INVENTIA
LIFE SCIENCE

Produce your own 3D cell models in minutes

Tailored to meet the needs of your drug discovery or disease research, RASTRUM™ makes complex biology more accessible. Explore biology in 3D by recreating dynamic tissue microenvironments and studying realistic cell behaviors under phenotypically relevant conditions. Advance disease understanding and accelerate therapeutic discovery with customizable disease-specific models, precise drug profiling, and scalable, reproducible drug screening.

Getting started with the RASTRUM platform

RASTRUM streamlines your 3D cell model development from start to finish. A library of tissue-relevant matrices, pre-validated architectures and printing protocols, enabled by our workflow-driven software to make getting started easy.

1 Select matrix

Stiffness selection

Storage Modulus (kPa)

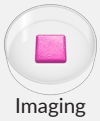
Peptide selection

- RGD: Fibronectin
- YIGSR: Laminin β
- GFOGER: Collagen I
- YSNS: Collagen IV

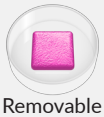
Additive selection

- Hyaluronic Acid
- Fibronectin
- Laminin

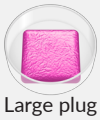
2 Select model architecture



Imaging model



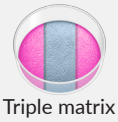
Removable model



Large plug model

Screening model

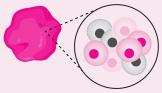
Dual matrix model



Triple matrix model

Mematix model

3 Prepare your cells

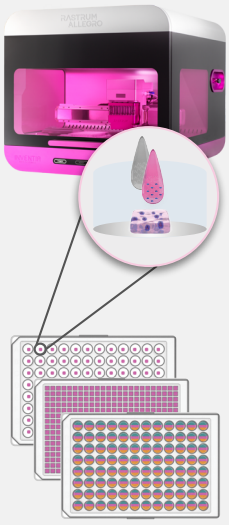


Patient-derived cells

Induced pluripotent stem cells (iPSCs)

Immortalised cells

4 Print cell models



Standard well plates

5 Perform downstream analysis

Perform in situ analysis

- Biochemical assays
- Viability
- Imaging (high-content, live)
- Immunohistochemistry
- Immunofluorescence
- Dose-response curves
- RNAi knockdown

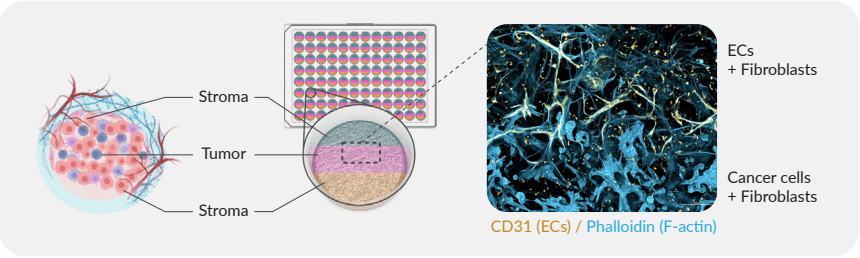
Recover cells for analysis

- Single cell sequencing
- RNA-seq
- Protein analysis
- RNA/DNA analysis
- Flow cytometry

Explore RASTRUM's capabilities

Reproducibly model the tumor-stroma interface

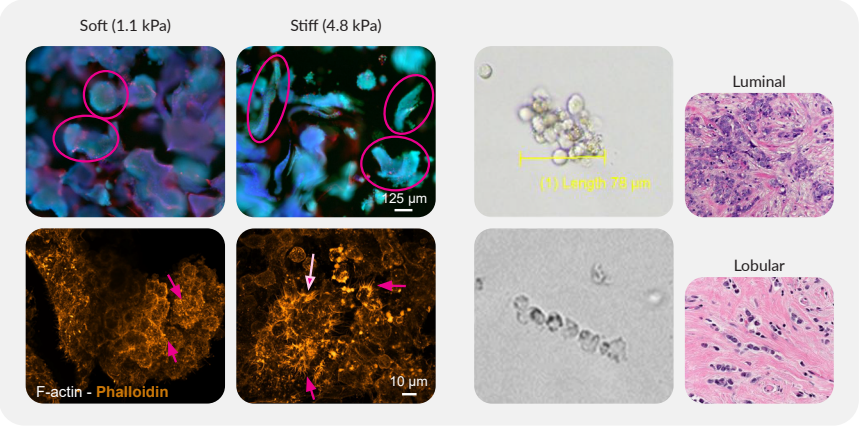
Create complex models that generate a tissue-like tumor-stroma interface to study cell population crosstalk, tumor growth, progression, metastasis, and drug screening.



