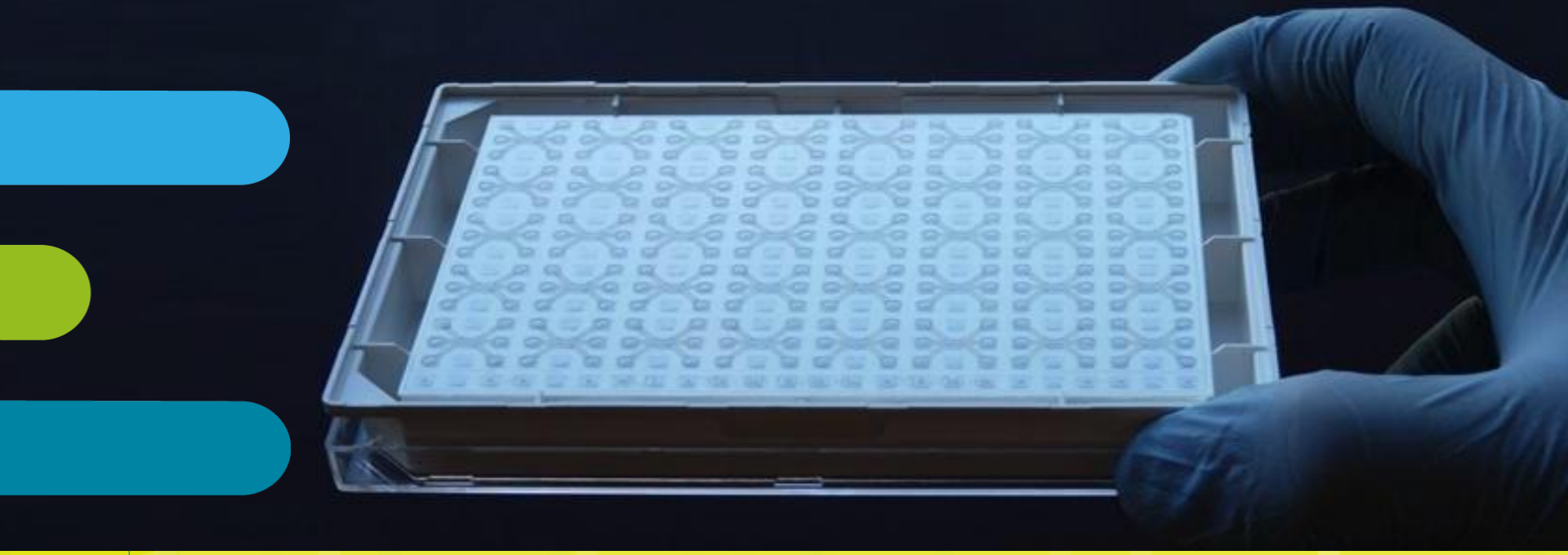


MIMETAS

the organ-on-a-chip company

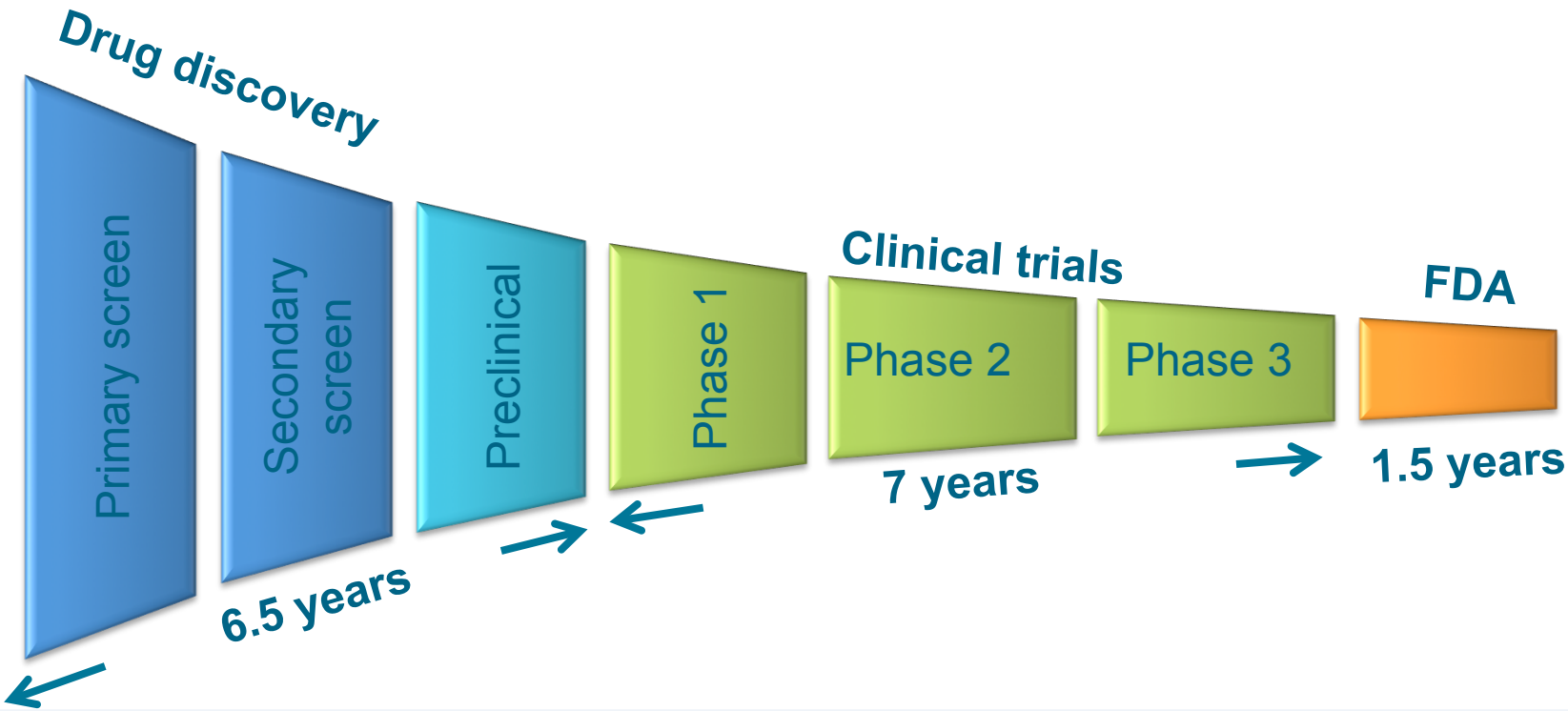
Karlijn Wilschut

Promega Discover Glo

March 10, 2015- AMC Amsterdam

MIMETAS
the organ-on-a-chip company

Early attrition

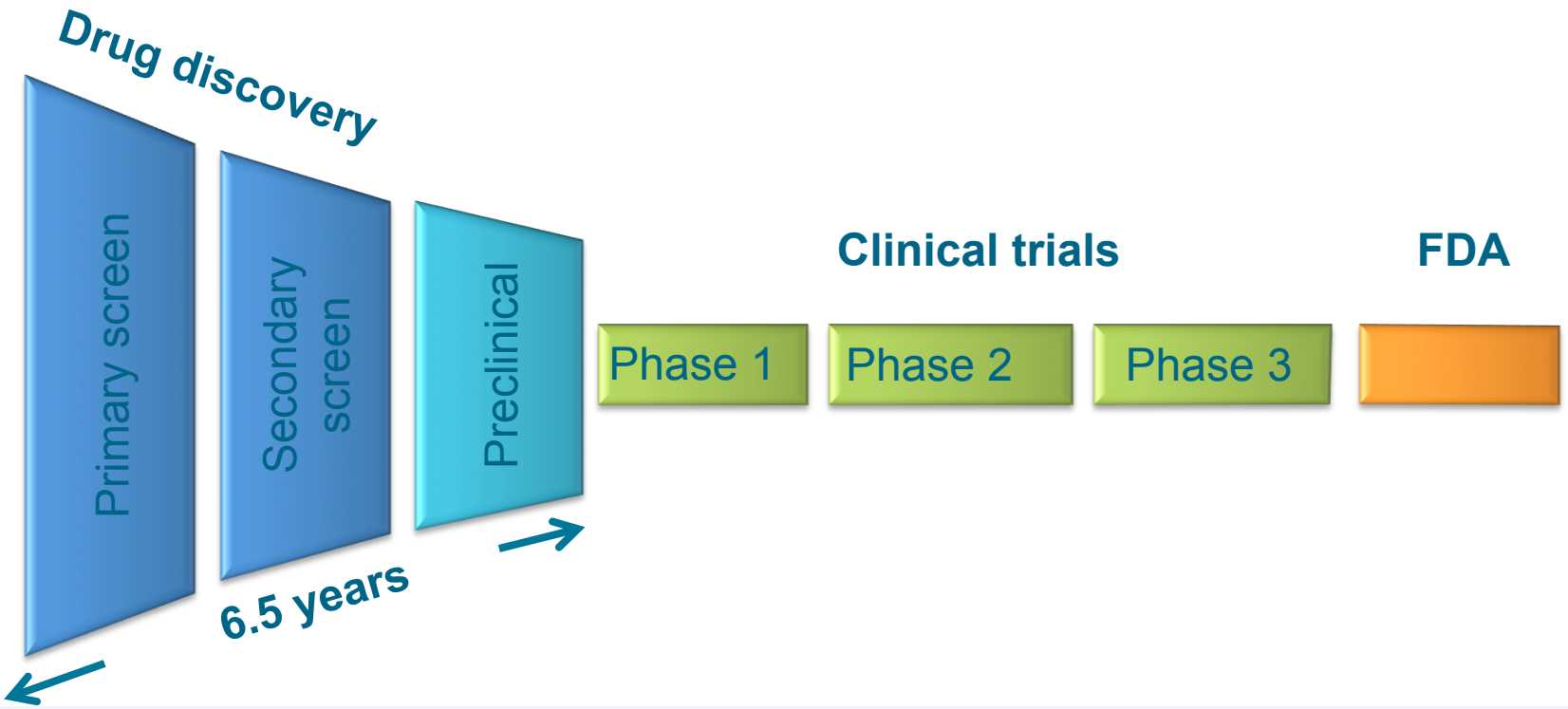


10,000 compounds → 250 compounds → 5 compounds → 1 FDA approved drug

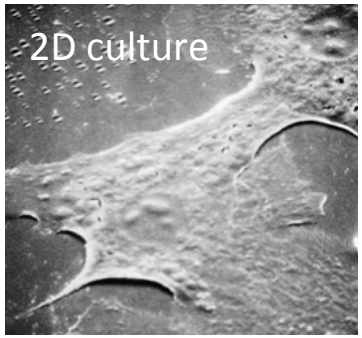
$ 0.8~1.8 bn

MIMETAS
the organ-on-a-chip company

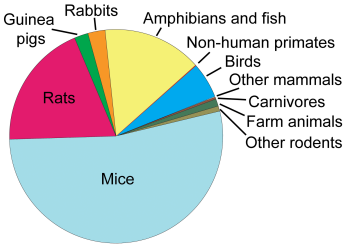
Early attrition

