

Alexandra Lorenz

## A multi-organ chip for co-culture of organ equivalents for long-term substance testing

# Solving the substance testing dilemma



animal models

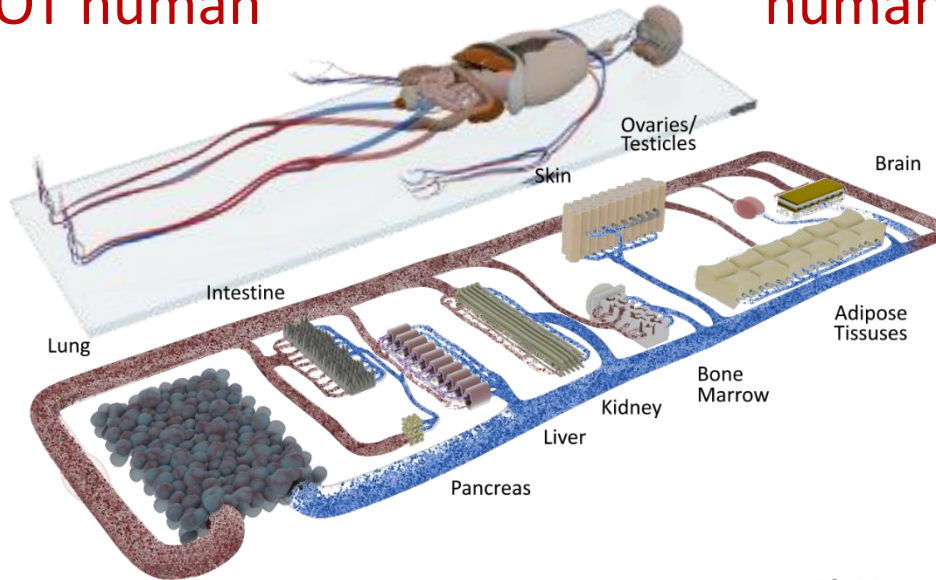
systemic but **NOT** human



static 2D & 3D

human cell culture

human but **NOT** systemic



**3Rs**



**“Human-on-a-Chip”**

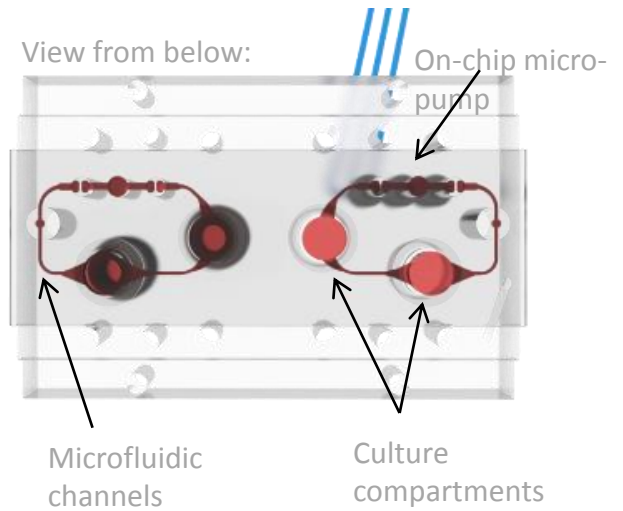
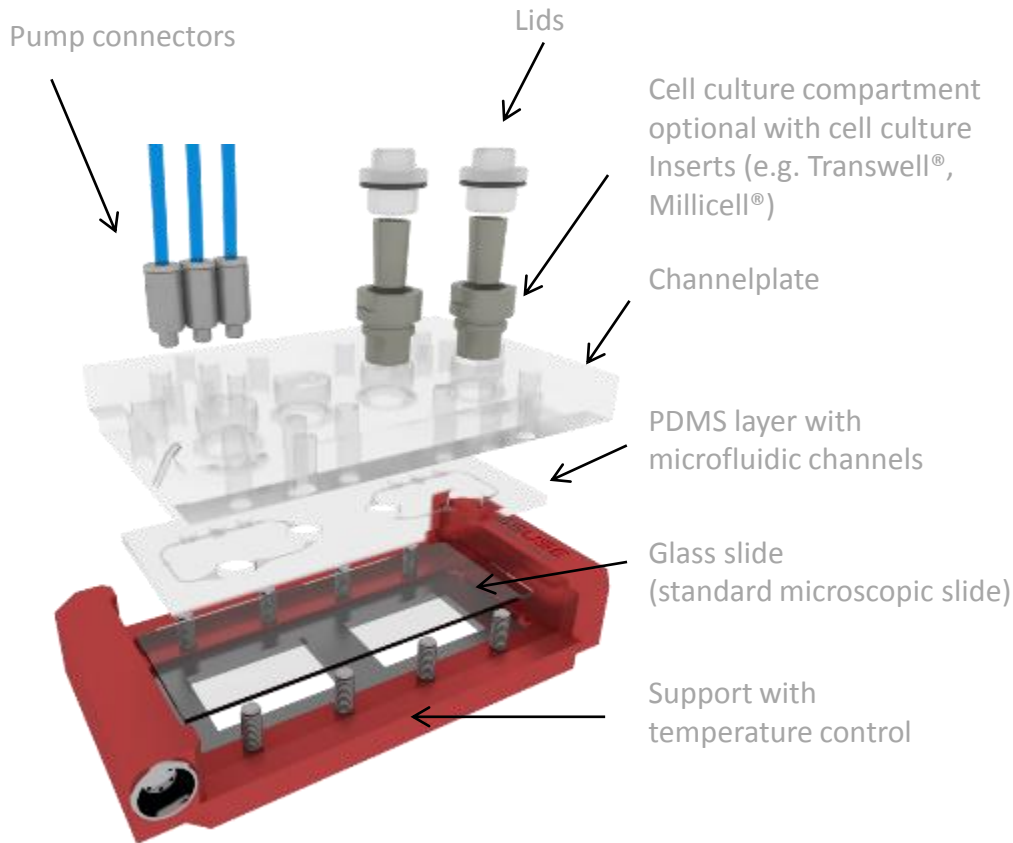
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Emulating Human Biology

human **AND** systemic

## Video 2 organ chip

<https://www.youtube.com/watch?v=whsqNvj9vdU>

# The Multi-Organ-Chip platform at a glance



- Chip format of a standard microscopic slide
- microscopic access for live tissue imaging
- supporting any cell type of choice (cell lines, primary cells, biopsies, 3D tissues)
- on-chip micro-pump providing stable pulsatile fluid flow and allows for near to physiological fluid-to-tissue ratio
- Dynamic system allows tissue-tissue communication
- enabling flexible organ arrangements (e.g. 2, 4, > 10 organs)
- supporting long-term performance at homeostasis (e.g. 28 days)
- and repeated dose substance exposure



