

# 3D Tumor Models for Immuno-Oncology Assays

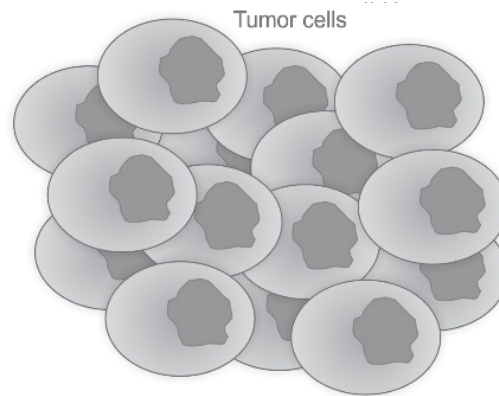
Cleo Goyvaerts & Karine Breckpot  
Laboratory for Molecular and Cellular Therapy  
Department of Biomedical Sciences  
Vrije Universiteit Brussel

Supported by: Fund Jean René Maisin

# Tumors

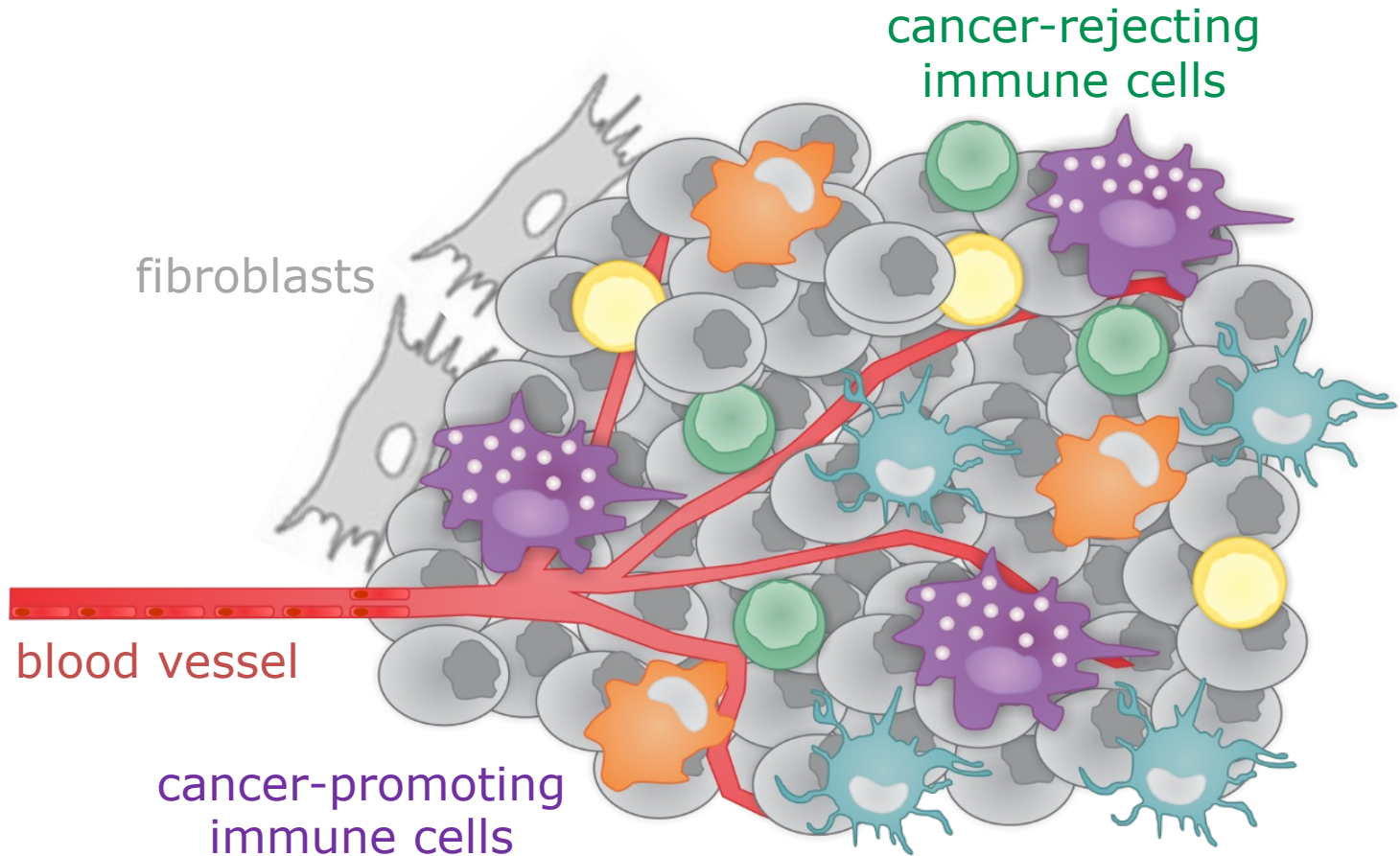
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**complex tissues that interact with host cells**