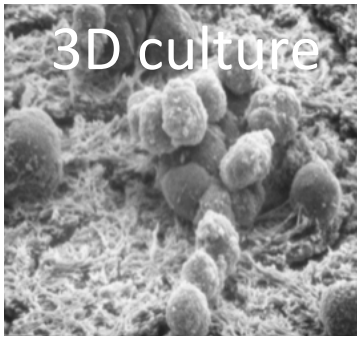


In need of better predictive models

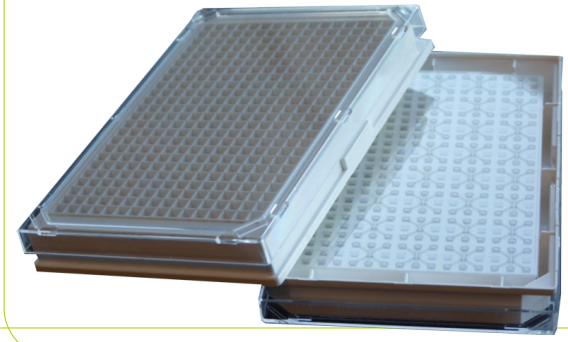


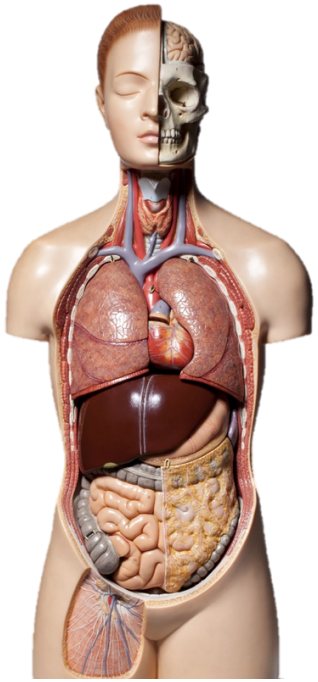
Animal testing





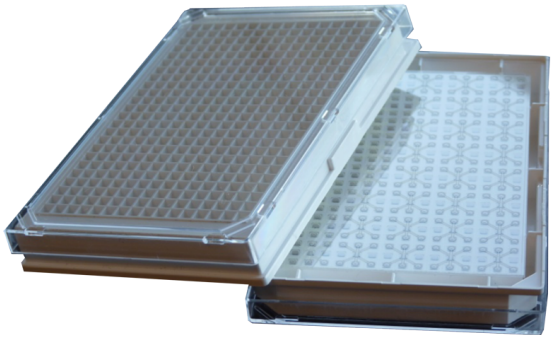
Human tissues
Layered co-culture
Tube formation
Boundary tissues





MIMETAS
the organ-on-a-chip company

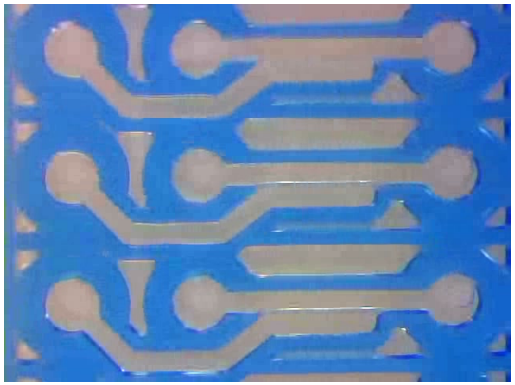
OrganoPlates™

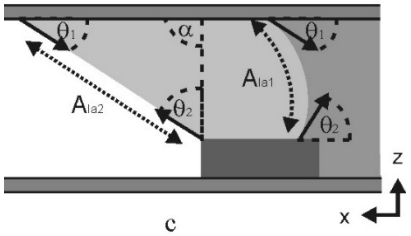


- Organ and tissue functionality
- Perfusion
- High throughput
- Low reagent consumption
- Compatible format

