AIM BIOTECH
ADVANCED • INTEGRATED • MICROFLUIDICS

Institute of Molecular and Cell Biology
A*STAR

3D Human Biology-On-A-Chip. Now as a Service.

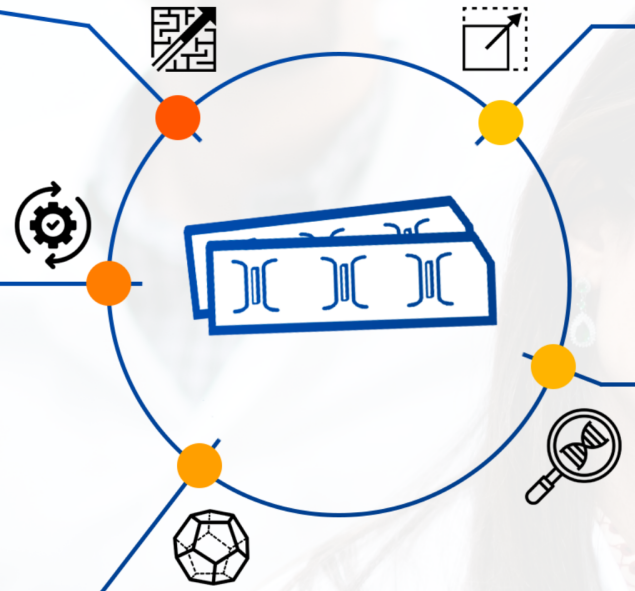
Lead optimization *Toxicology Screening* *Molecular Research*

Simplicity

Simply-designed tools compliant with standard cell culture laboratories

Scalability

From a few experimental tests to high-throughput screening



Efficiency

Insightful results in a fractional time and cost of comparable animal work

Biological relevance

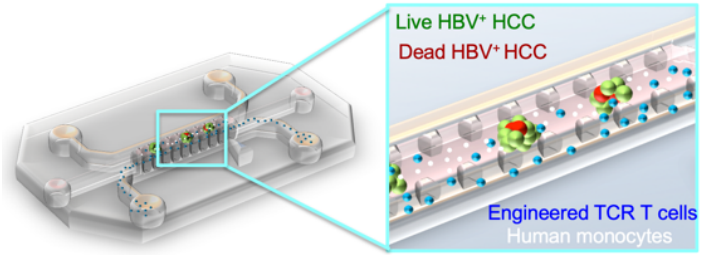
Human-focused models recapitulate the uniquely human microenvironment

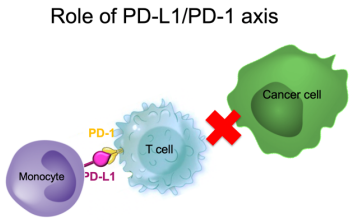
Mimic complexity

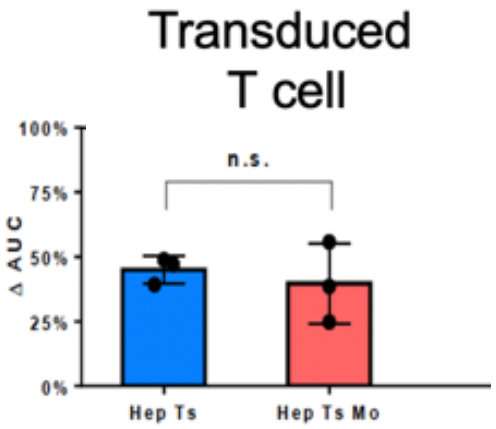
Model the interplay between controlling cells and environmental cues

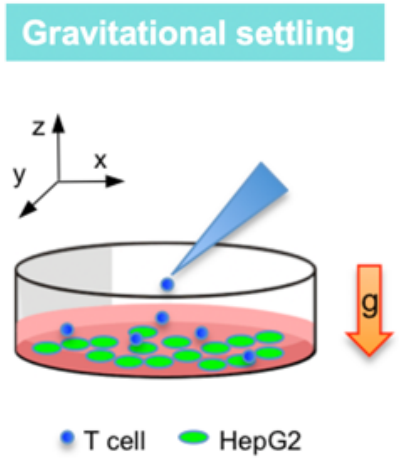
"Because human data can't wait for clinical trials."