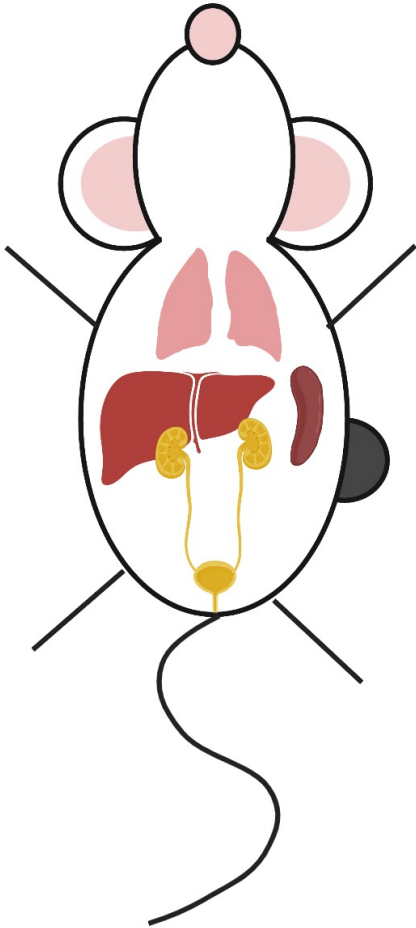


# Tumors

**complex tissues that interact with host cells**

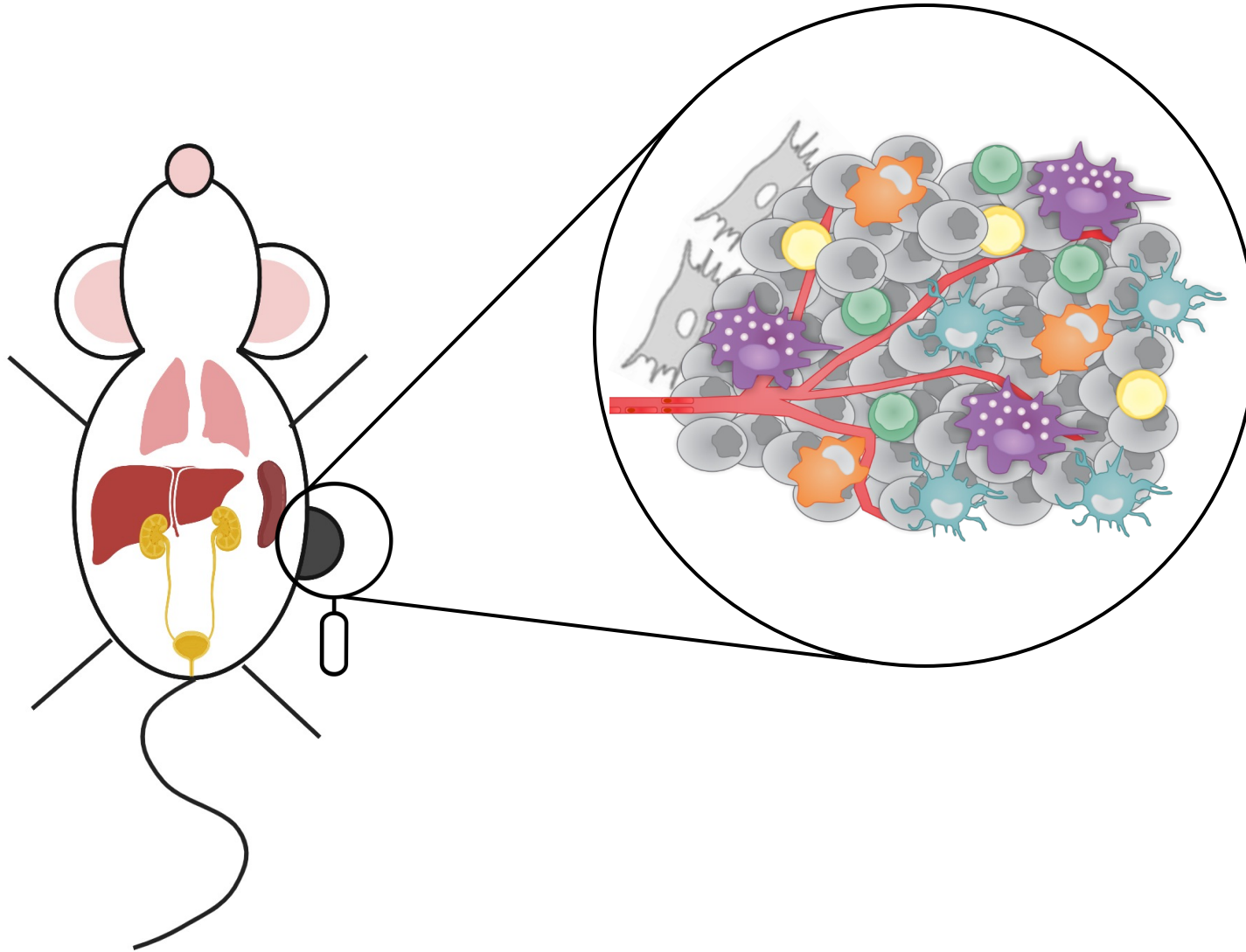


# Immune-oncology research models

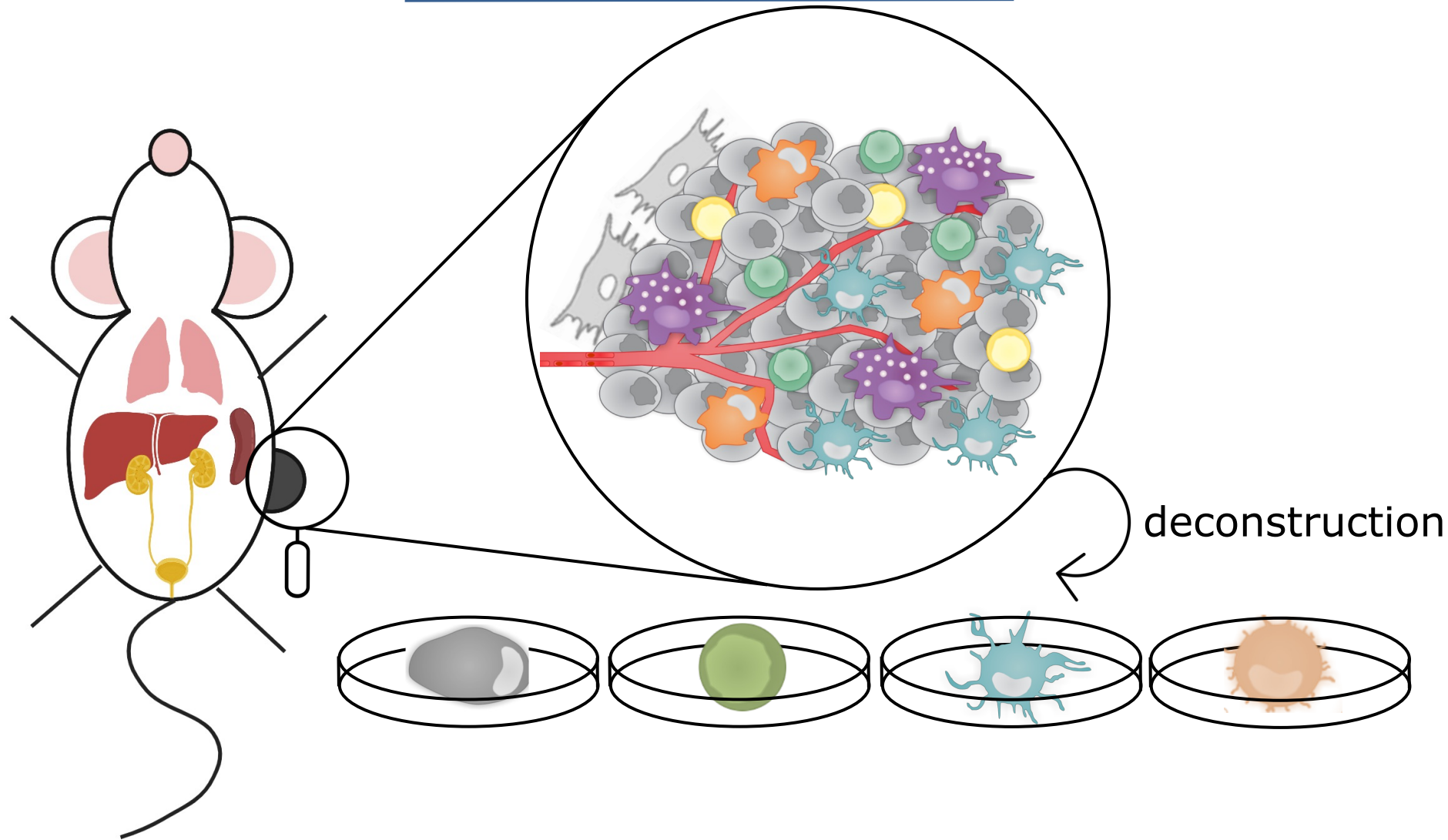




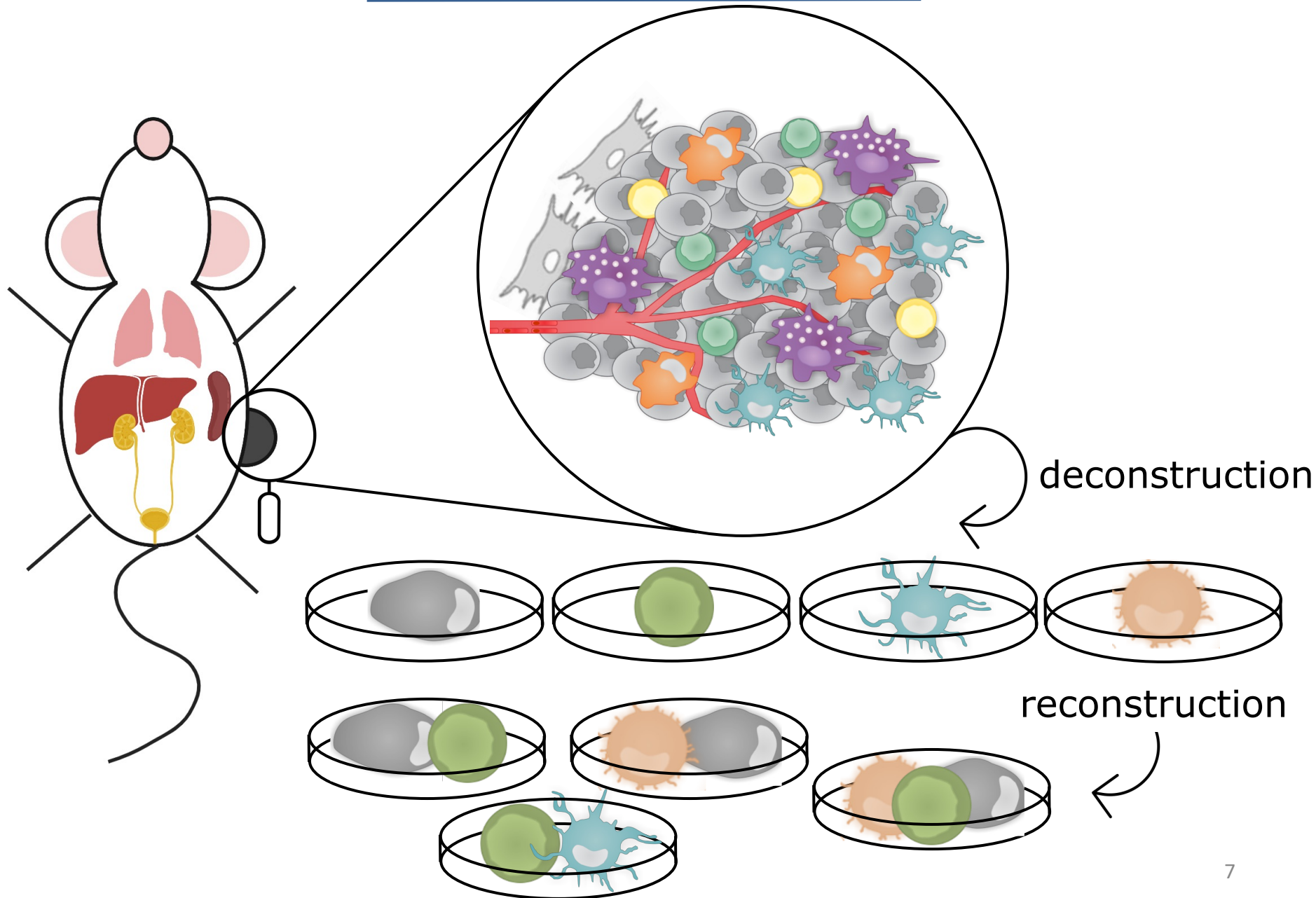
# Immune-oncology research models



# Immune-oncology research models

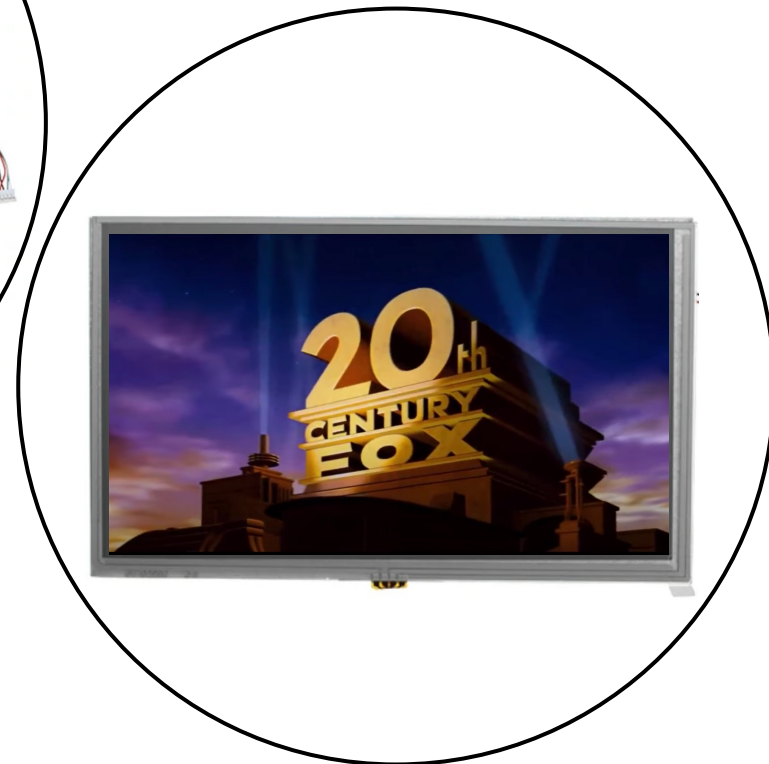