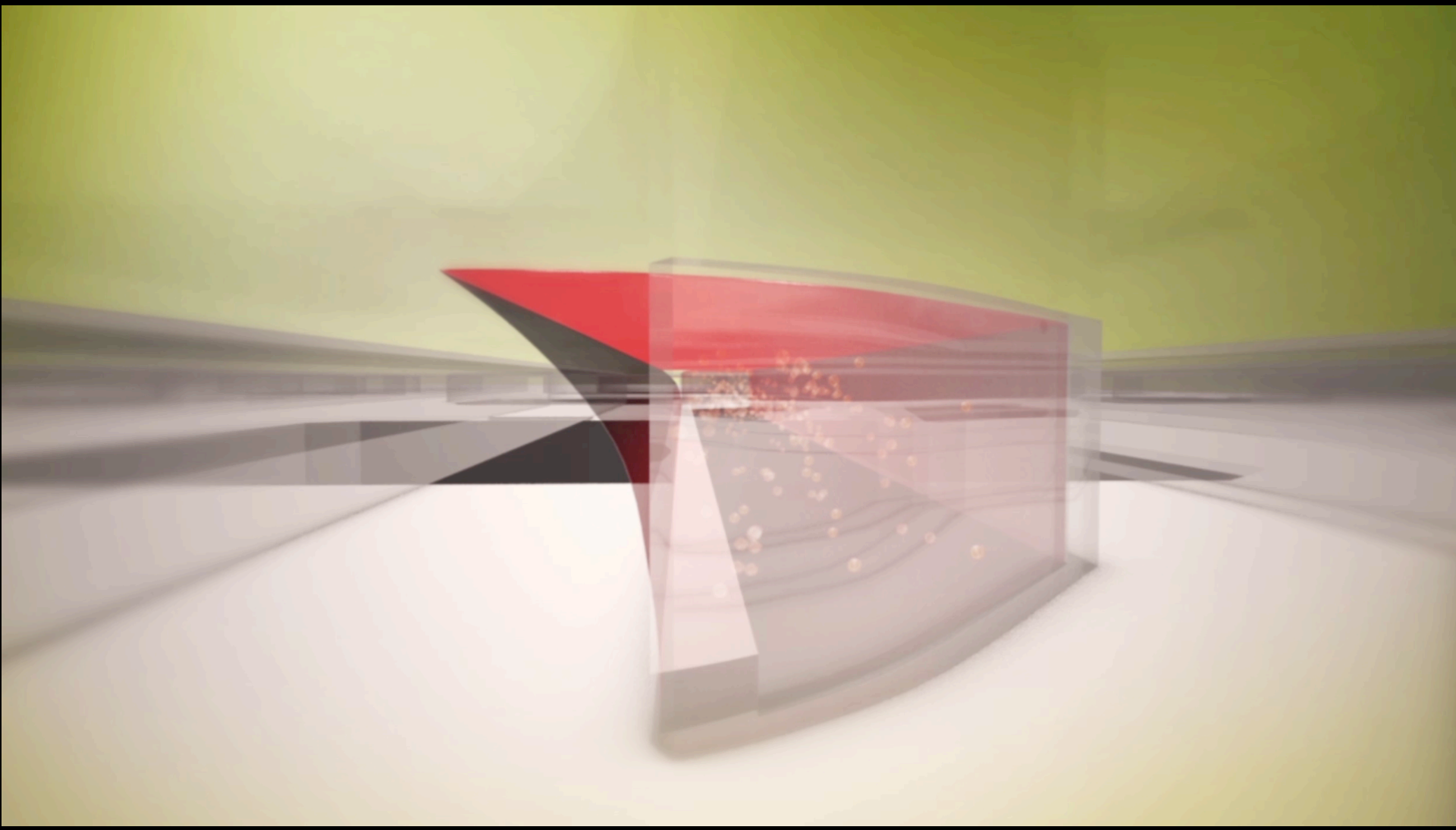
PhaseGuides

- Fully passive liquid control
- Easy filling of any shape
- Liquid & gel patterning
- Gradient formation
- Tissue layering

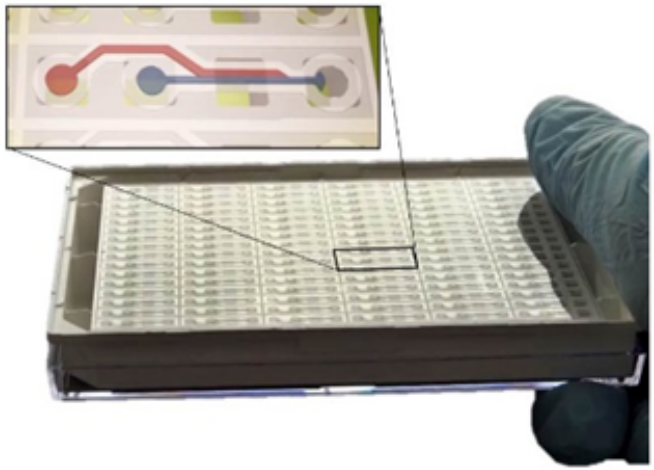




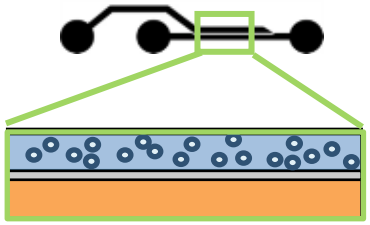
Movie: http://youtu.be/L_VEJAZ5J6U



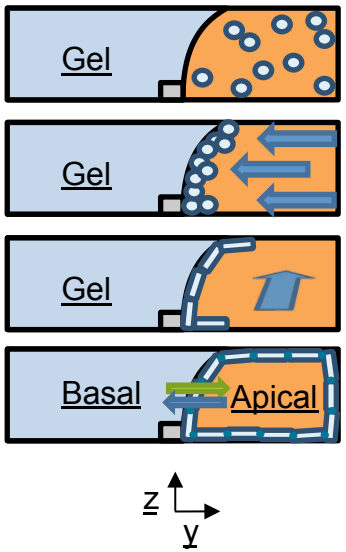
OrganoPlate™



MIMETAS OrganoPlate™ 96x 2-lane chip: gel lane (red) and perfusion lane (blue)



Gel+ cells
Medium + compound

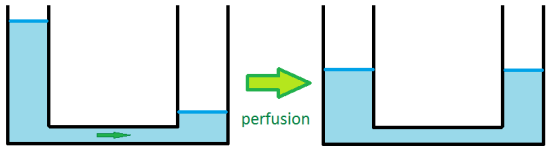


Gel
Medium + cells

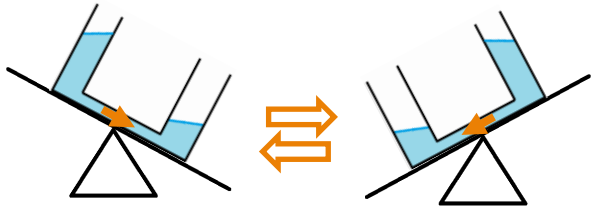
90° rotation

Flow/ perfusion

Flow created by perfusion-by-levelling



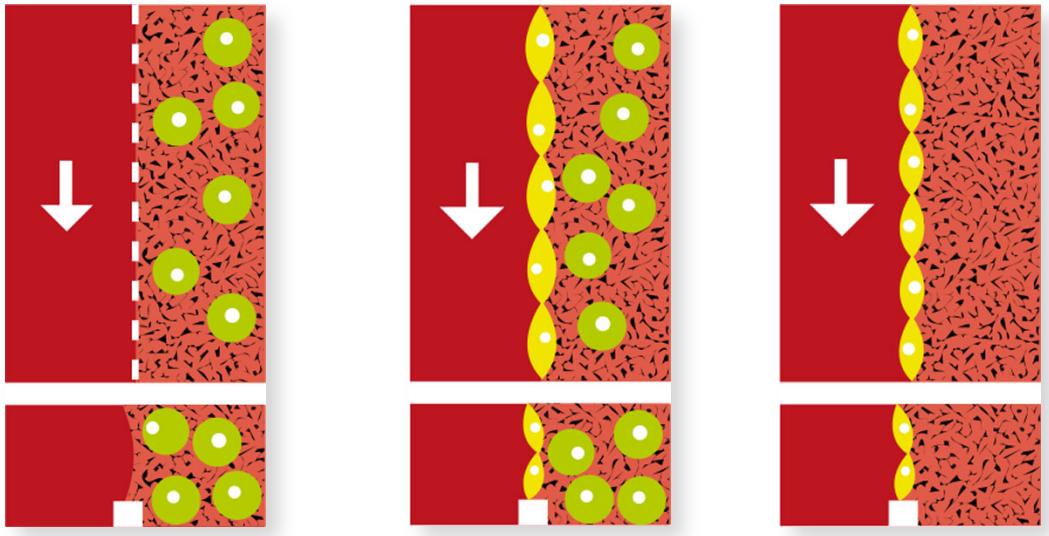
Perfusion-by-levelling on a rocker platform