Application 1/6: Immune checkpoint assay for PD-1/PD-L1

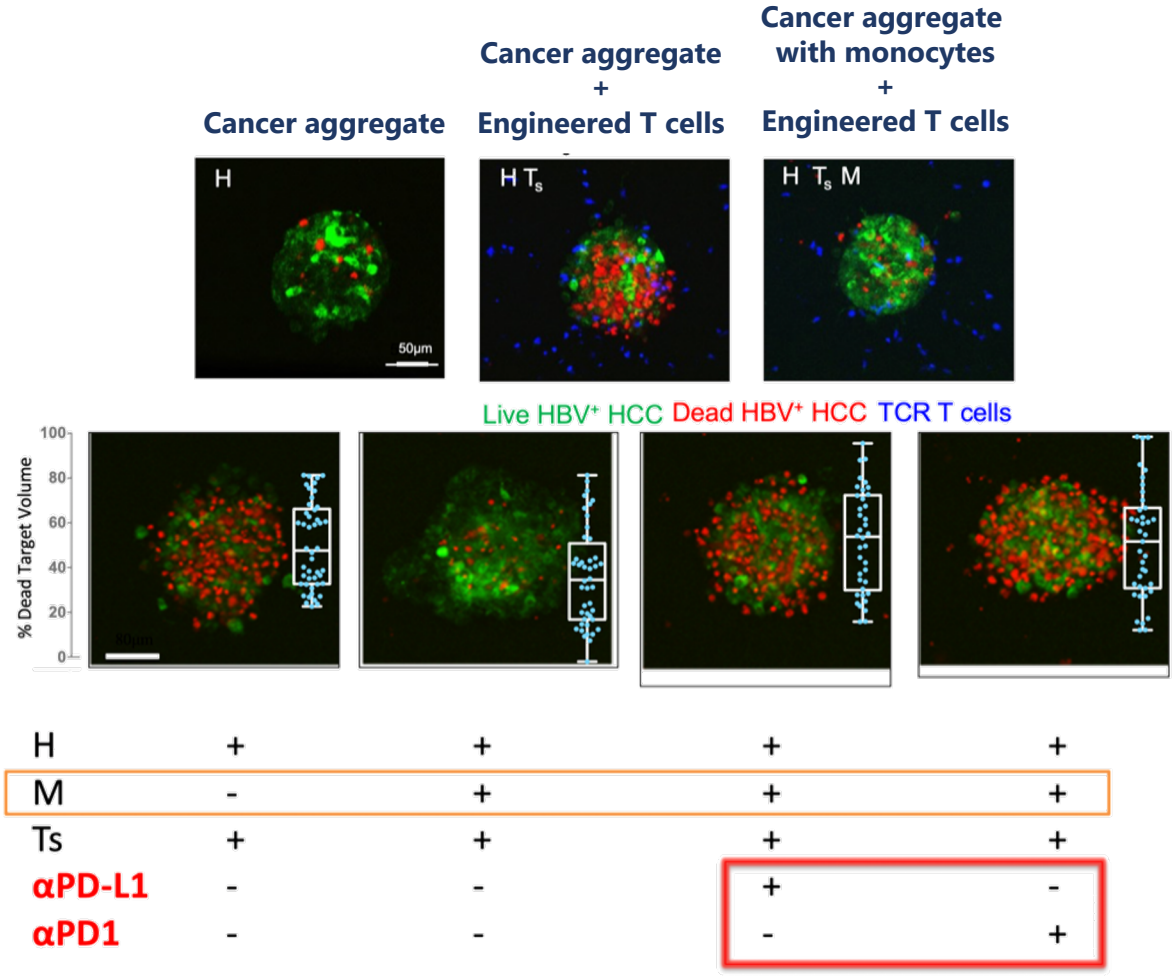








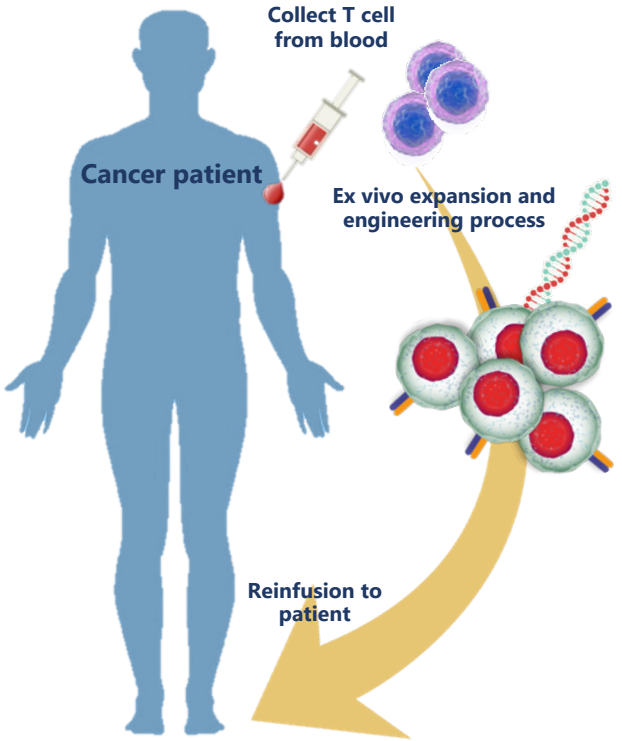
2D impedance assay is not able to highlight the impact of monocyte due to gravitational settling of effector cells against target cells