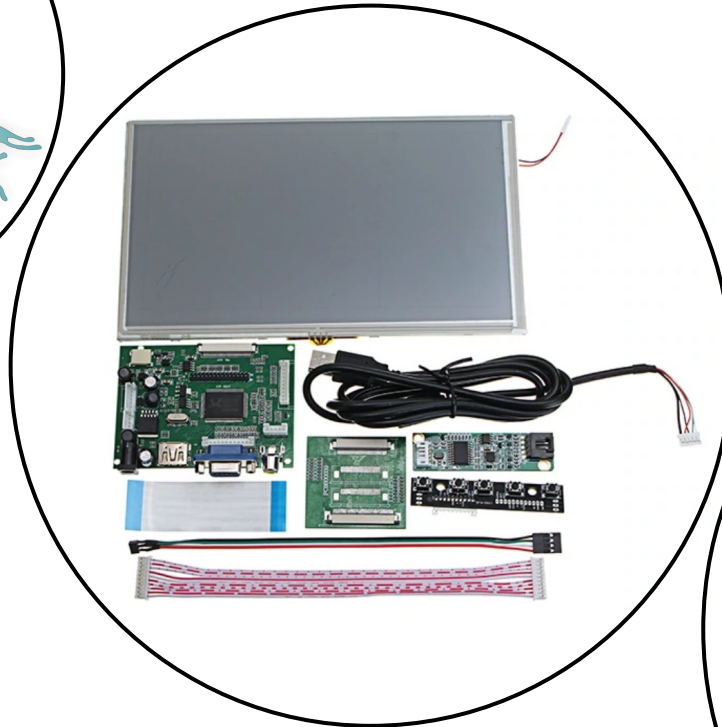
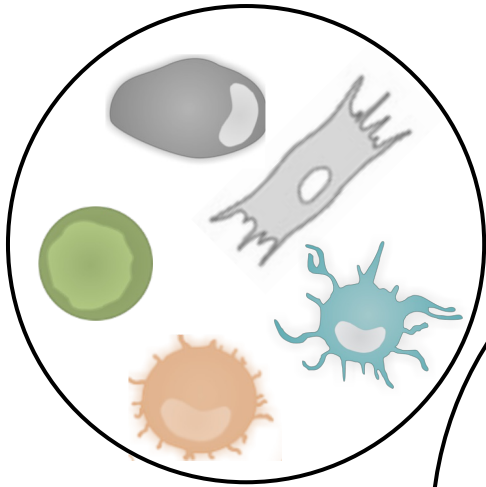


# Immune-oncology research models



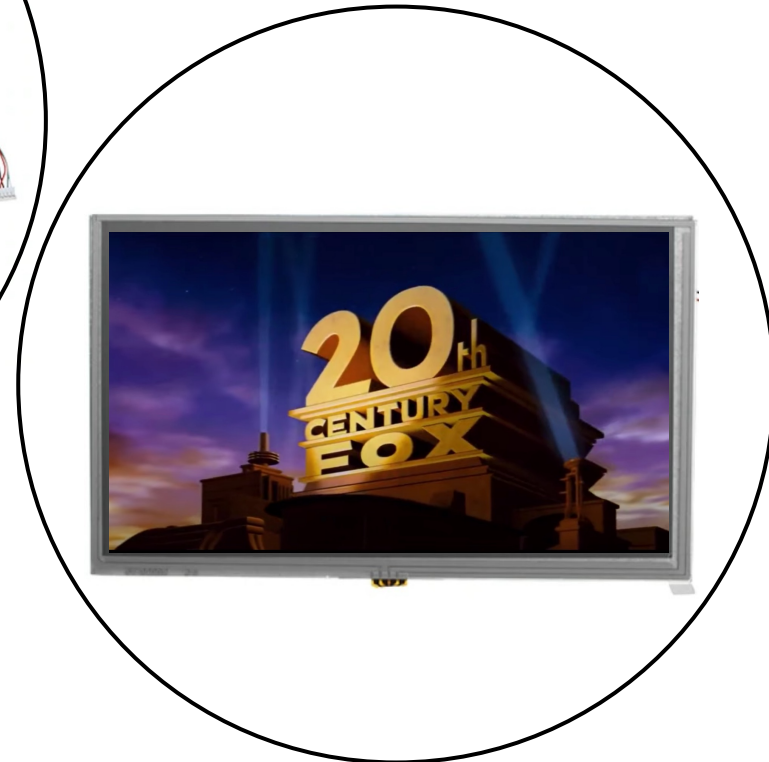
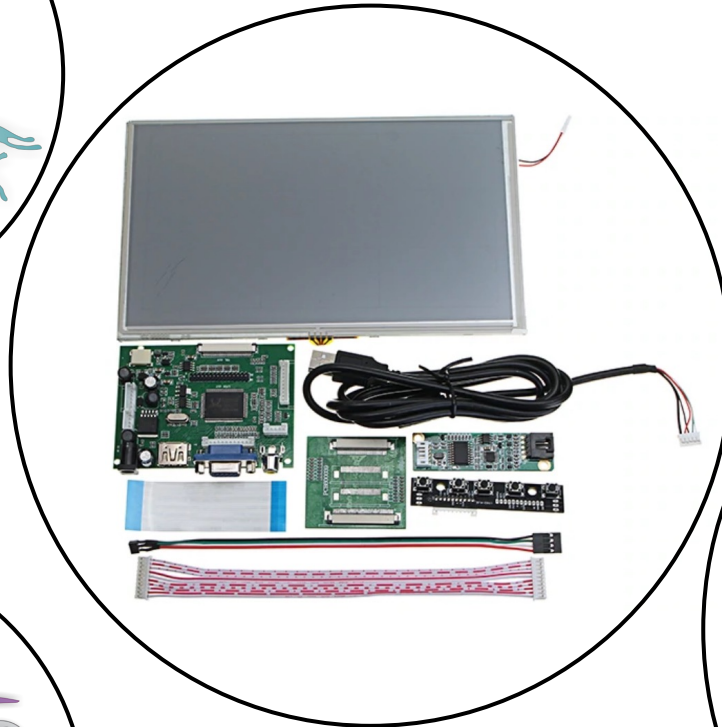
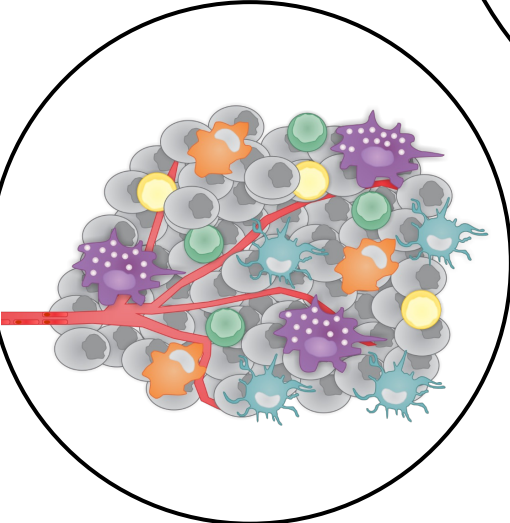
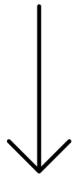
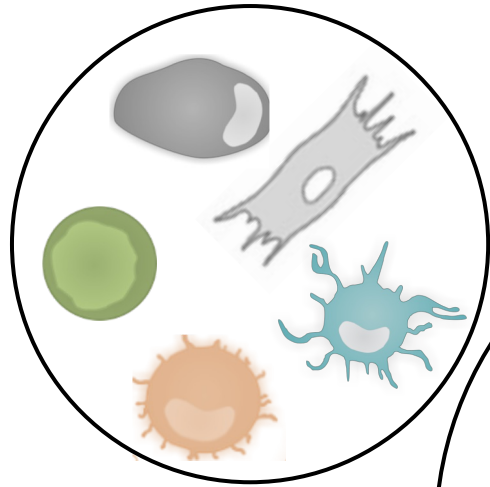
# Immune-oncology research models