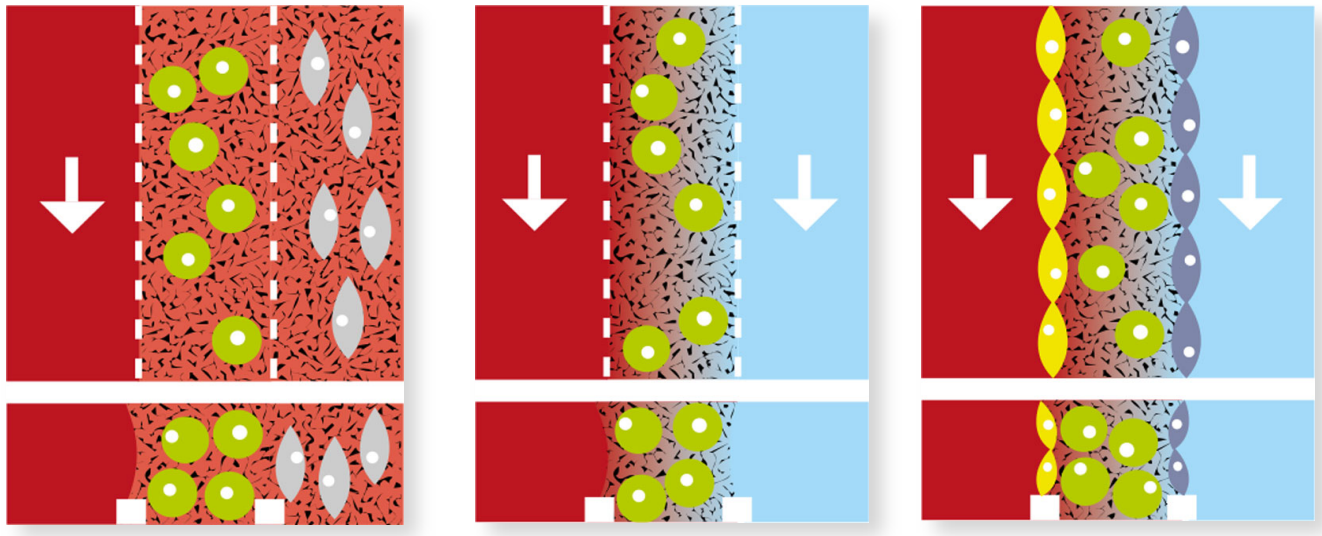
MIMETAS
the organ-on-a-chip company

Tissue model designs

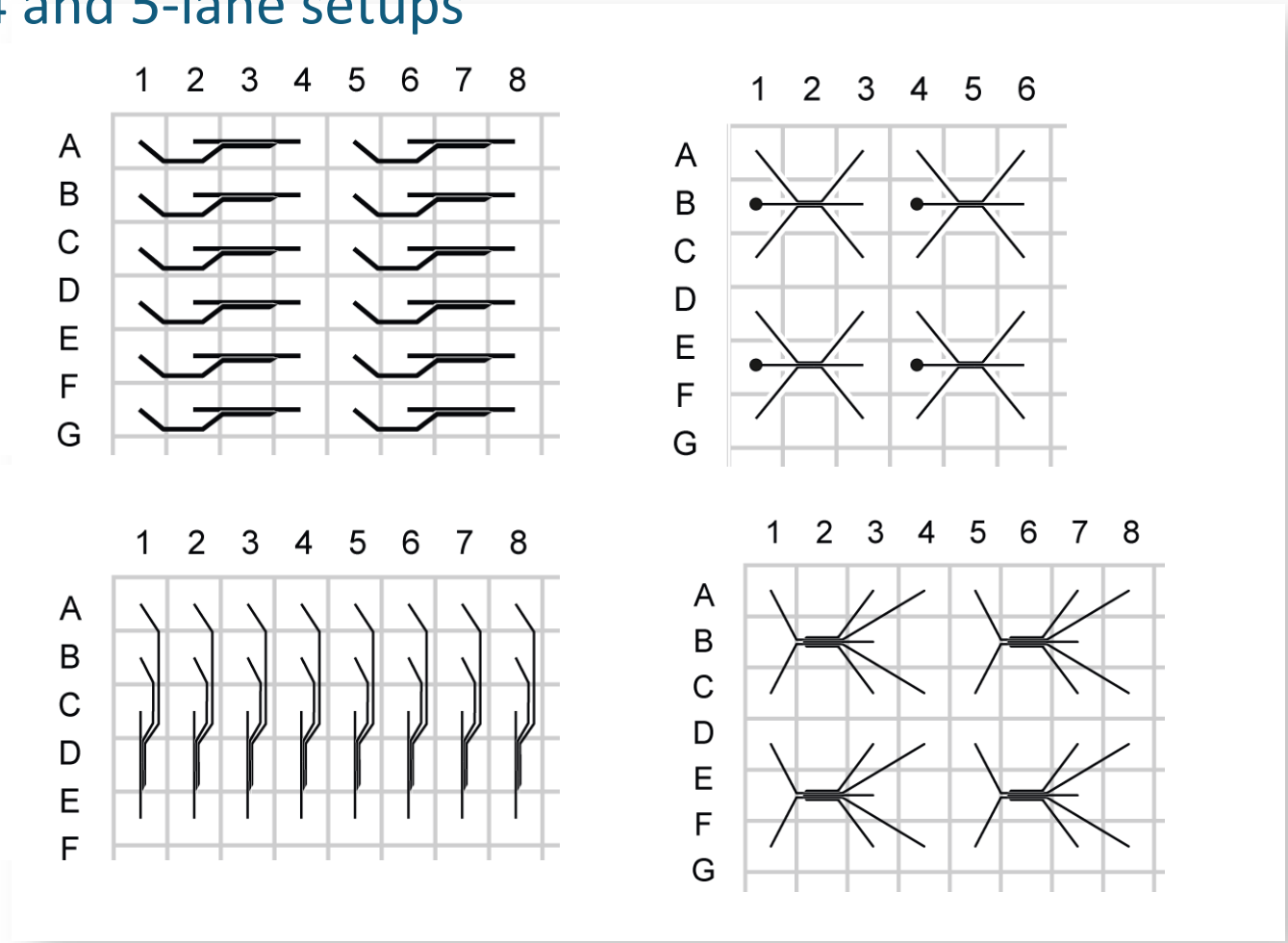
2 - lane



3 - lane

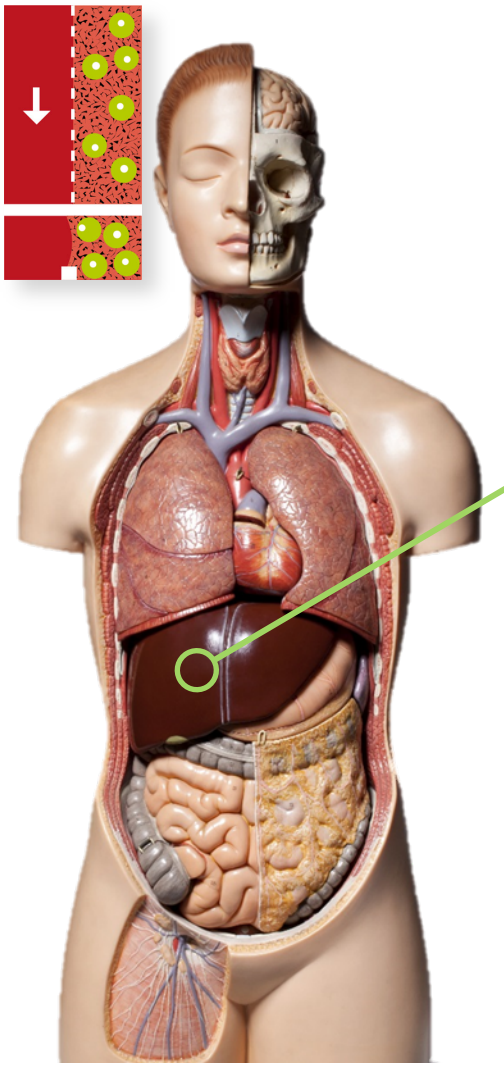


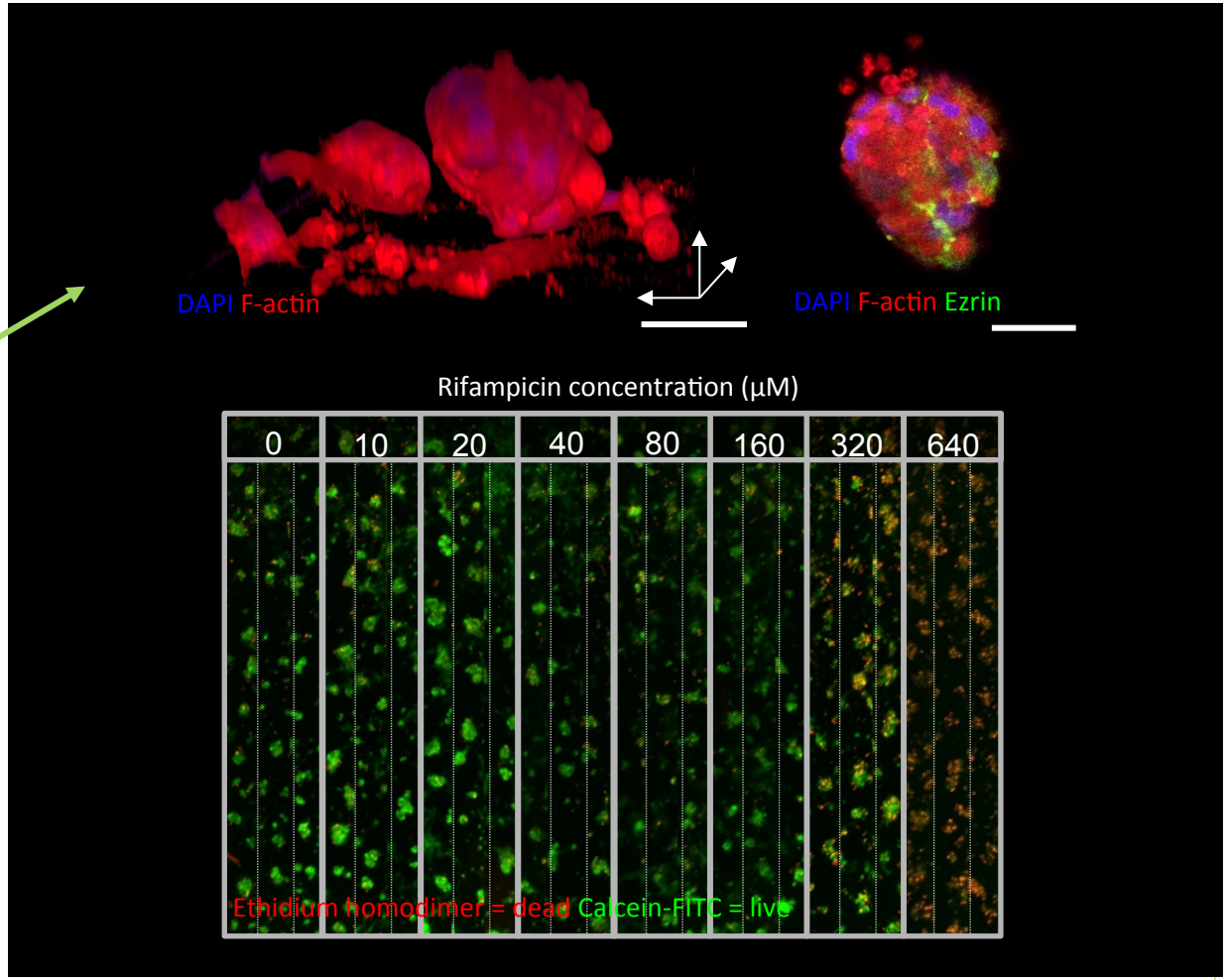
…and 4 and 5-lane setups



MIMETAS
the organ-on-a-chip company

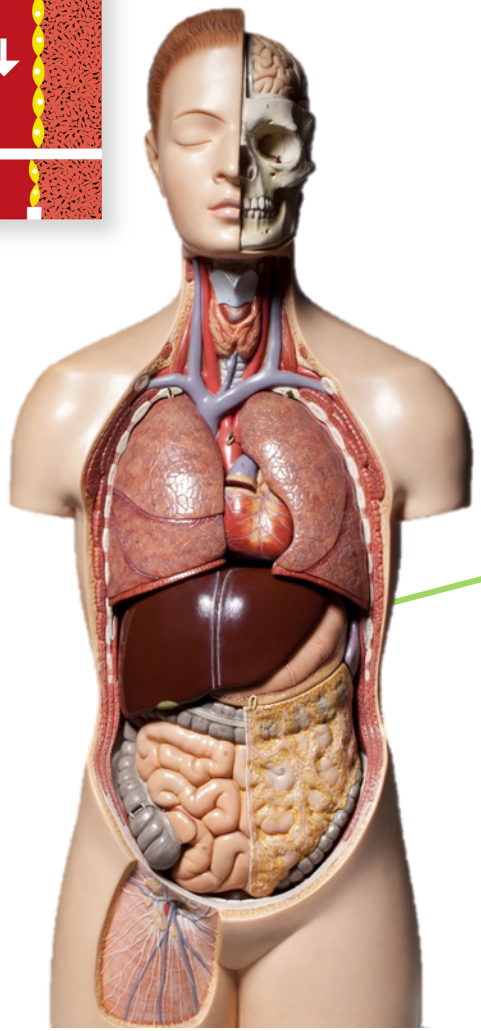