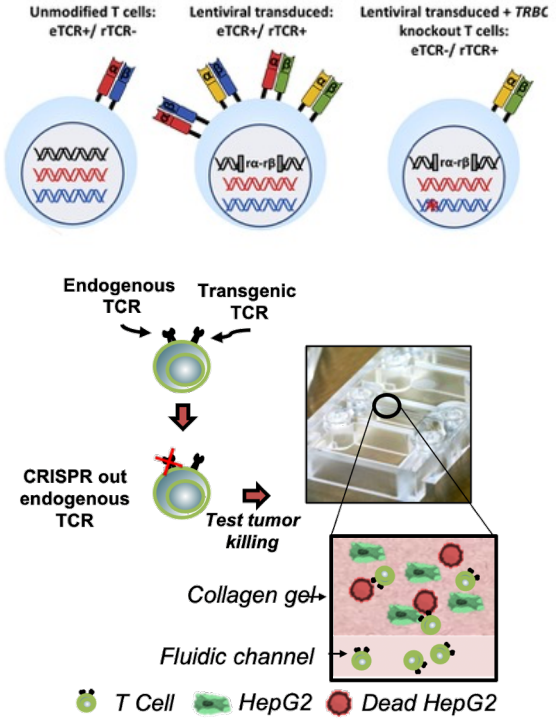


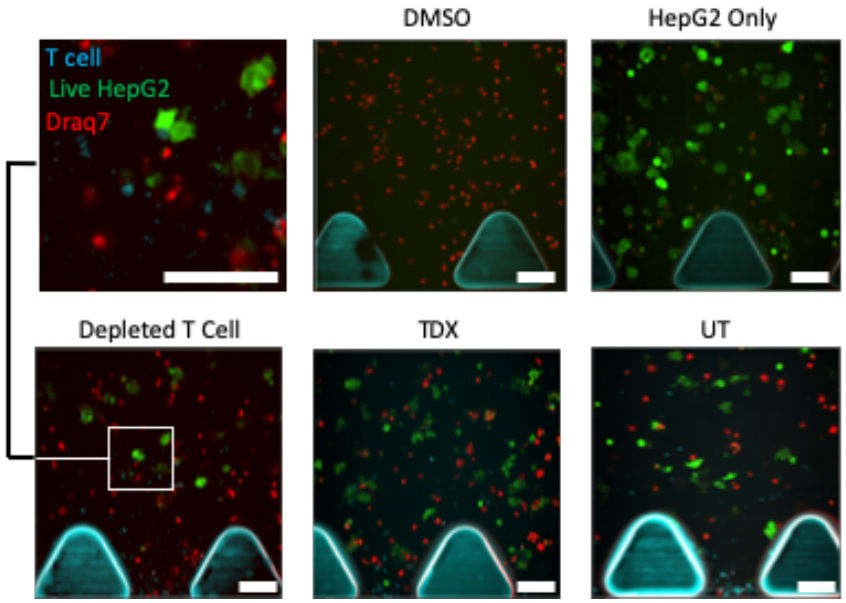
The 3D assay is showing the impact of immunosuppressive monocytes in the tumor microenvironment. This model can be used to test combinations of immune checkpoint inhibitors.