## 3D models



# Immune-oncology research models

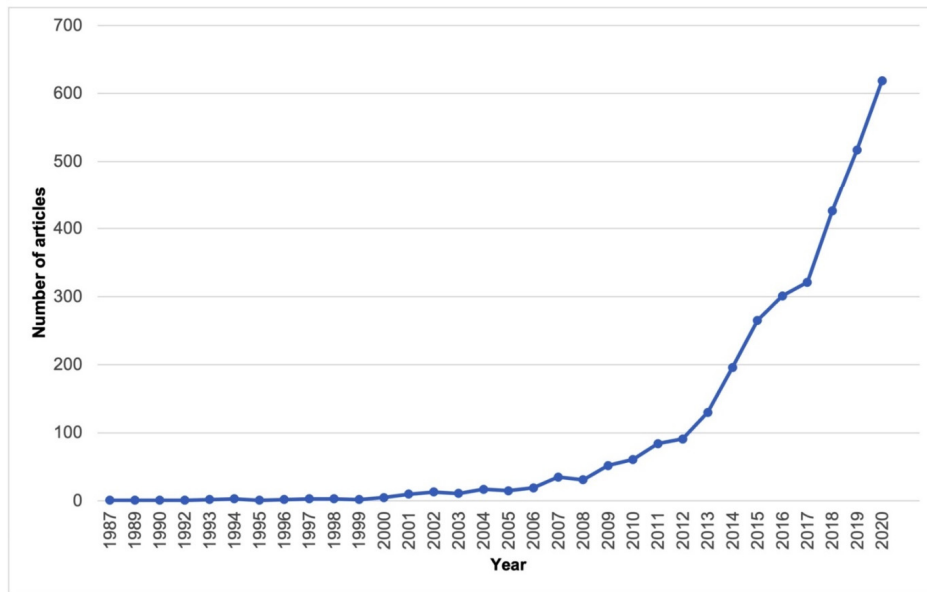
## 3D models



# Immune-oncology research models

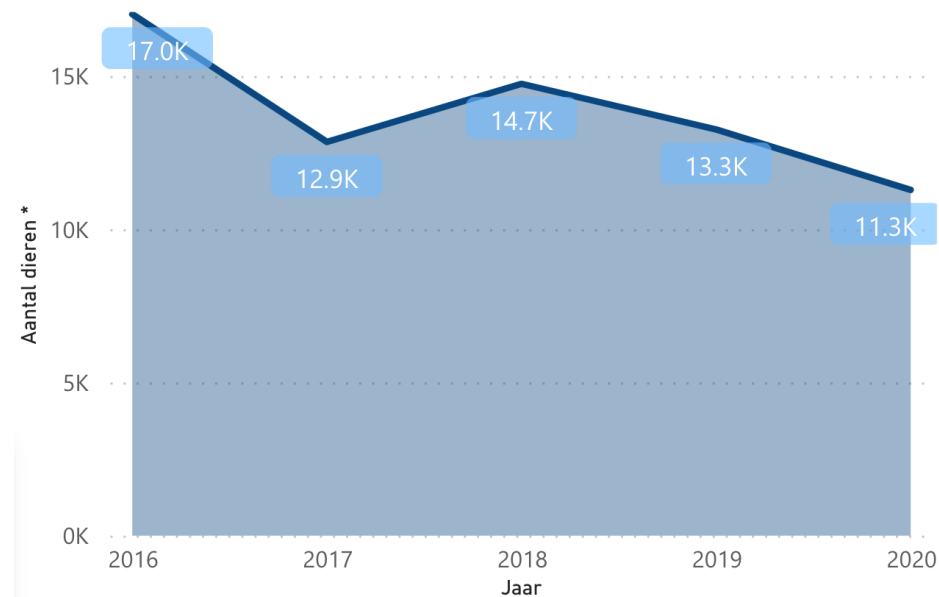
## 3D models are earning their place

Papers published on 3D in vitro tumor models



Martinez-Pacheco, Cancers (Basel), 2021

Use of laboratory animals

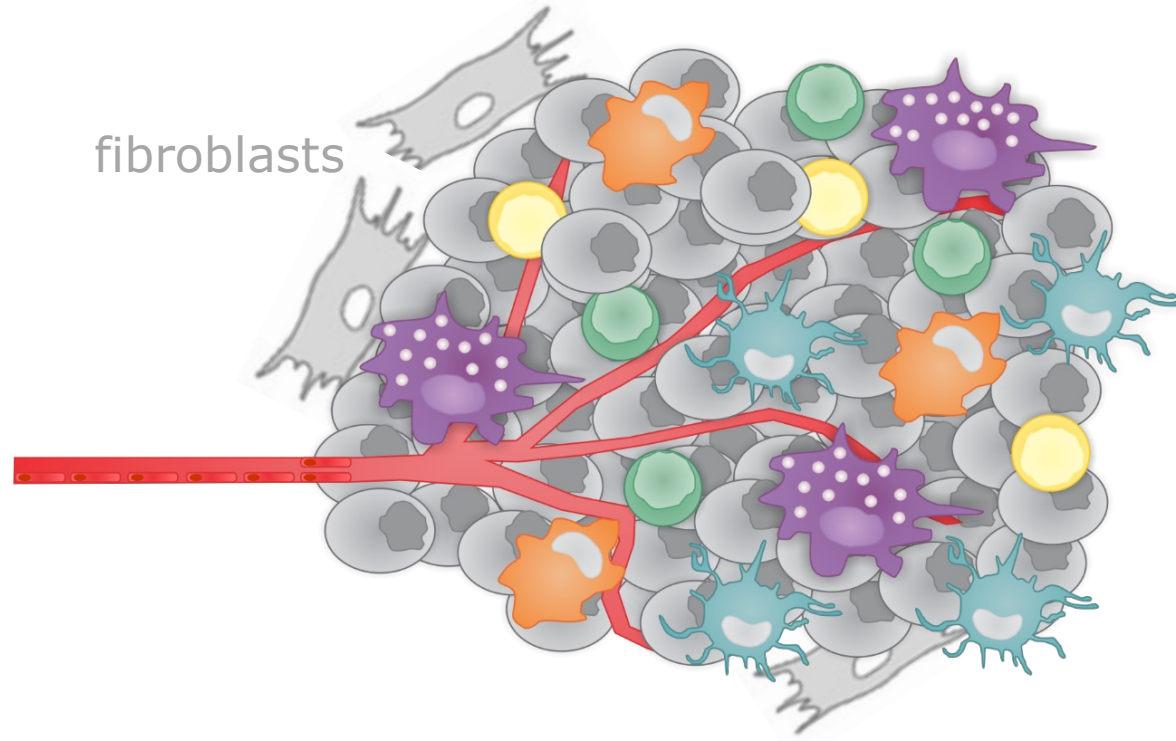


<https://dierproeven.vub.be/nl/cijfers>

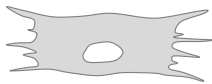


# 3D lung tumor model

## Recapitulating the stromal tumor architecture



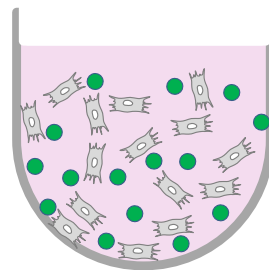