Liver

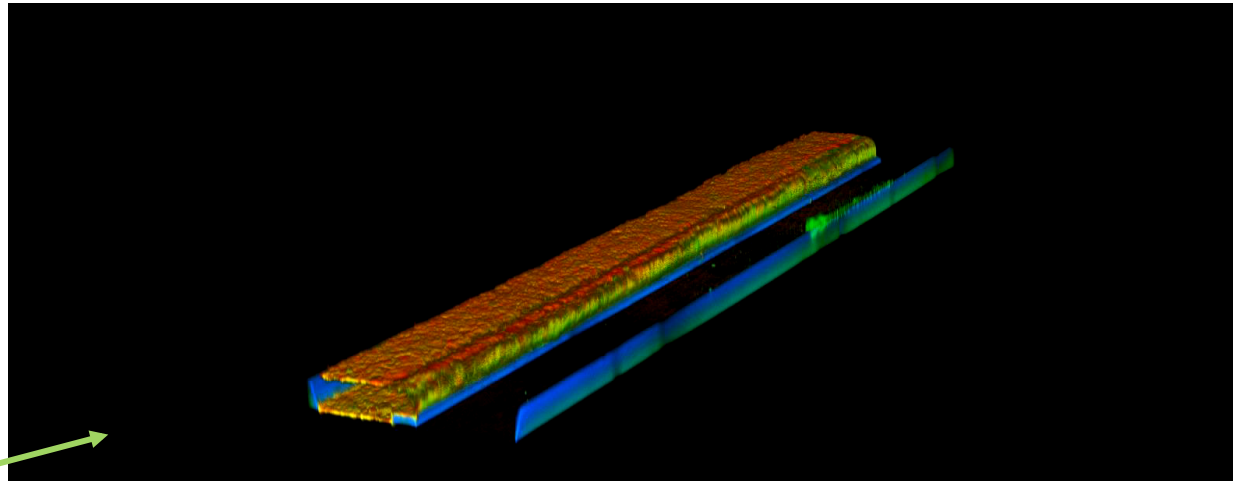


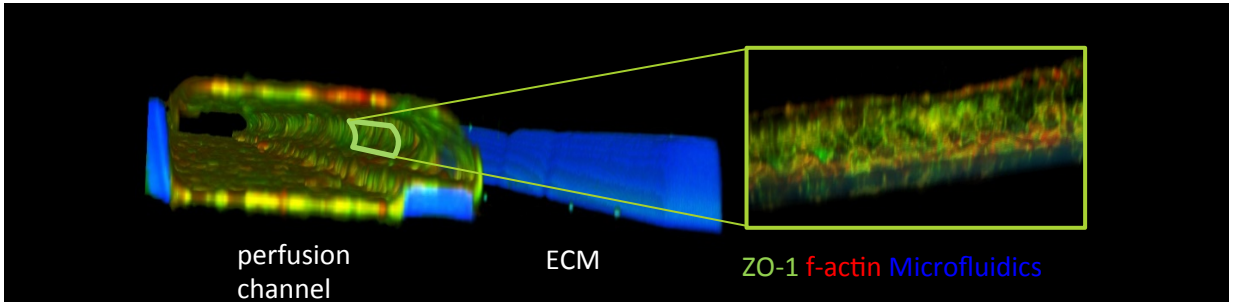


MIMETAS
the organ-on-a-chip company

Kidney





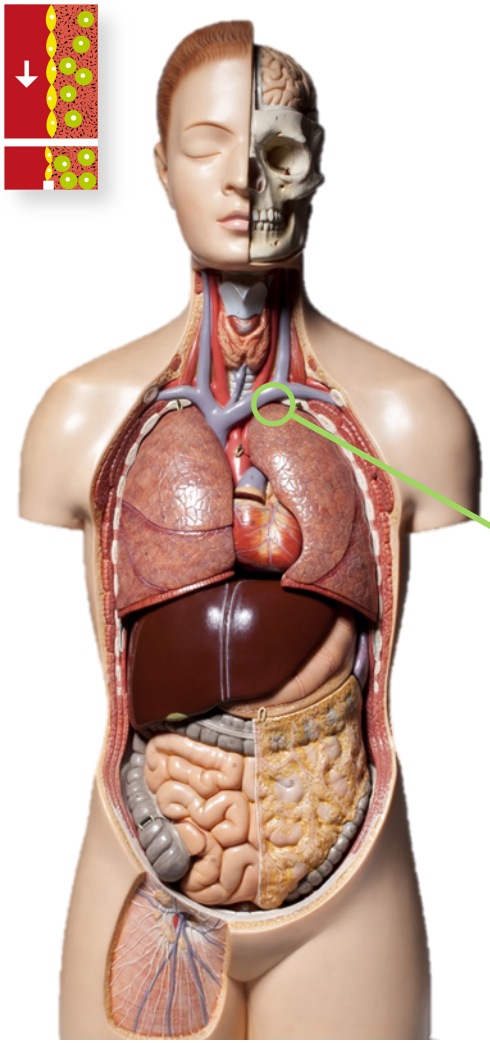


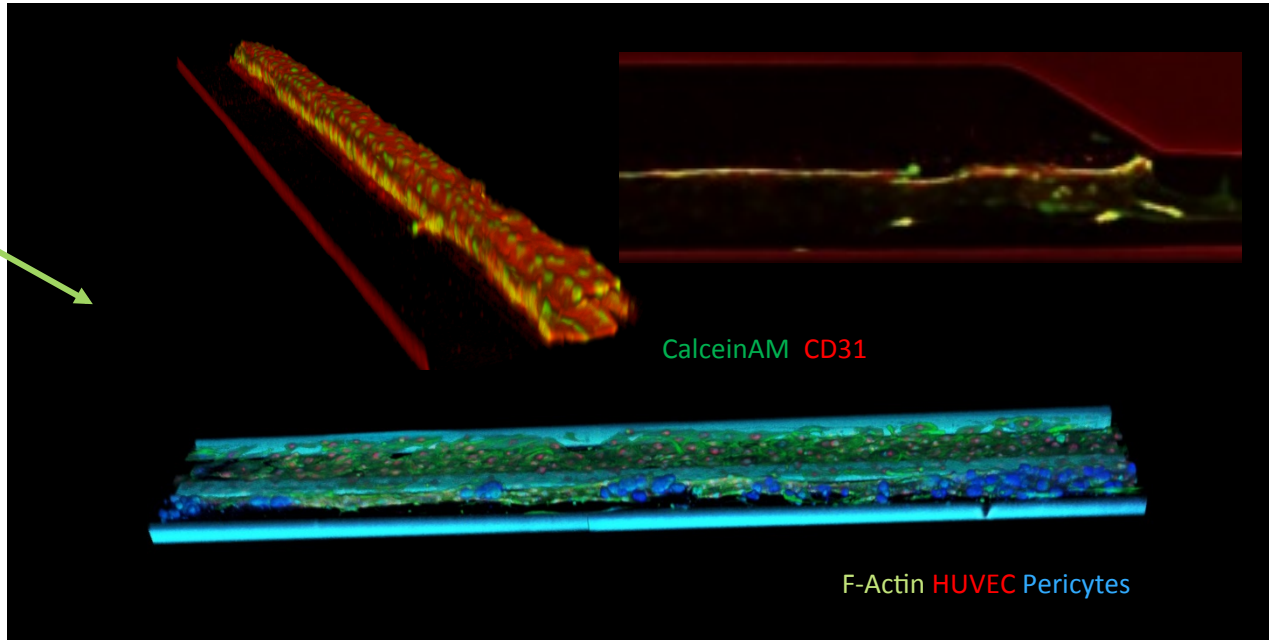
Collaboration Wilmer group

NC 3R[S] National Centre for the Replacement Refinement & Reduction of Animals in Research