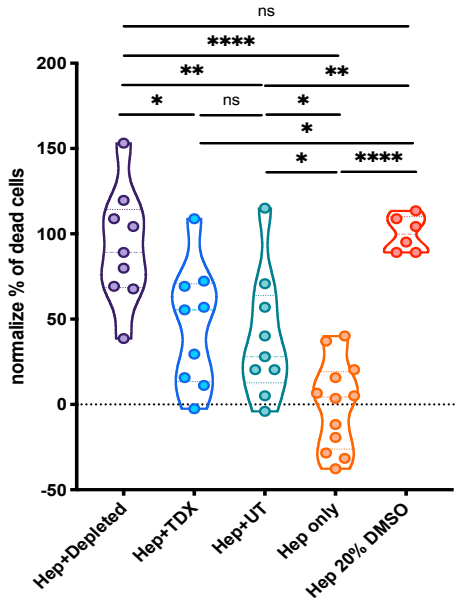
Adriani et al. (2018). Frontiers in Immunology

Application 2/6: Killing efficiency assay for adoptive cell therapy







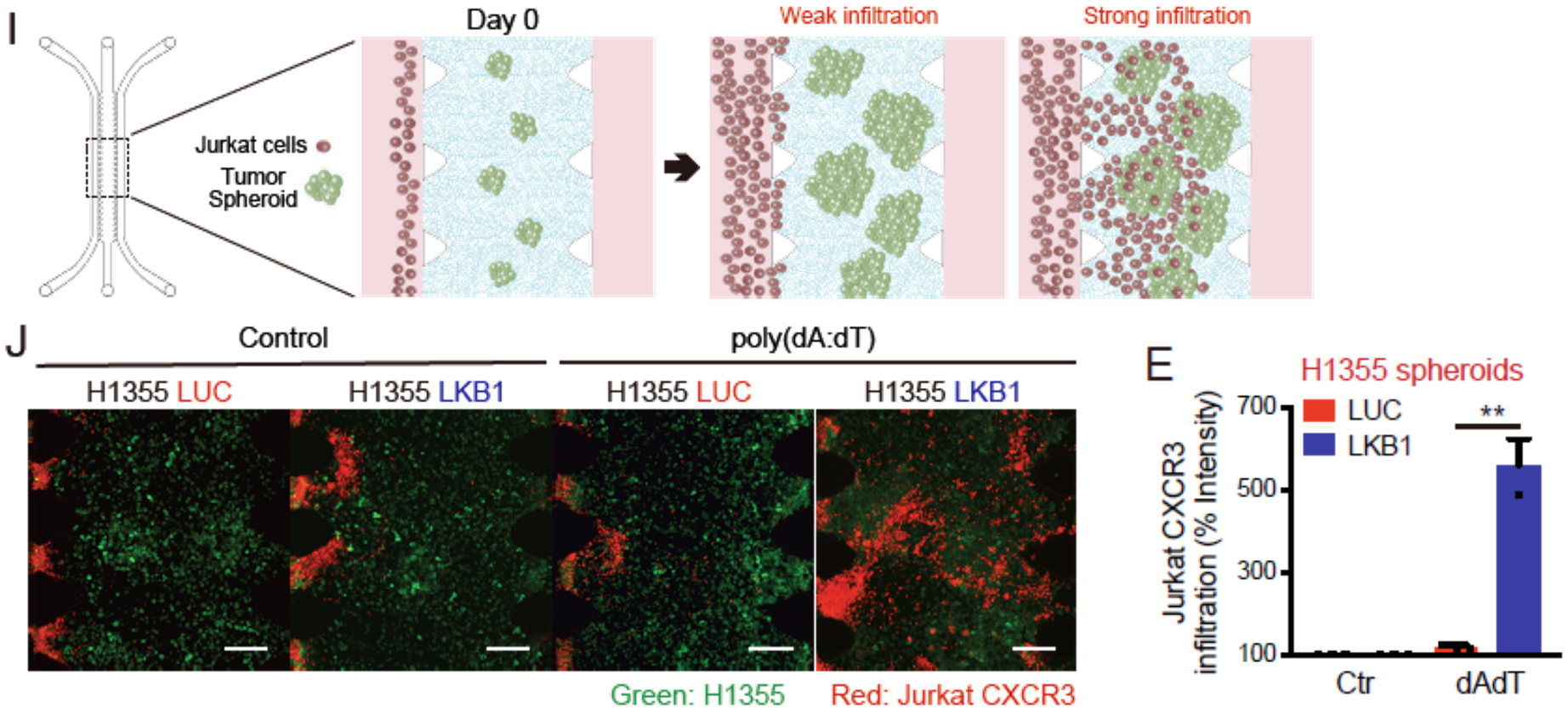


- **Robust *in vitro* models**
- **Quality Control (QC) tools**
- **Pre-clinical test for polytherapy**
- **Testing killing efficiency against solid tumor**

Targeted disruption of eTCR and discriminatory enrichment of antigen specific T cells offers the prospect of enhanced T cell therapy

Preece at al. (2020). Molecular Therapy.