Fibroblasts



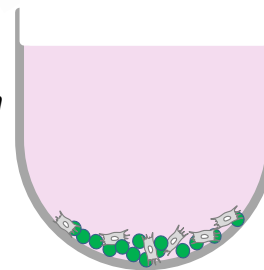
eGFP<sup>+</sup>  
Tumor cells



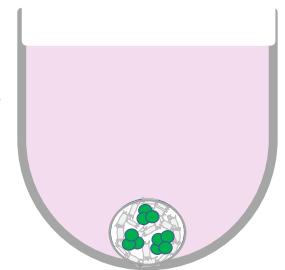
Mix in cell-  
repellent  
96-wells



10 min

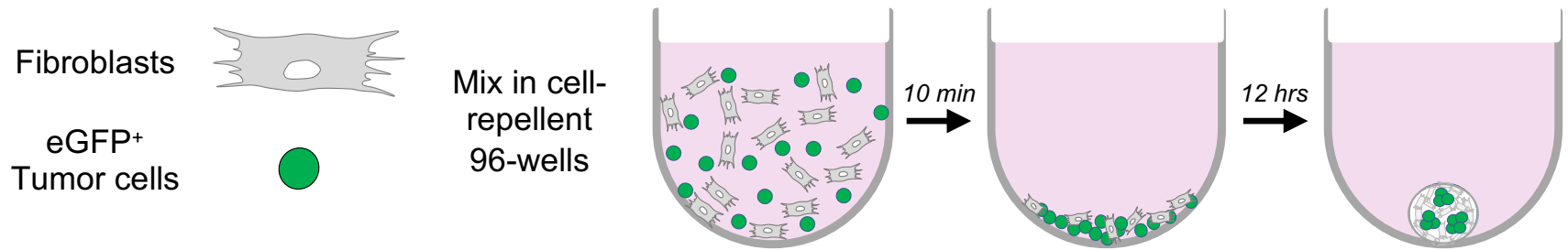


12 hrs



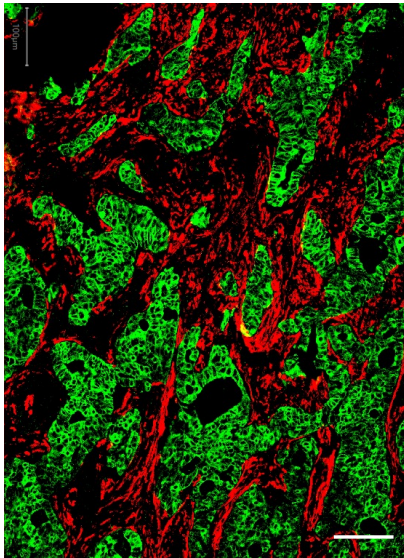
# 3D lung tumor model

## Recapitulating the stromal tumor architecture

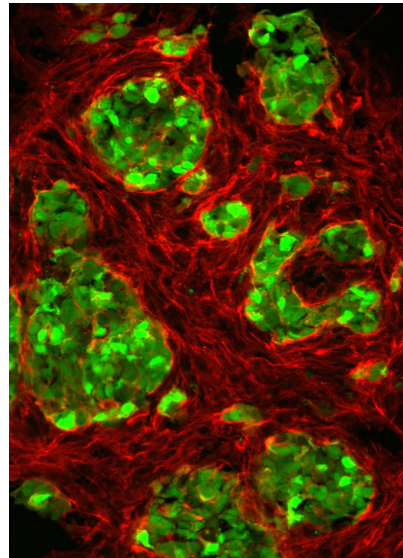


### Confocal microscopy

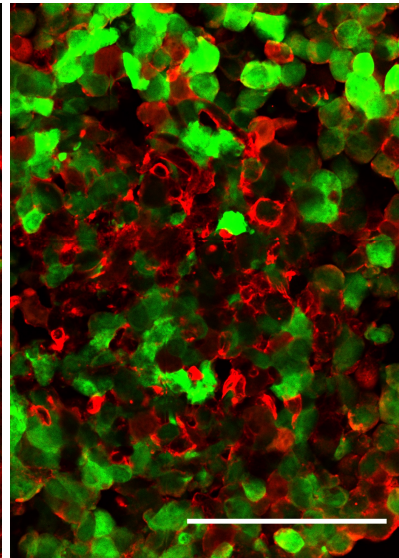
NSCLC patient biopsy



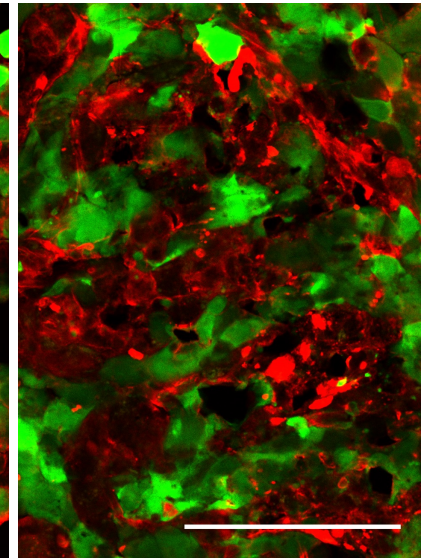
Murine KP spheroid



Murine LLC spheroid



Human H1650 spheroid