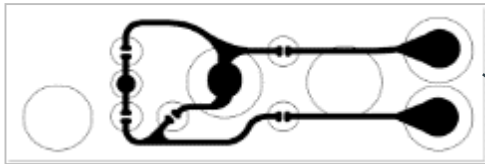
2-organ-chip  
launched June 2013



4-organ-chip  
launched August 2014

# Flexible technology

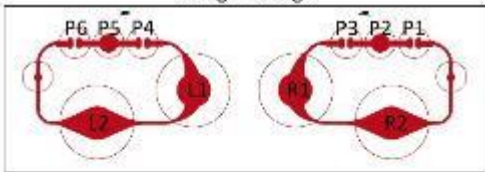
circulating 1 organ design



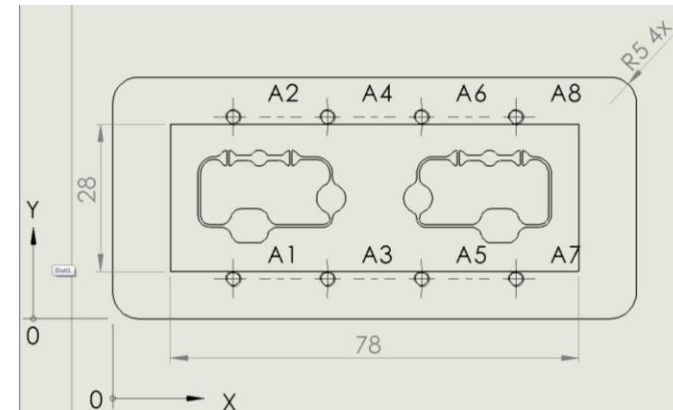
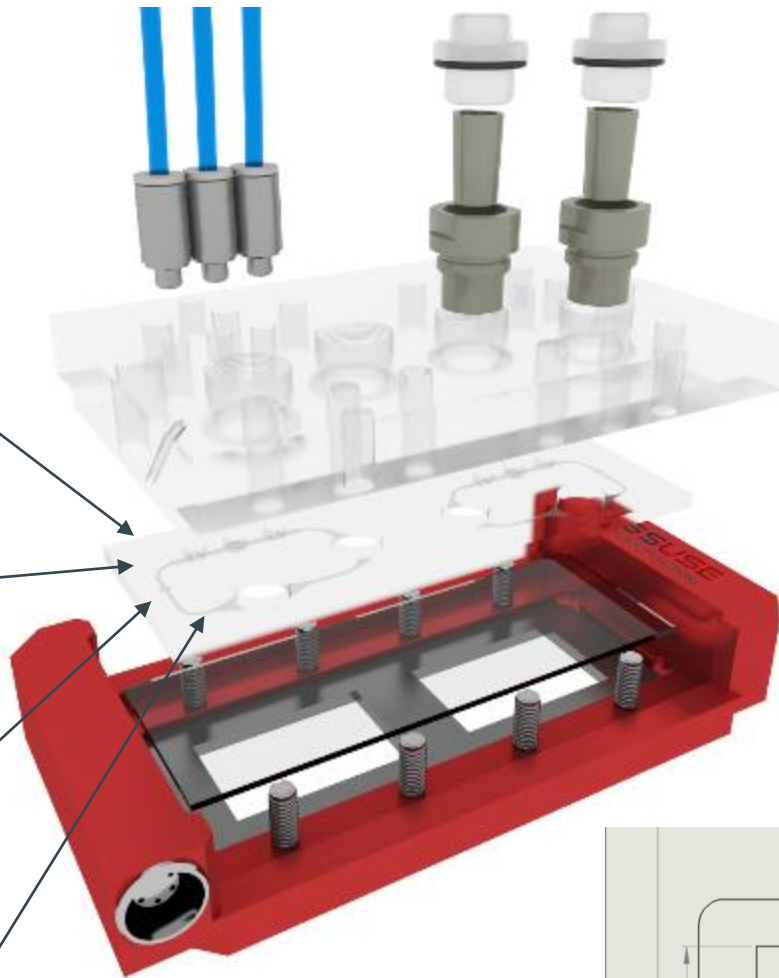
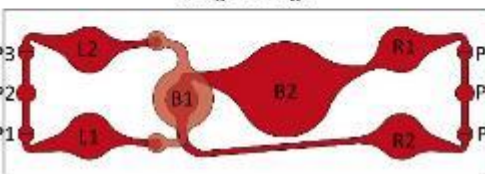
One direction 1 organ design