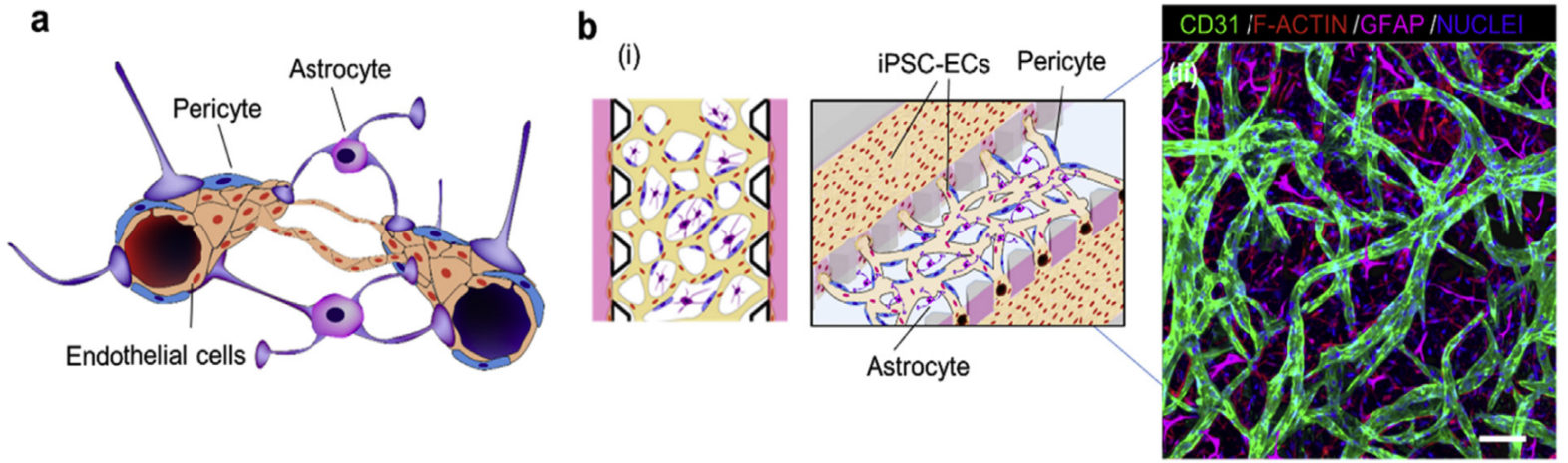
Application 3/6: Immune cell infiltration assay

