TRANSITIES IN THE Organ-on-a-chip company

Human Tissue Models for Better Therapies

Dutch Life Sciences Conference November 24, 2016



E Better predictive models in the pharma pipeline

21st century medicine requires models that capture:

The complexity of tissues

Disease phenotypes

Differences between individuals



E A leap forward in physiological relevance

The challenge of reductionism:

"Make things as simple as possible, but not simpler", Albert Einstein





Co-culture Perfused ECM embedded Tubes & vessels



The OrganoPlate® platform









Vulto et al 2011 Phaseguides: a paradigm shift in microfluidic priming and emptying. *Lab Chip* 11(9) 1596-1602

Meet the OrganoPlate® (video)



Watch full movie https://youtu.be/L_VEJAZ5J6U

E Brain-on-a-Chip: Neuronal network

Rapid network formation directly after seeding in OrganoPlate® (iPSC-derived Dopa.4U)





Characterization of human 3D neuronal models

iPSC-derived neuroepithelial stem cells (day 31)



iPSC-derived Huntington neuronal precursors (day 42) (Axol)



iPSC-derived Neurons (iCell® Neurons)





iPSC-derived Dopa.4U[™] (Axiogenesis)







Neuronal activity in 3D neuronal models

Calcium imaging in OrganoPlate® (iCell GlutaNeuron)



Detection of calcium fluctuation using Fluo4AM dye

Variation in the fluorescent trace represents neuronal activity





E Brain-on-a-Chip: Toxicity testing

Vehicle

Methylmercury





Renal Proximal Tubuli



Tube polarization: Acetylated tubulin and ZO-1



E Real-time Barrier Integrity Assay

Barrier Integrity Assay: to determine the quality of the epithelial monolayer a impermeable fluorescent dye is added to the lumen of the tube.

Real time read out assay during toxicant exposure.







E Renal Toxicity Testing: apical versus basal exposure



Renal clearance model





DNA ZO-1 Ezrin Huvec-RFP

Blood-brain barrier

Blood-brain barrier with neuronal end-points







Complex endothelial co-cultures





Concentric co-culture of endothelium and pericytes in a functional tubular tissue





Huvecs

Primary monocytes

Angiogenesis-on-a-chip





















Caco-2 tubule

E Assays in the OrganoPlate®





Organ models in the OrganoPlate[®]



















Co-culture









Barrier tissues

















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