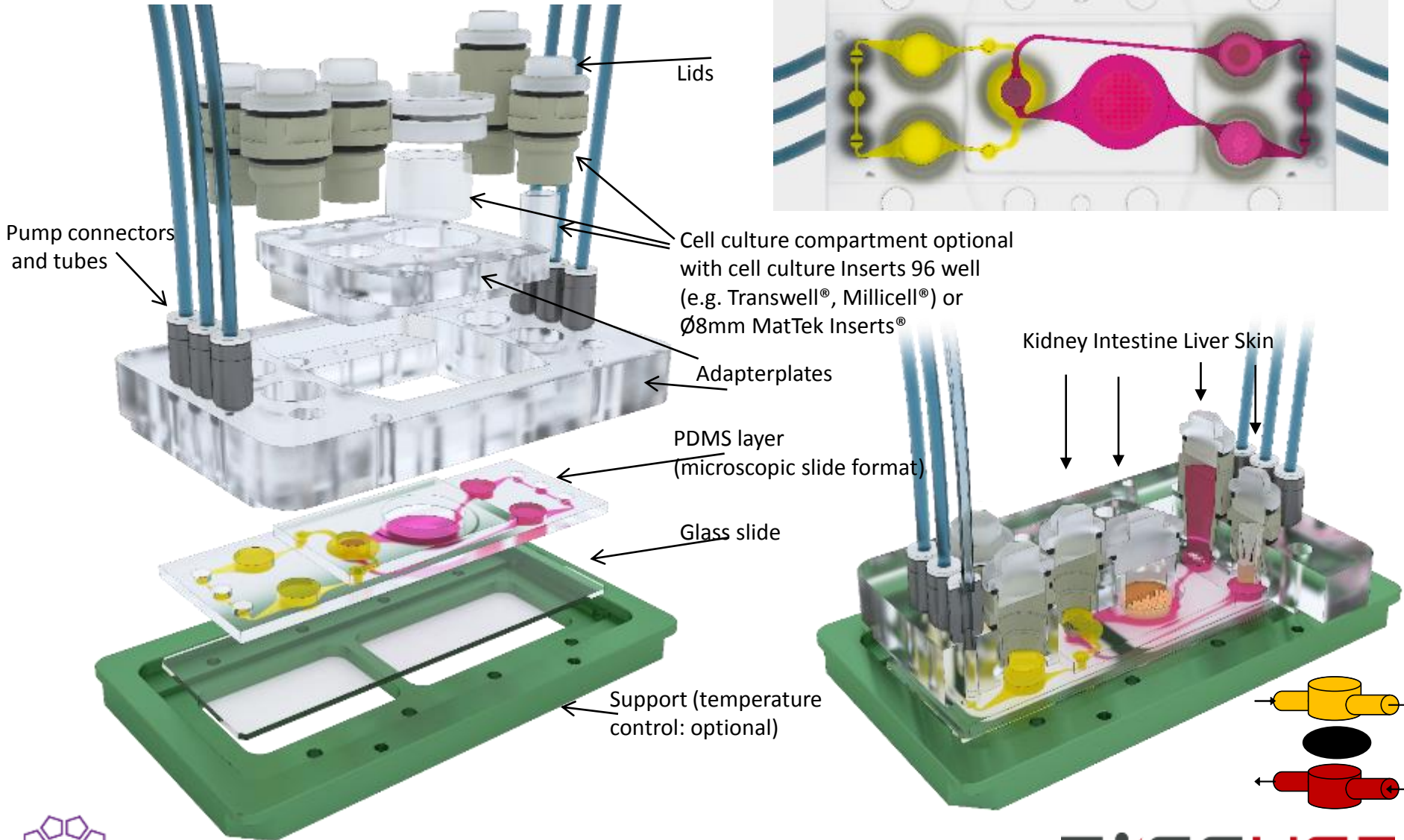
2 organ design



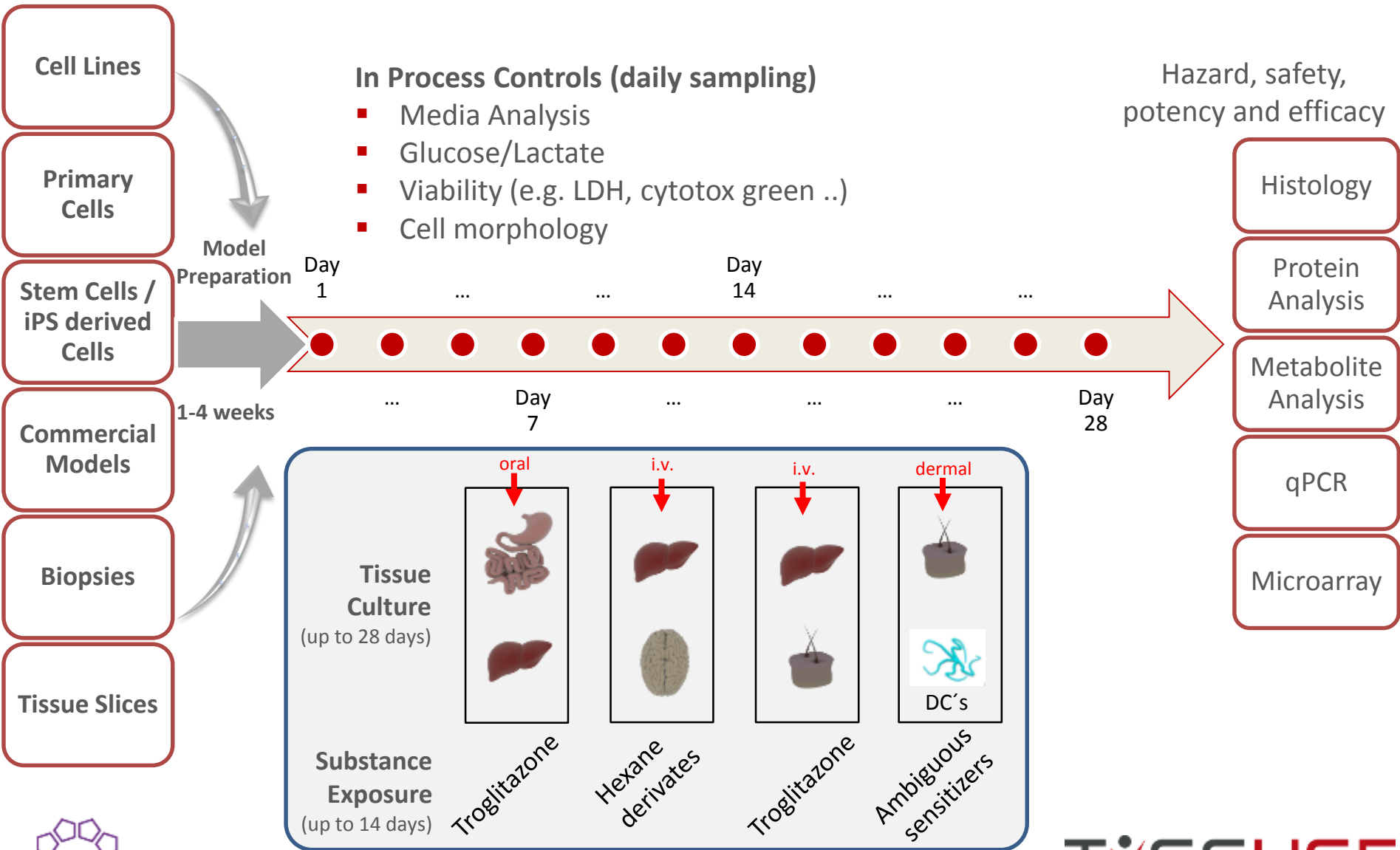
4 organ design



# The Multi-Organ-Chip (MOC) platform – 40C

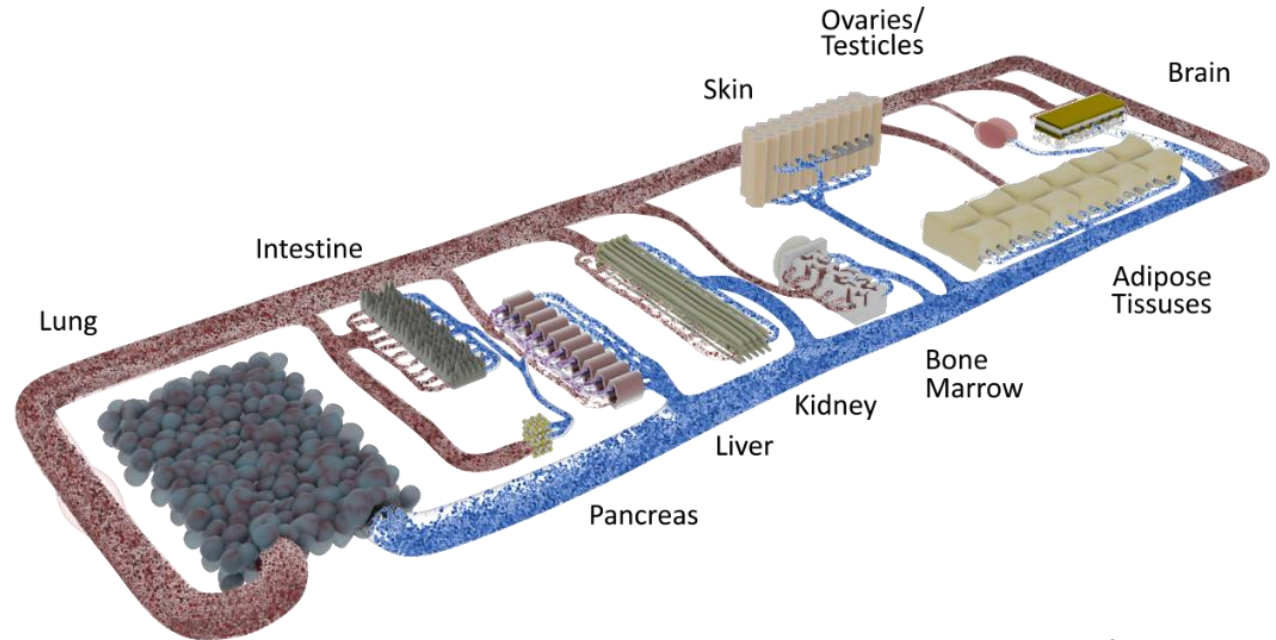
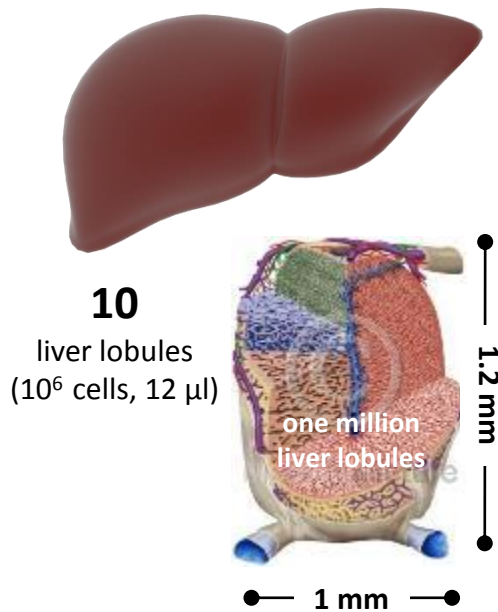


# Human Organ-Chip Assays



# Our mission

smallest biologically acceptable scale – 1:100.000 of the original size