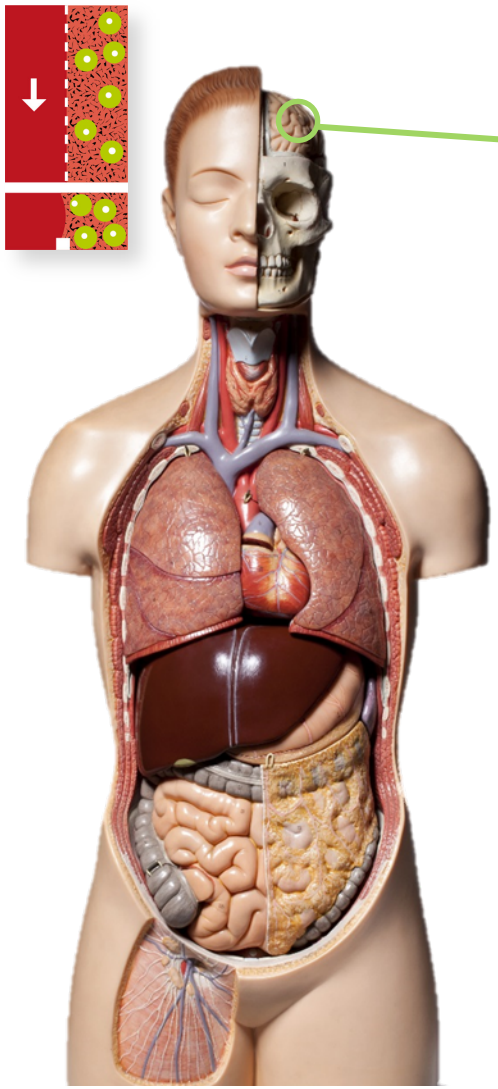
MIMETAS
the organ-on-a-chip company

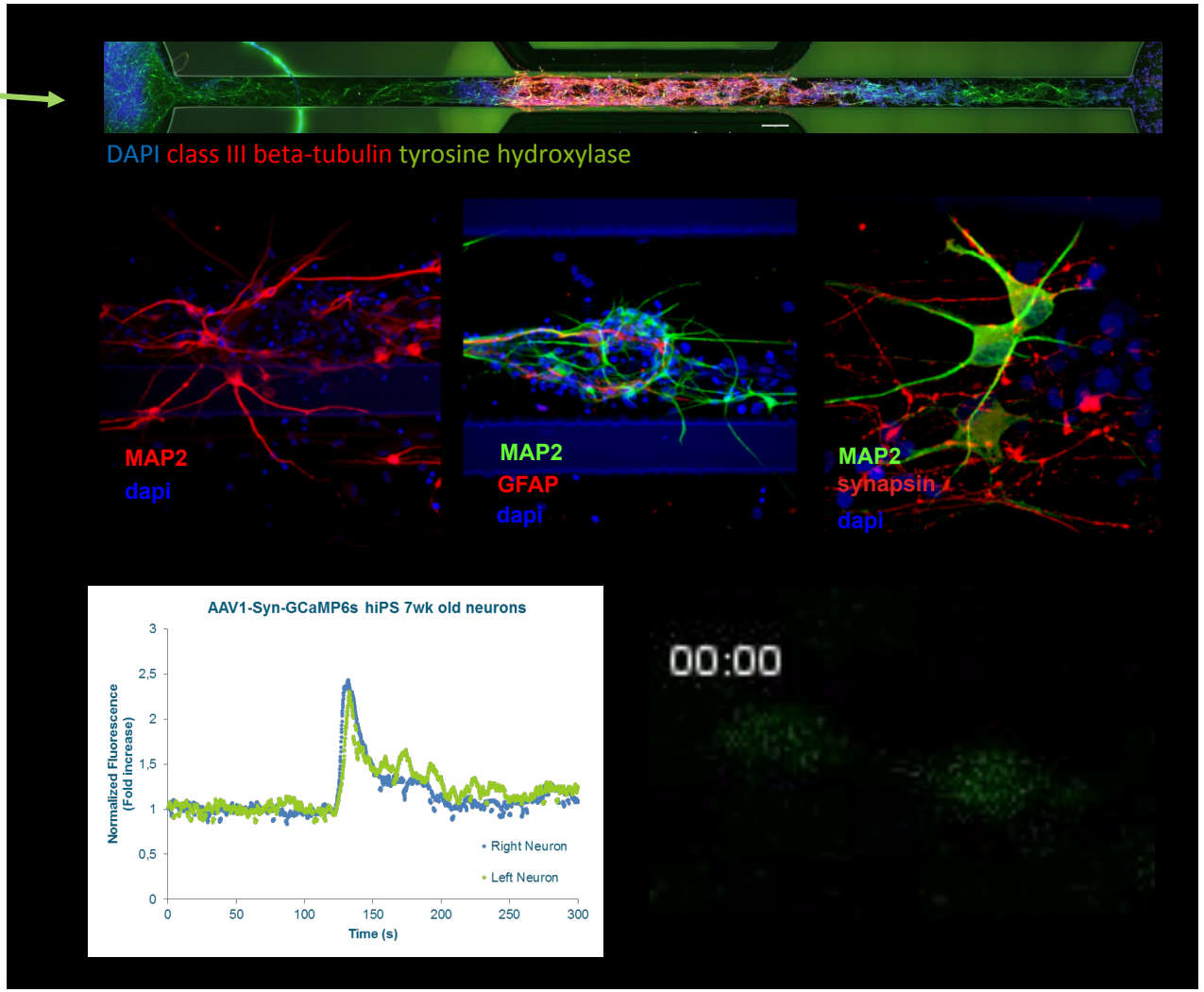
Blood vessels, capillaries





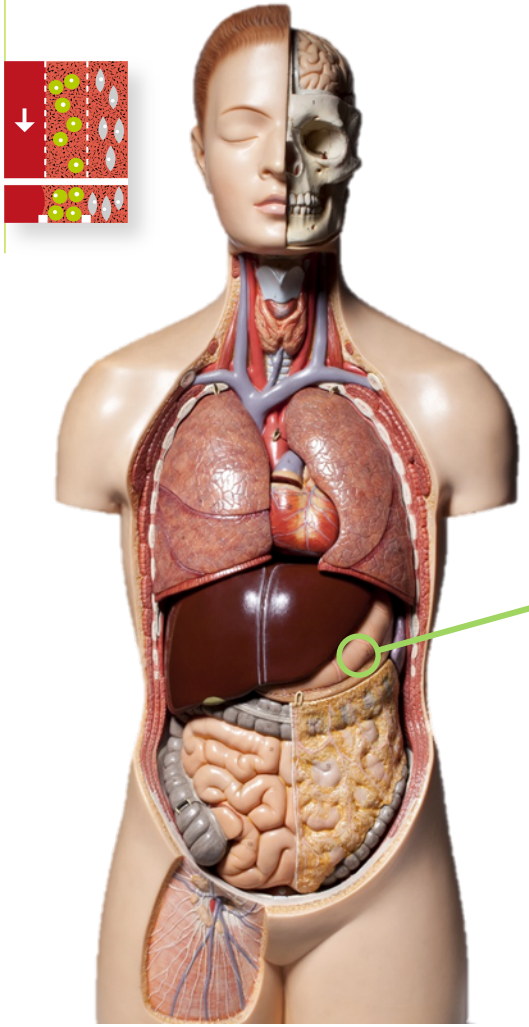
Brain, neurons

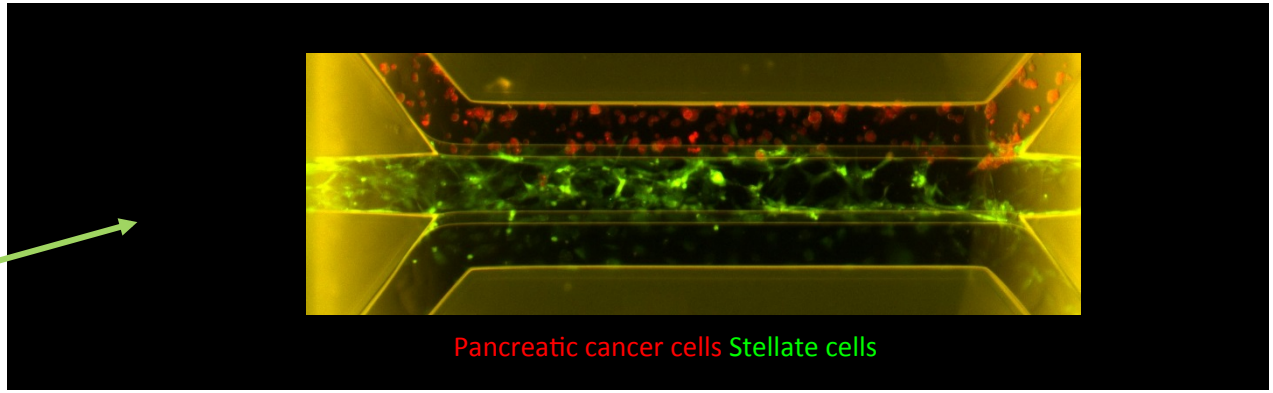




Collaboration Kushner group, Fleming group

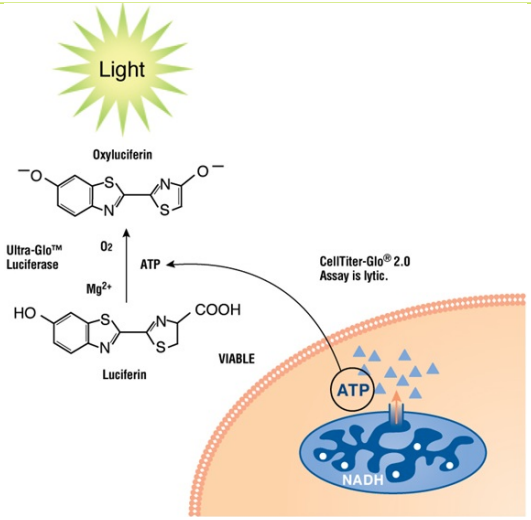