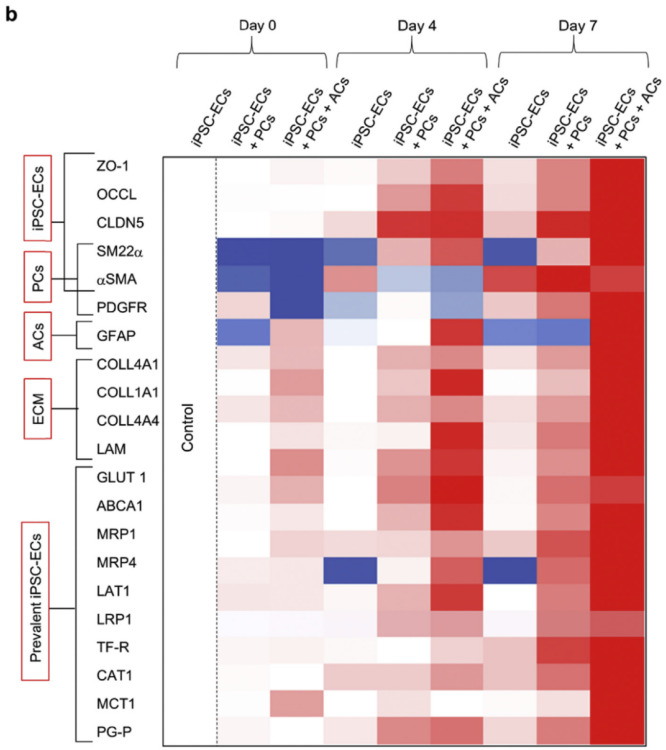


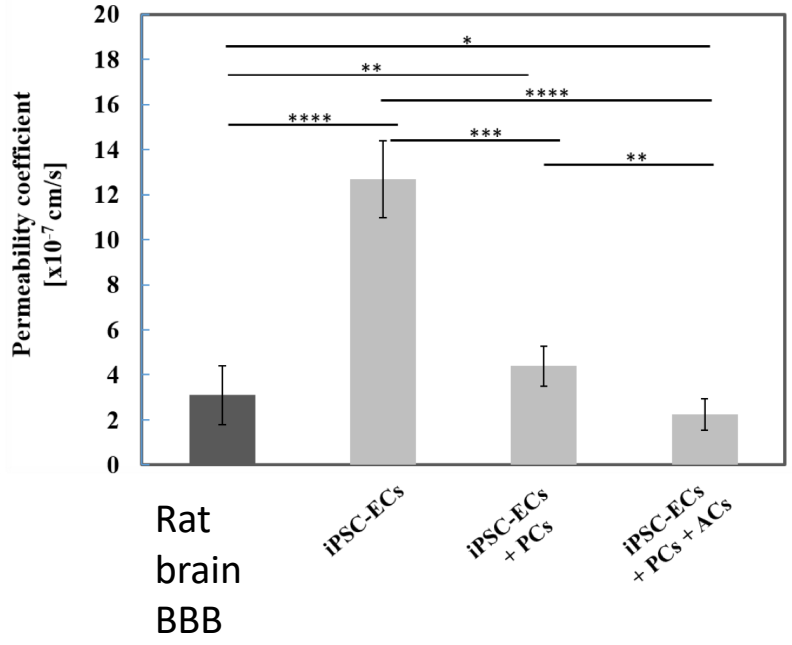
H1355, a KRAS-driven lung cancer cell line that lacks LKB-1 and PD-L1 expressions and it does not attract immune cells. The reconstitution of LKB1 in H1355 lung cancer cell line leads to higher degree of immune cell infiltration in AIM chips which supports the *in vivo* observation that LKB1+ patients have higher number of infiltrated T cells in the tumors.