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Marx et al. *ATLA*, 2012, 40, 235-257 'Human-on-a-chip' developments: a translational cutting edge alternative to systemic safety assessment and efficiency evaluation of Substances in laboratory animals and man?

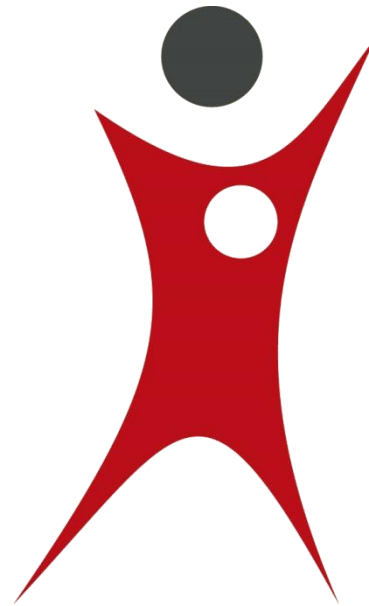


# Contact



## Publications:

- Materne et al. J Biotechnol. (2015)
- Maschmeyer et al. J. Pharmaceutics and Biopharmaceutics (2015)
- Schimek et al. Lab on Chip (2013)
- Maschmeyer et al. Lab on Chip (2015)
- Materne et.al. JOVE (2015)



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