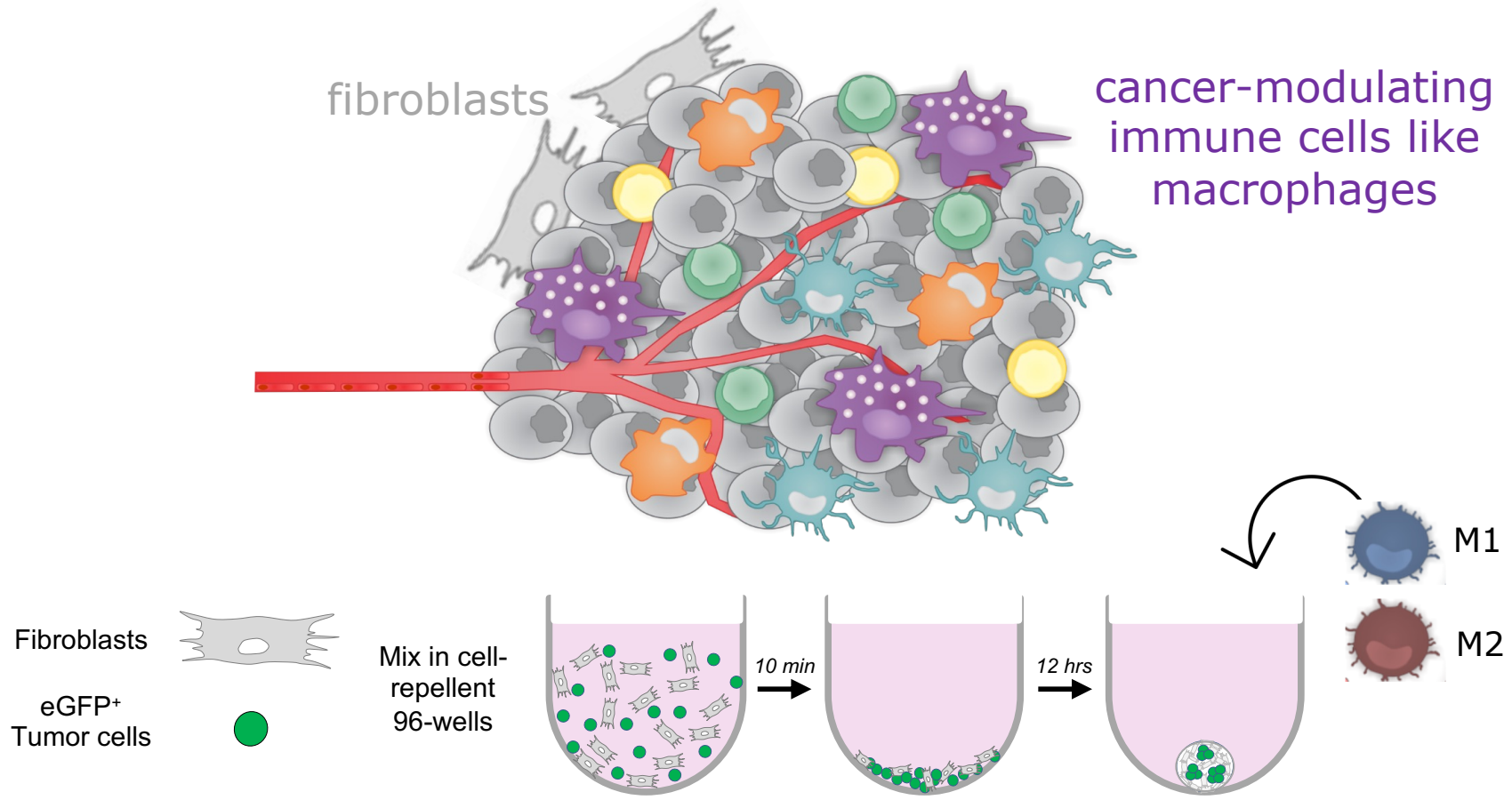




# 3D lung tumor model

## Applications in immune-oncology research

### Infiltration of macrophages



# 3D lung tumor model

## Applications in immune-oncology research

### Infiltration of macrophages

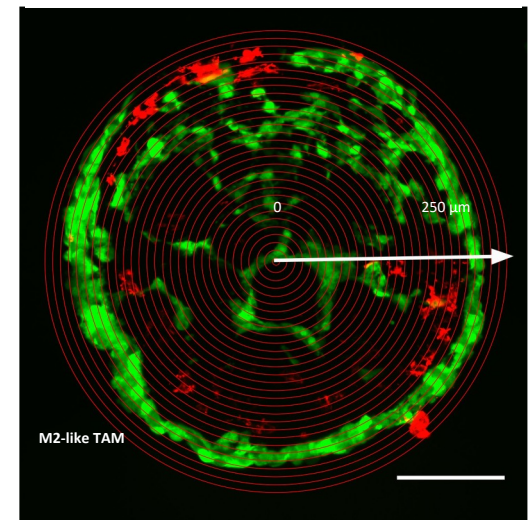
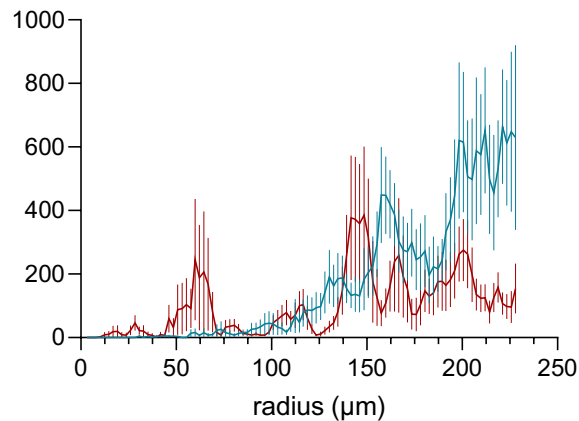
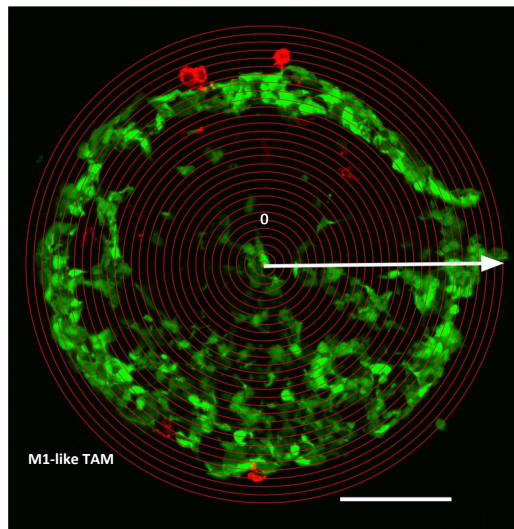


M1 macrophage

Confocal microscopy



M2 macrophage

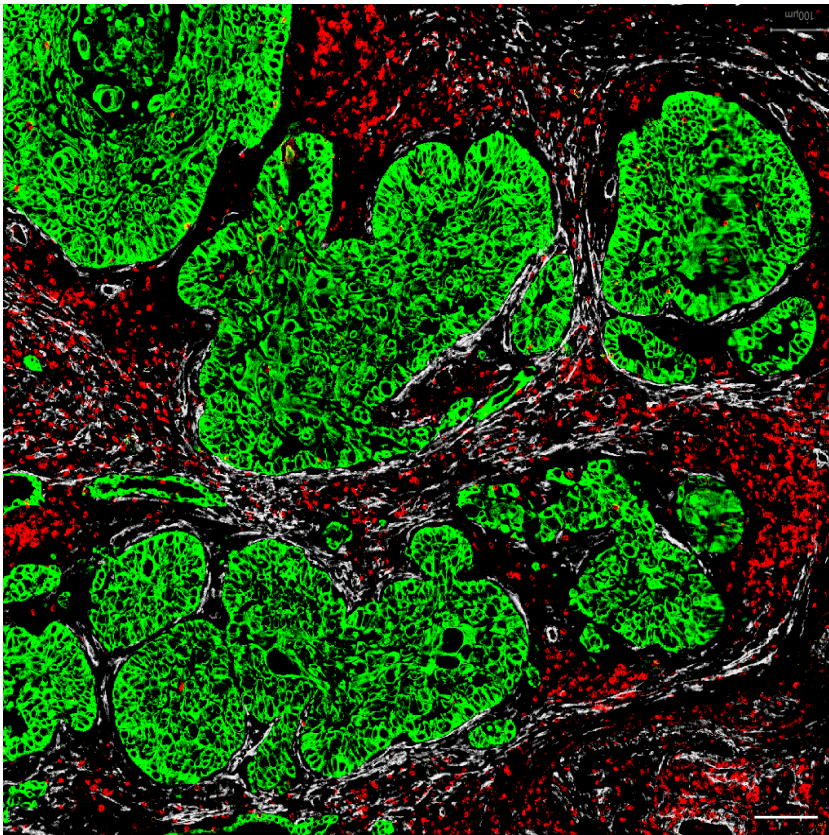


# 3D lung tumor model

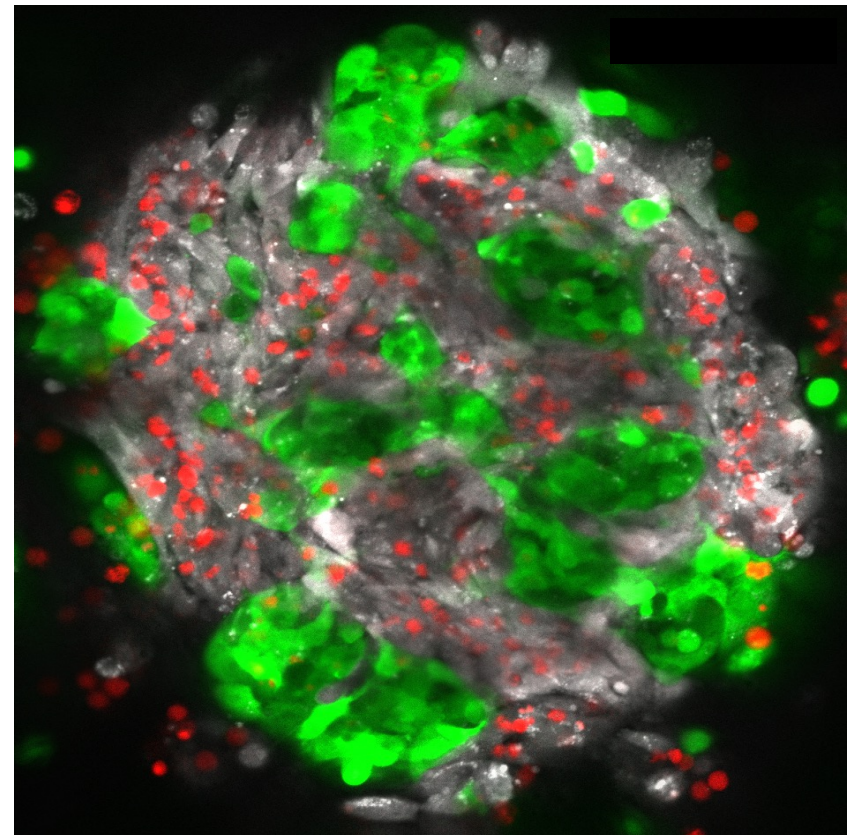
## Applications in immune-oncology research

