.1002/cpz1.564

Ichwan, M., Walker, T. L., Nicola, Z., Ludwig-Müller, J., Böttcher, C.,Overall, R.W., Adusumilli, V.S., **Bulut, M.**, Sykes, A.M., Hübner, N., Ramirez-Rodriguez, G., Ortiz-López, L., Lugo-Hernández, E.A. & Kempermann, G. (2021). Apple Peel and Flesh Contain Pro-neurogenic Compounds. Stem Cell Reports, 16(3), 548-565. Doi: 10.1016/j.stemcr.2021.01.005

In Preparation

Bulut, M., Hanczar, M., van den Hil, F. E., Mummery, C. L., & Orlova, V. V. 3D hiPSC-derived Vessels-on-Chip recapitulate inflammatory responses in Hereditary Hemorrhagic Telangiectasia-1.

Bulut, M.*, Tsikari, T.*, van den Hil, F. E., Cuenca, M. V., Mummery, C. L., & Orlova, V. V. 3D hiPSC-derived Vessel-on-Chip model for investigating perivascular macrophage function.

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