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High-throughput Microfluidic Platform for 3D *In vitro* Vascularization and Tissue Microenvironment Modelling for Drug Discovery †

Dorota Kurek [1,*], Karla Queiroz [1], Paul Vulto [1], Jos Joore [1], Henriette Lanz [1]

[1] Mimetas, The Netherlands
* Correspondence: d.kurek@mimetas.com (D.K.);
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Abstract: The challenge in creating better biomimetic tumor models lies in capturing the 3D morphology, heterogeneity, and complex microenvironment architectures *in vivo*. Recent developments in microfluidic techniques enable to addition of more physiologically relevant cues, such as long-term gradient stability, continuous perfusion, and patterning of cell layers as stratified co-cultures. Here we introduce the OrganoPlate®, a microfluidic platform that allows reproducible inclusion of different components of the tumor microenvironment such as extracellular matrix components, supporting and immune cells, flow, and perfused vasculature. Mimetas organ-on-a-chip platform is based on a microtiter plate footprint, harboring up to 96 culture chambers, and fully compatible with high content screening (HCS), including fluorescent and luminescent readout. OrganoPlate microengineered physiological systems can mimic complex environments and allow for quantitative and reproducible characterization of the modeled tissue with (patho)physiological significance and ultimately predictive drug response. We propose using the 3D tissue modeling in Organoplate® platform to improve efficiency in the drug development pipeline and personalized tumor models for phenotypic drug screenings.

Keywords: organ-on-a-chip; vascularization; 3D tissue modeling; phenotypic drug screening.

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Conflicts of Interest

The authors declare no conflict of interest.