Cancer



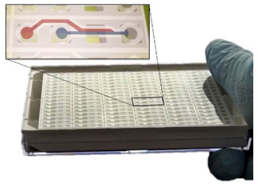


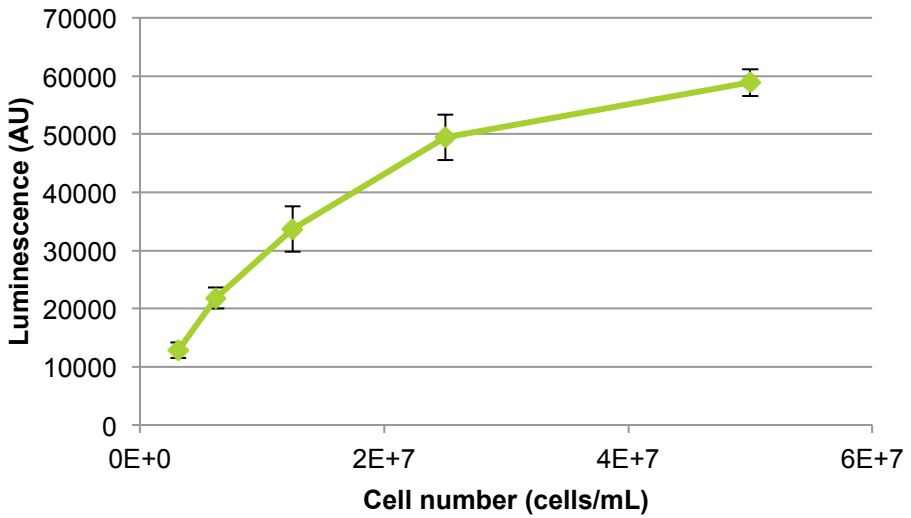
Collaboration Leenstra group, Buchholz group

Cell viability: CellTiter-Glo®



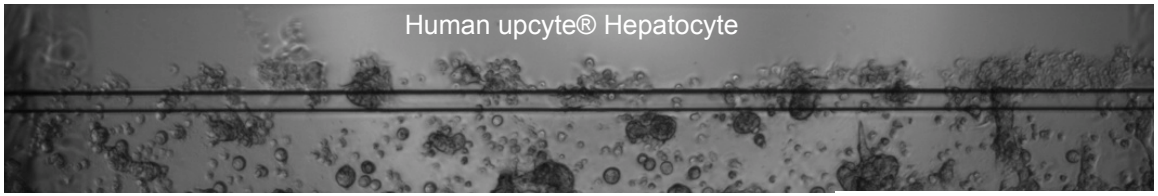
- Luminescent method for measuring for ATP in the OrganPlate™
- Different HepG2 cell densities
- Luminescence microplate reader