Kitajima et al. (2018). Cancer Discovery

Application 4/6: Blood-Brain Barrier (BBB) assay



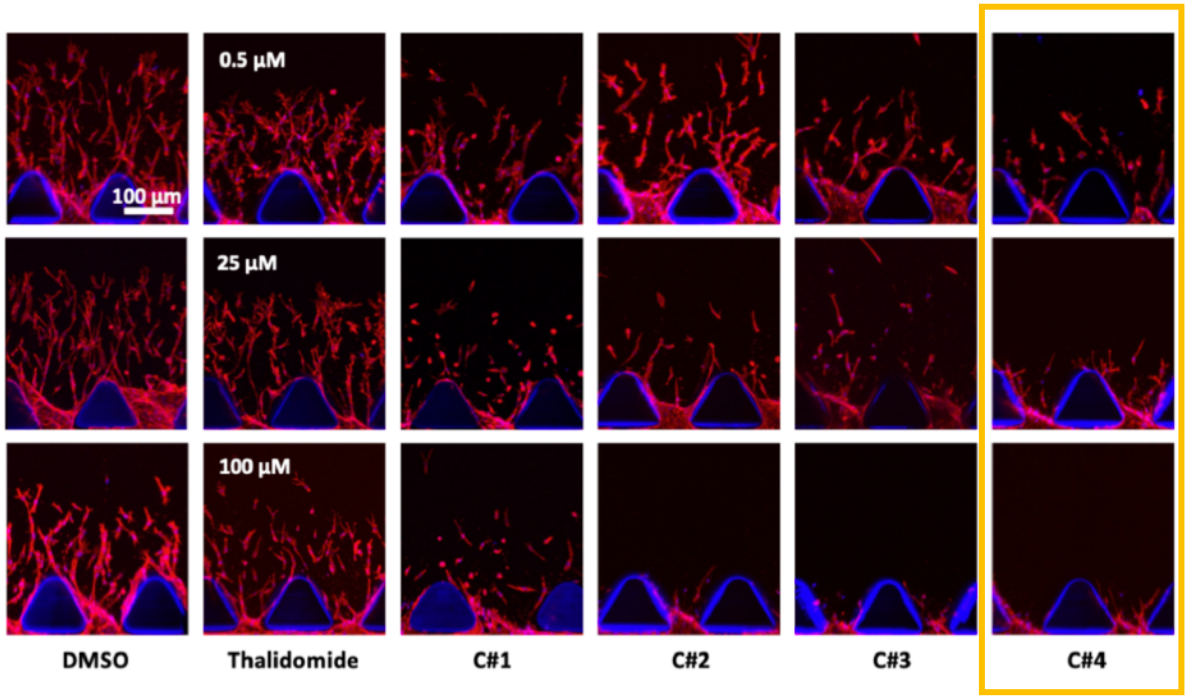


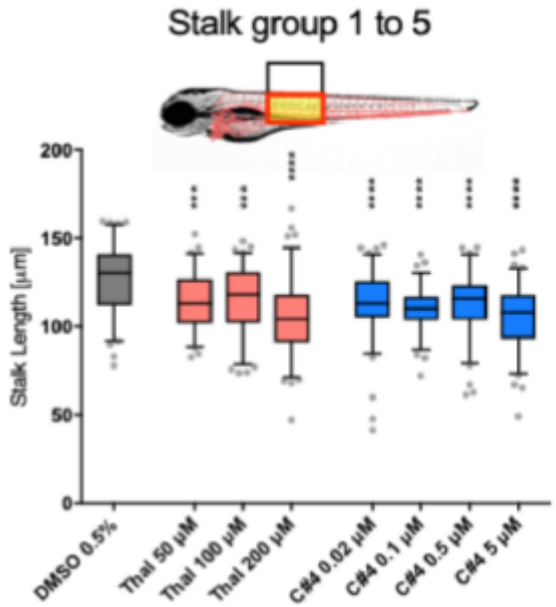


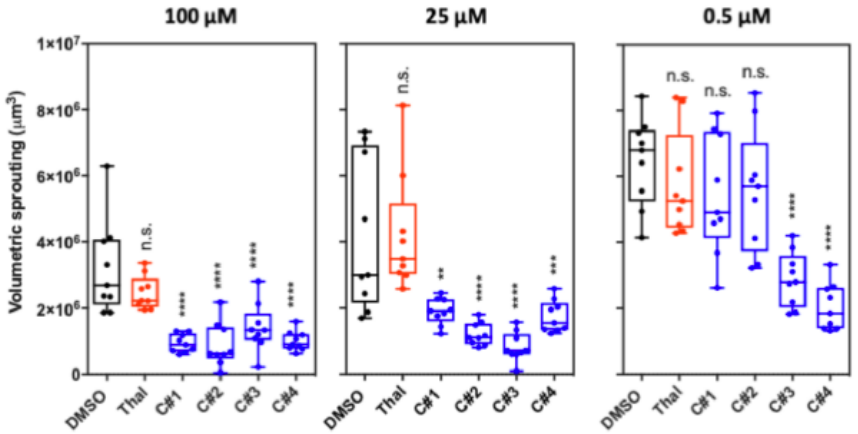
- **Formation of BBB model using brain pericytes, astrocytes and endothelial cells**
- **Transporter genes were upregulated over 7 days in culture. The resulted microvascular network achieved a permeability level as low as *in vivo* BBB's value**

