Microphysiological liver systems for in vitro modeling and industry implementation

Bonanini, F.F.

Curriculum Vitae

Flavio Bonanini was born on the 8th of September 1992, in Baden, Switzerland. Following his school education, he obtained a bachelor's degree in Biology at the Swiss Federal Institute of Technology (ETH Zurich) in 2015. He then pursued a master's degree in Biomedical Engineering from 2016 to 2018 at ETH Zurich where his thesis, titled "Body-on-a-chip: Towards an in vitro biotransformation assay to study liver-mediated cytotoxicity of prodrugs on tumor microtissues," explored the intricate pharmacological interplay between liver and tumor tissues under the guidance of Christian Lohasz and Prof. Andreas Hierlemann. Here, he collaborated with InSphero AG, laying the foundations for his expertise and passion in applying microphysiological systems for commercial applications. In 2019 he joined Mimetas B.V. and Leiden University as a PhD candidate under the supervision of Dr. Dorota Kurek and Prof. Thomas Hankemeier as part of the PoLiMeR consortium. From 2019 to 2022 his PhD research was funded through the European Union's Horizon 2020 research and innovation program under the Marie Skłodowska-Curie grant agreement. Here, his work emphasized the integration of vascularization and metabolism in advanced, human liver microphysiological systems. This work included the development of a novel in vitro strategy devised for the vascularization of large tissue models, as well as metabolic studies in the context of energy metabolism, performed in collaboration with Leiden University. As part of the PoLiMeR consortium training network, Flavio was trained in systems biology, computational modeling and biochemistry. Transitioning to a scientist role at Mimetas, from 2022 to 2024, Flavio led assay development and drug screenings of compound libraries, contributing to the commercialization of complex models of liver fibrosis and toxicity. This work granted him a patent

(PCT/NL2024/050126), as well as multiple peered reviewed publications and oral or poster presentations at international conferences, such as MPS World Summit (2023), AASLD Liver Meeting (2023), SLAS (2024), and more. Beyond the bench, he actively participated in numerous commercial activities within the company, such as supporting sales, business development and marketing.

List of Publications

1 **Bonanini Flavio***, Roelof Dinkelberg*, Manuel Caro Torregrosa, Nienke Kortekaas, Tessa M S Hagens, Stéphane Treillard, Dorota Kurek, Vincent van Duinen, Paul Vulto and Kristin Bircsak. 2024. “A Microvascularized in Vitro Liver Model for Disease Modeling and Drug Discovery.” *Biofabrication* 17(1): 015007. doi:10.1088/1758-5090/ad818a.

2 **Bonanini Flavio***, Dorota Kurek*, Sara Previdi*, Arnaud Nicolas, Delilah Hendriks, Sander de Ruiter, Marine Meyer, Maria Clapés Cabrer, Roelof Dinkelberg, Silvia Bonilla García, Bart Kramer, Thomas Olivier, Huili Hu, Carmen López-Iglesias, Frederik Schavemaker, Erik Walinga, Devanjali Dutta, Karla Queiroz, Karel Domansky, Bob Ronden, Jos Joore, Henriette L Lanz, Peter J Peters, Sebastiaan J Trietsch, Hans Clevers and Paul Vulto. 2022. “In Vitro Grafting of Hepatic Spheroids and Organoids on a Microfluidic Vascular Bed.” *Angiogenesis* 25(4): 455–70. doi:10.1007/s10456-022-09842-9.

3 **Bonanini Flavio***, Madhulika Singh*, Hong Yang, Dorota Kurek, Amy C. Harms, Adil Mardinoglu, and Thomas Hankemeier. 2024. “A Comparison between Different Human Hepatocyte Models Reveals Profound Differences in Net Glucose Production, Lipid Composition and Metabolism in Vitro.” *Experimental Cell Research* 437(1). doi:10.1016/j.yexcr.2024.114008.

4 Harrison Sean P., Richard Siller, Yoshiaki Tanaka, Maria Eugenia Chollet, María Eugenia de la Morena-Barrio, Yangfei Xiang, Benjamin Patterson, Elisabeth Andersen, Carlos Bravo-Pérez, Henning Kempf, Kathrine S Åsrud, Oleg Lunov, Alexandr Dejneka, Marie-Christine Mowinckel,

Benedicte Stavik, Per Morten Sandset, Espen Melum, Saphira Baumgarten, **Flavio Bonanini**, Dorota Kurek, Santosh Mathapati, Runar Almaas, Kulbhushan Sharma, Steven R Wilson, Frøydis S Skottvoll, Ida C Boger, Inger Lise Bogen, Tuula A Nyman, Jun Jie Wu, Ales Bezrouk, Dana Cizkova, Javier Corral, Jaroslav Mokry, Robert Zweigerdt, In-Hyun Park and Gareth J Sullivan. 2023. "Scalable Production of Tissue-like Vascularized Liver Organoids from Human PSCs." *Experimental and Molecular Medicine* 55(9): 2005–24. doi:10.1038/s12276-023-01074-1.

5 Mátyás A. Bittenbinder*, **Flavio Bonanini***, Dorota Kurek, Paul Vulto, Jeroen Kool & Freek J. Vonk. 2024." Using organ-on-a-chip technology to study haemorrhagic activities of snake venoms on endothelial tubules." *Scientific Repports* **14**, 11157. https://doi.org/10.1038/s41598-024-60282-5

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