Infiltration and killing by cytotoxic T cells

NSCLC patient biopsy



Murine lung tumor spheroid

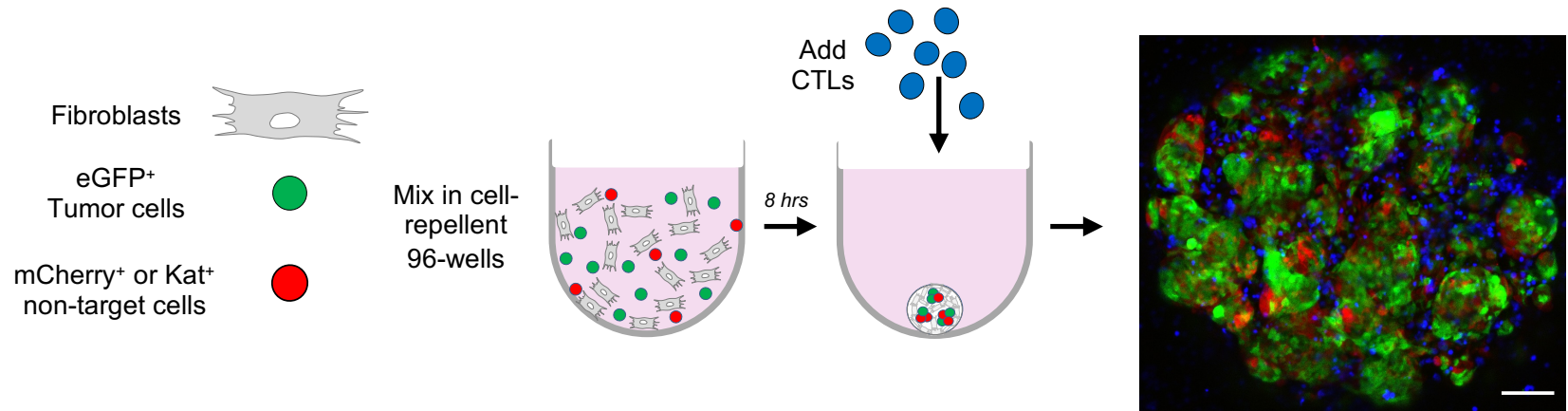




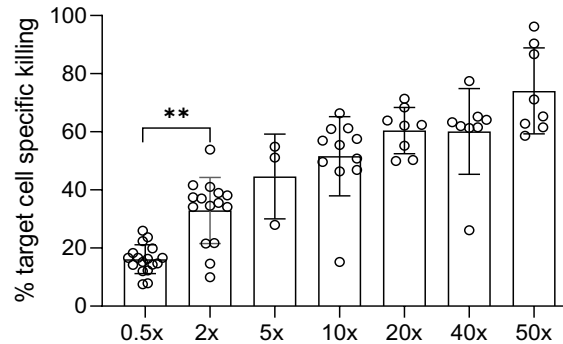
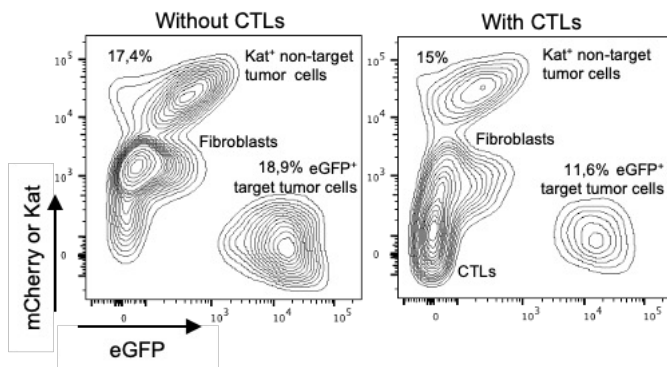
# 3D lung tumor model

## Applications in immune-oncology research

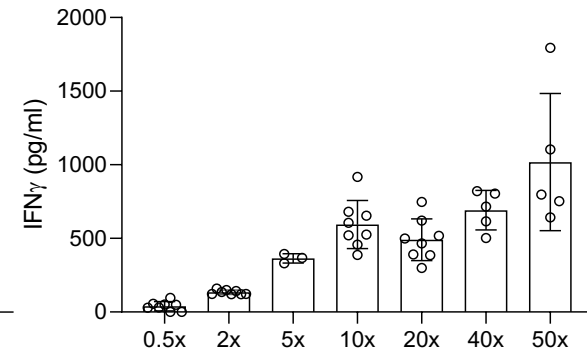
### Target antigen specific tumor cell killing by CTLs