Campisi et al. (2018). Biomaterials

Application 5/6: Angiogenesis assay



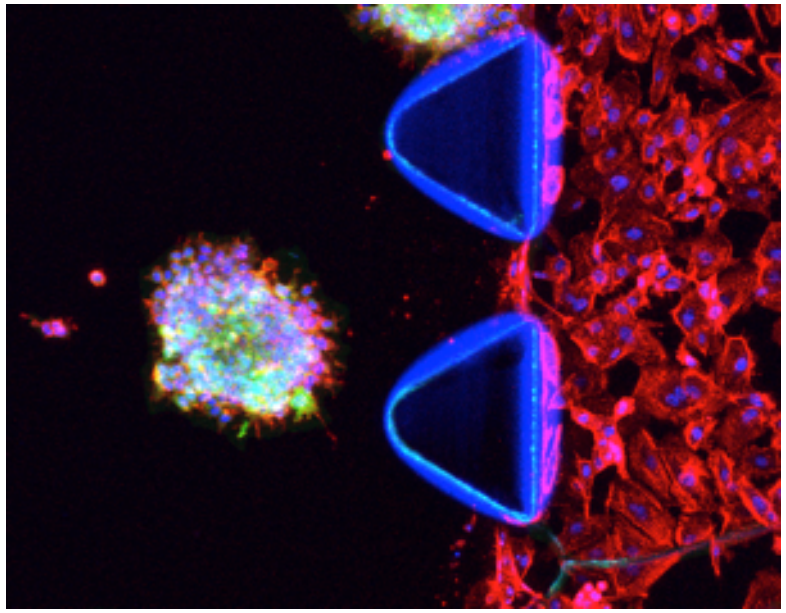


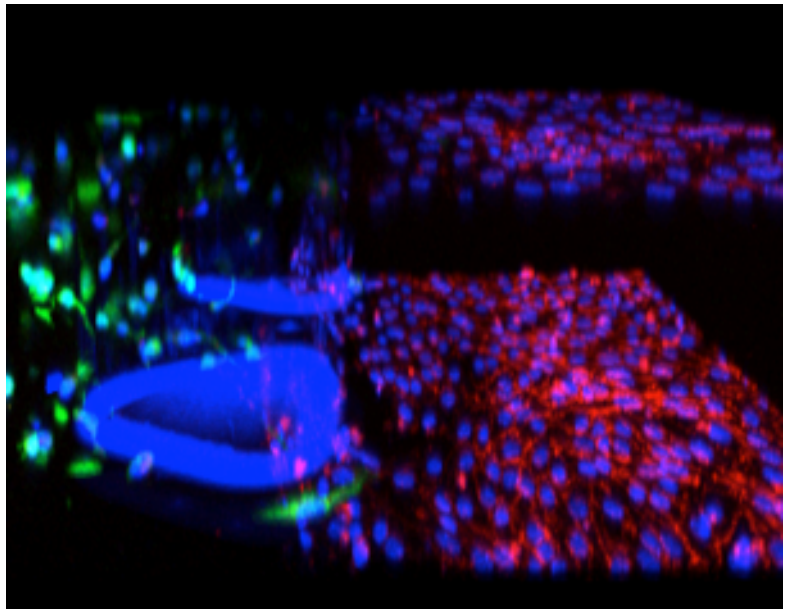


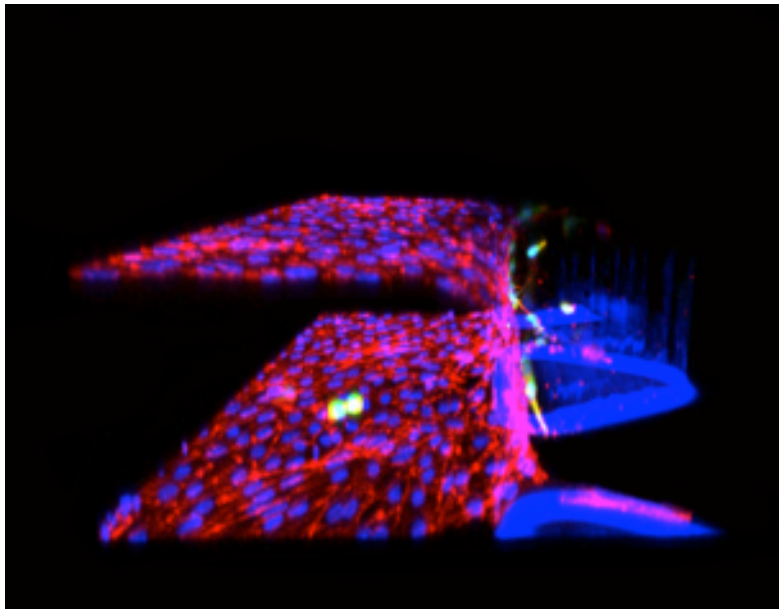
The anti-angiogenic effects of compound 4 (C#4), a phthalimide derivative in AIM chips were validated against the zebra fish models.

Mercurio et al. (2019). Frontiers in Pharmacology

Application 6/6: Metastasis assay







Dissemination ***Intravasation*** ***Extravasation***

Metastasis is a multi-stage event that involves dissemination/local invasion, intravasation and extravasation of cancer cells. Each event can be modelled separately in AIM 3D Cell Culture Chips.

Aref et al. (2013). Integrative Biology; Zervantonakis et al. (2012). PNAS; Bersini et al. (2014). Biomaterials