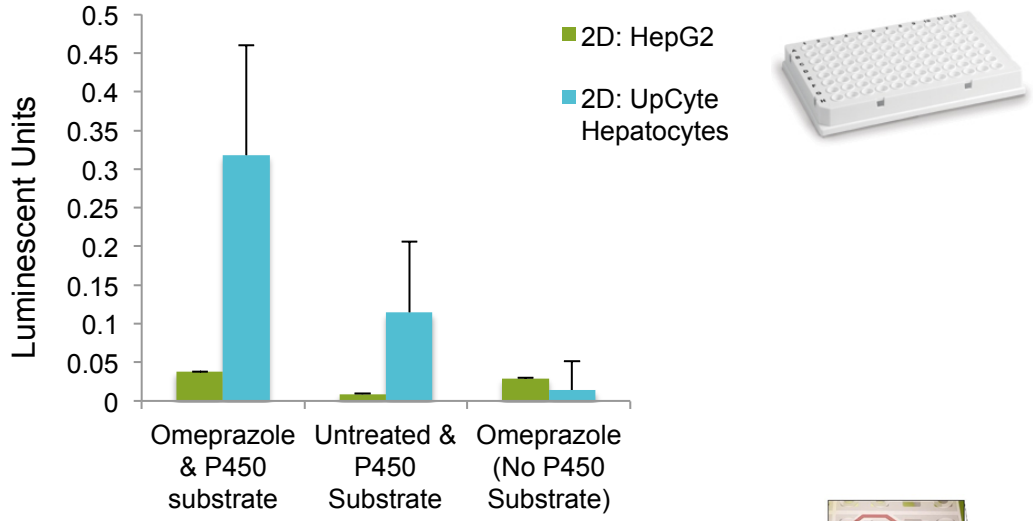


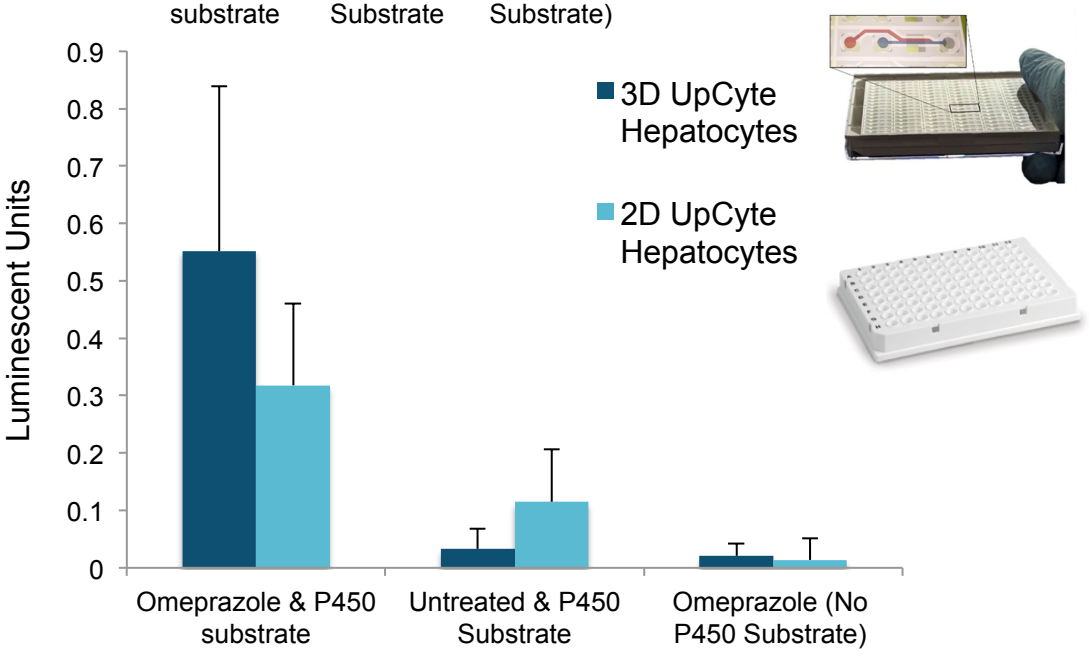
Drug metabolism: P450-Glo™ Assay

- Luminescent method for measuring cytochrome P450 activity (CYP enzyme)
- Treatment with 50mM Omeprozole for 72hrs
- Detection of CYP 1A2 metabolic activity with P450-Glo™ Assay
- Fluoroskan Ascent™ FL Microplate Luminometer (Thermoscientific)



P450 CYP activity





Pump-less perfusion	Increased tissue longevity
	Stable culture conditions
Co-culture	Complex, biomimetic models
Boundary formation	Epithelial function models
384-well format	Compatible with readers
	Suitable for automation
	Medium – high throughput
Glass bottom plate	Excellent optical properties
Design flexibility	Wide range of models
Low absorbance	Compound compatible

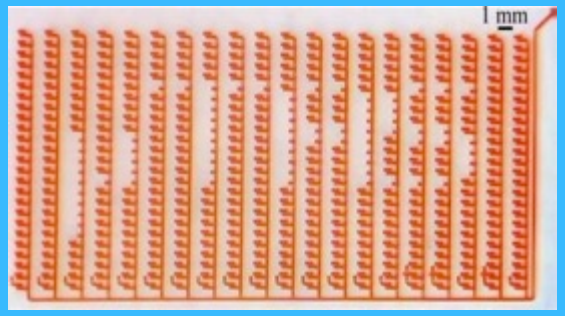
- Immunofluorescence
- Luminescence assays
  - Viability assays
  - Metabolic assays

MIMETAS in a nutshell

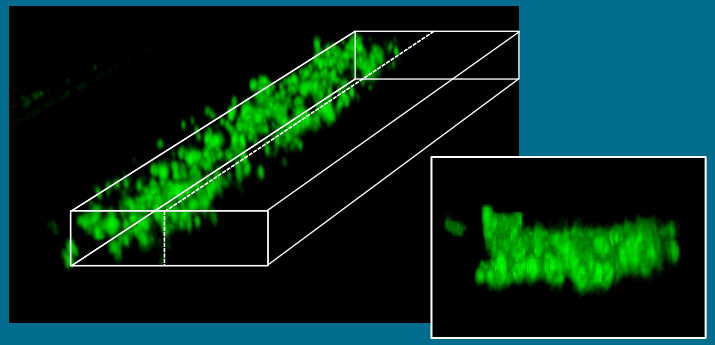
- Founded in 2011 by Paul Vulto and Jos Joore
- MIMETAS BV established in 2013 in Leiden, NL
- Microfabrication in Enschede
- MIMETAS Inc in Rockville, MD, USA

MIMETAS
the organ-on-a-chip company

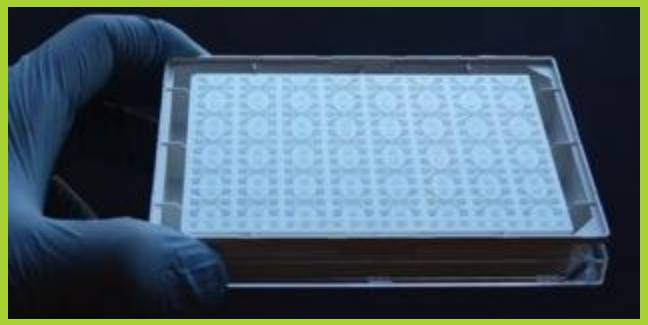
Massive parallel



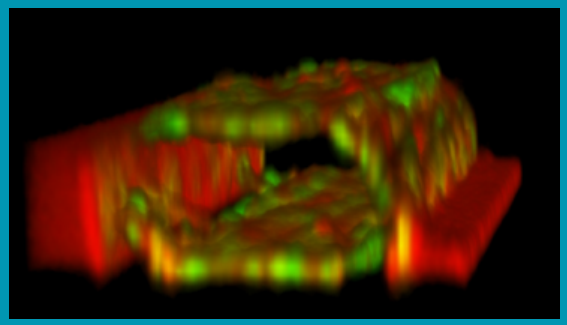
3D cell culture

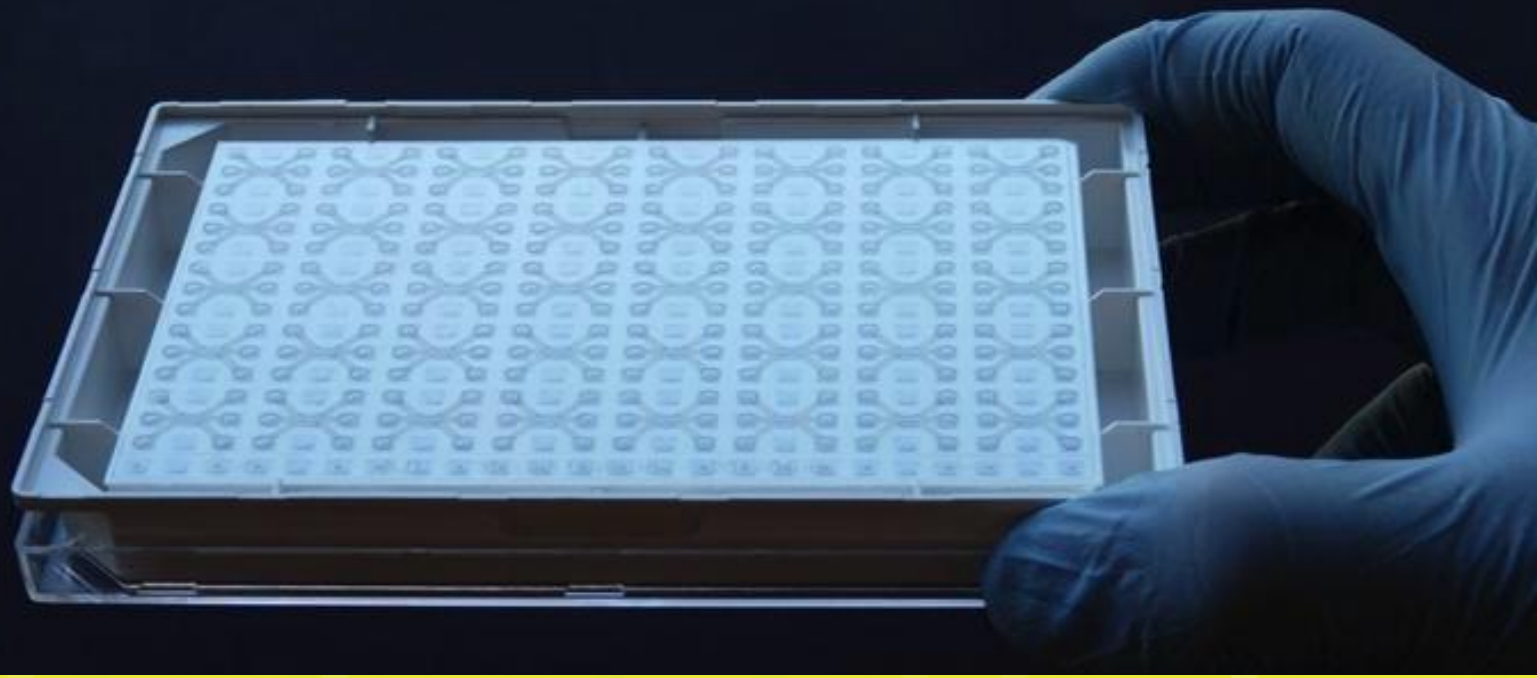


Compatible & affordable



Biomimetic





MIMETAS

the organ-on-a-chip company

k.wilschut@mimetas.com

www.mimetas.com