#### Flow cytometry



#### ELISA

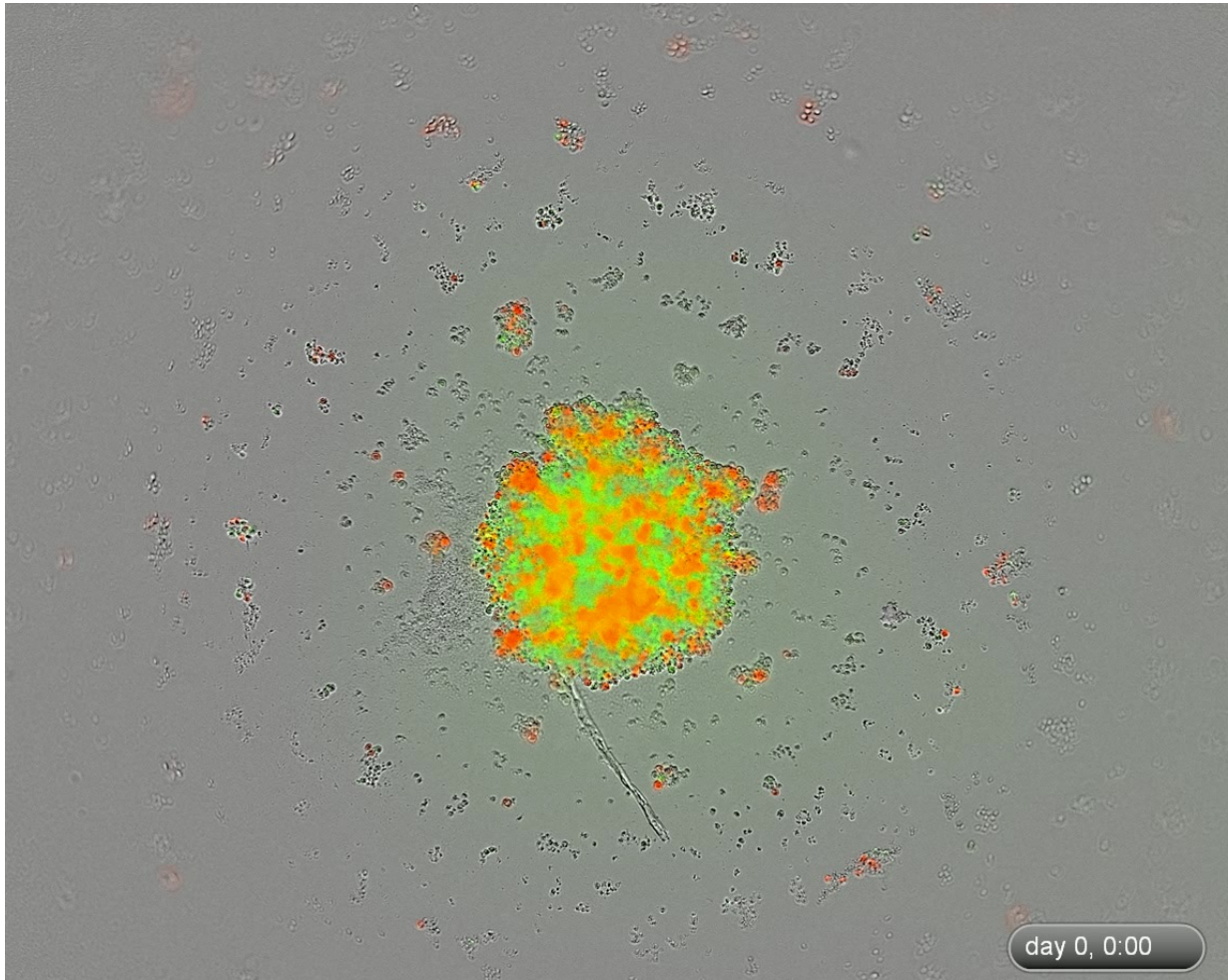


# 3D lung tumor model

## Applications in immune-oncology research

Spheroid growth follow up

Incucyte live  
cell imaging

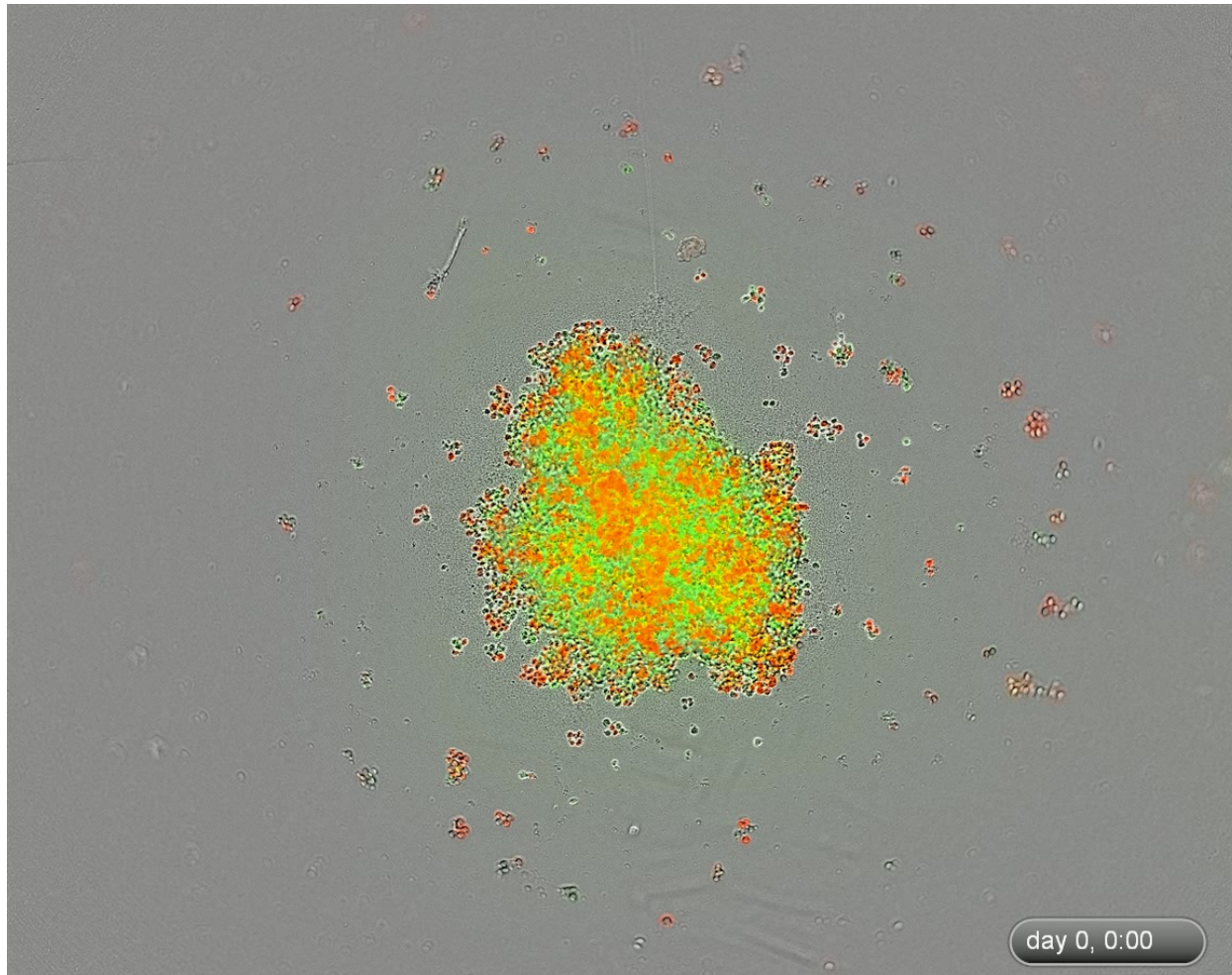


# 3D lung tumor model

## Applications in immune-oncology research

Target antigen specific tumor cell killing by CTLs **without** treatment

Incucyte live  
cell imaging



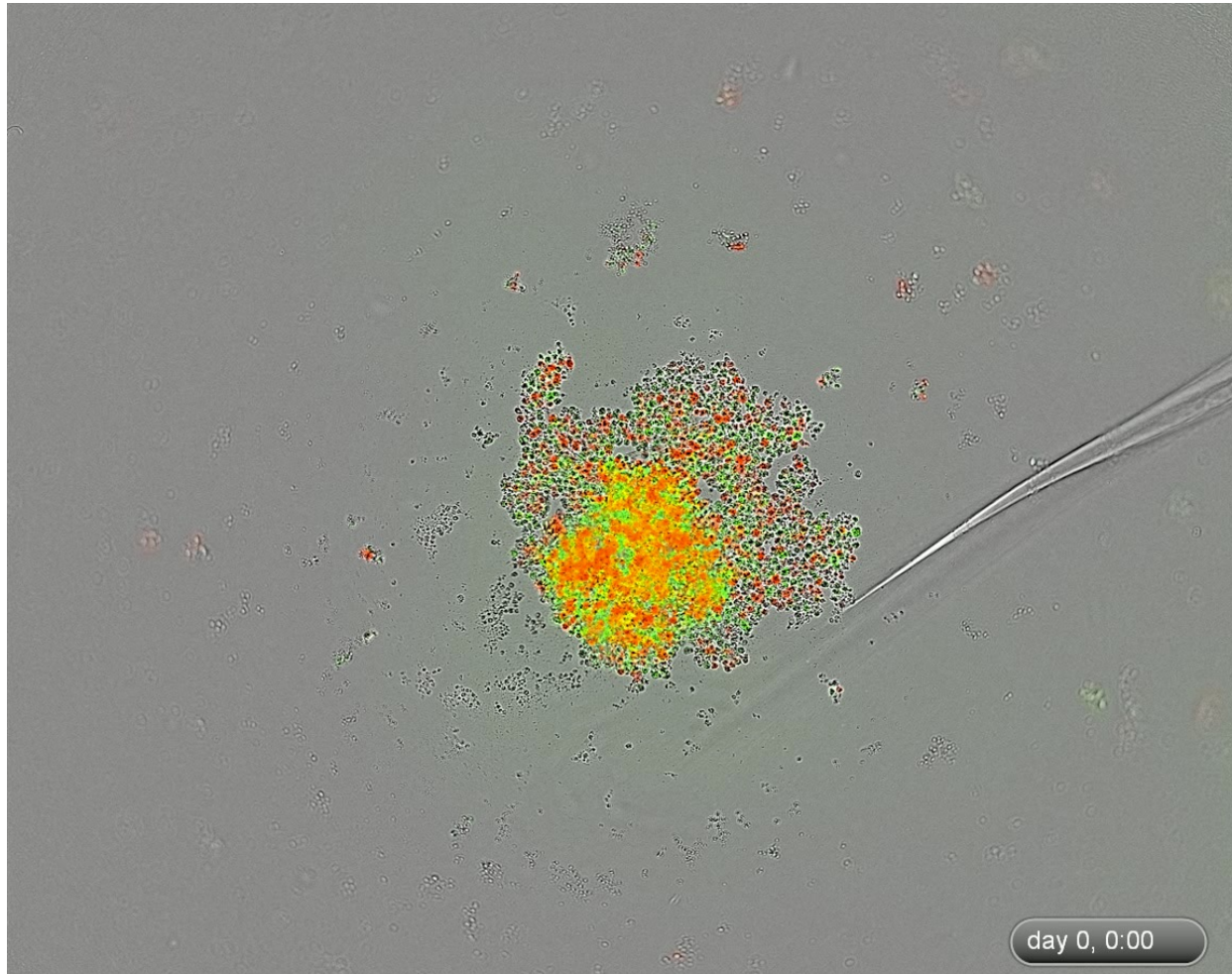


# 3D lung tumor model

## Applications in immune-oncology research

Target antigen specific tumor cell killing by CTLs **with** treatment

Incucyte live  
cell imaging



# 3D tumor modelling

## Take home messages

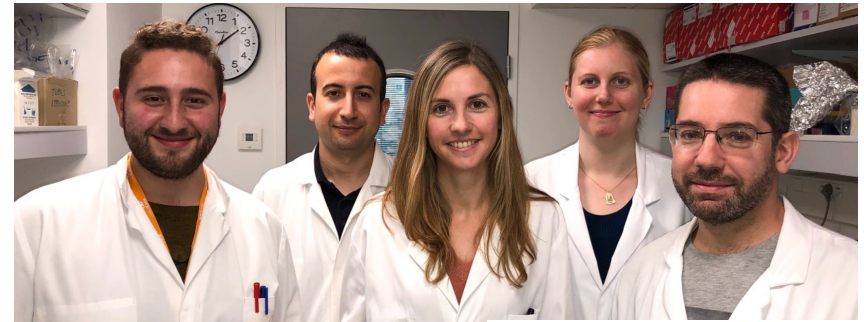
- ✓ Straightforward **murine and human** multicellular lung tumor spheroid platform
- ✓ **Recapitulates** characteristic tumor islet - stroma architecture
- ✓ Suitable for macrophage and T-cell **infiltration** studies
- ✓ Suitable for **spatiotemporal tumor cell-specific killing** evaluation
- ✓ **96-well format** allows high-throughput gene/cell/drug screenings on conventional imaging instruments
- ✓ Can serve as a **blueprint for other solid cancer types**
- ✓ Recently added to the [RE-Place](#) database



# Acknowledgements



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RESEARCH GROUP



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Kirsten De Ridder



Navpreet Tung