In vitro model of the tumour-stromal interface. A co-culture of primary normal human lung fibroblasts (NHLF cells) and primary human vascular endothelial cells (HUVECs) were printed to interface with A549 lung adenocarcinoma cells, using a triple matrix model architecture. Cell nuclei (purple) were labeled with DAPI, filamentous actin (blue) with phalloidin, and the endothelial marker CD31 (gold) with a protein-specific antibody, at day 9 post-printing.

Modulate the tumor microenvironment to study cancer cell phenotypes

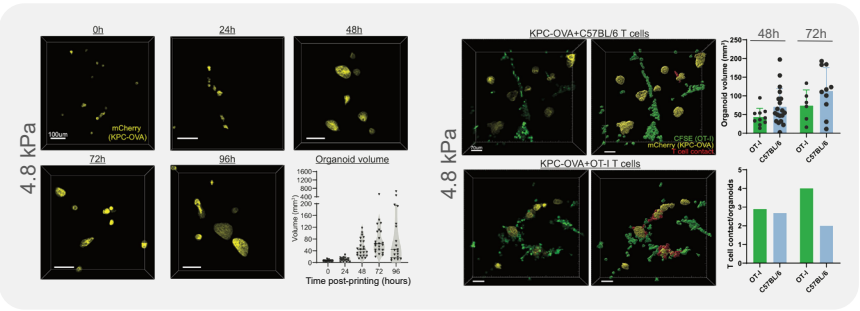
Tune matrix stiffness to mimic in vivo tumor microenvironments and gain deeper insights into cancer biology.



Control of the microenvironment to study cancer cell phenotypes. (Left panels) Culture of A2780 ovarian cancer immortalised cell lines were grown in 1.1 or 4.8kPa matrices grown for 7 days. Calcein staining (green: live cells), DAPI (blue: nuclei) and ethidium homodimer-3 (red: dead cells), Phalloidin (gold/brown: F-actin). When ovarian cancer cells are grown in a close-to-in vivo "stiff" environment, an increase in cell proliferation or metabolic activity is observed (data not shown), spheroid shape changes from round to elongated (pink circles), and actin stress fibers are formed (pink arrows). **(Right panels)** Patient cells from lumina (top) of lobular (bottom) breast cancers were cultured in RASTRUM matrices. After 10 days of culture, cells presented the same "cluster" or "single cell file" morphology as in vivo (H/E staining images). *Courtesy of Dr. McIlroy, Royal College of Surgeons, Ireland.*

Create functional 3D cell models with extended viability for testing of drug and novel therapeutic strategies

Create 3D cell models that replicate phenotypically relevant environments, extend cell viability, and demonstrate key functional characteristics. These models enable robust drug discovery and screening by providing accurate platforms for evaluating efficacy, toxicity, and metabolism.



Interactions between cancer cells and immune cells in pancreatic cancer. KPC-OVA/mCherry cells were printed in an optimized RASTRUM matrix containing pancreas-specific extracellular matrix (ECM) peptides and proteins. Organoids were cultured for 7 days post-printing before measurement **(left)** or 2 days and then co-cultured with CFSE-labelled activated T-cells from OT-I or C57BL/6 mice (right) before organoid volume measurement and T-cell contact/organoids counting. *Courtesy of Aji Istadi, Dr. Sean Porazinski and A/Prof. Marina Pajic at Garvan Institute of Medical Research, Sydney, Australia.*

Additional applications

- **Generation of patient-derived organoid 3D breast cancer models.** Bock et al., 2023, Pharmaceutics, doi.org:10.3390/pharmaceutics15010261
- **Generation of 3D human iPSC-derived neuron-astrocyte co-culture models.** Whitehouse et al., 2023, JOVE, doi:10.3791/65856
- **Study cancer cell migration in 3D.** Jung et al. 2022, Biomaterials Science, doi.org:10.1039/d2bm00651k
- **Functional 3D liver model for toxicology assessment.** Yee et al., 2024 STAR Protocols, doi.org:10.1016/j.xpro.2024.103234

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