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Development of a “ metastasis-on-a-chip ” to monitor extravasation during metastatic process in breast cancer

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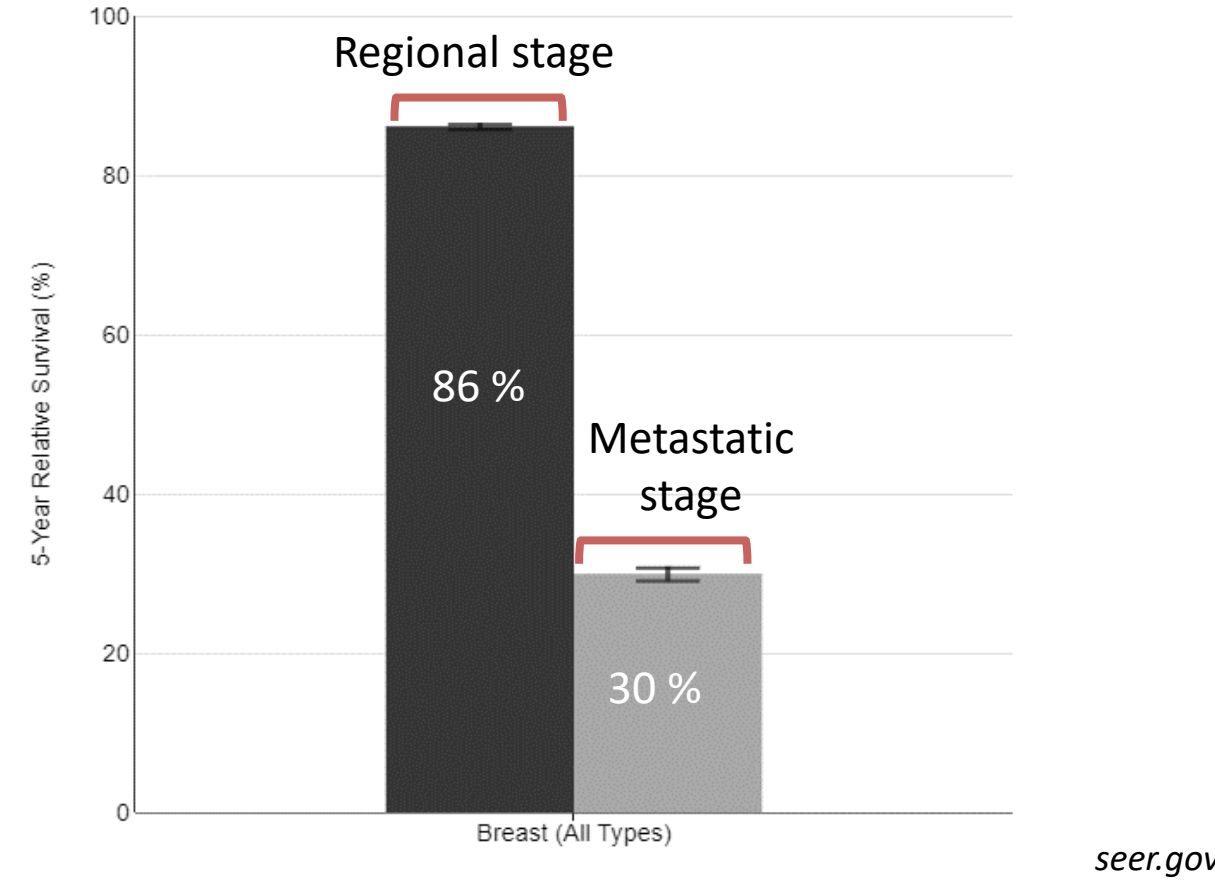
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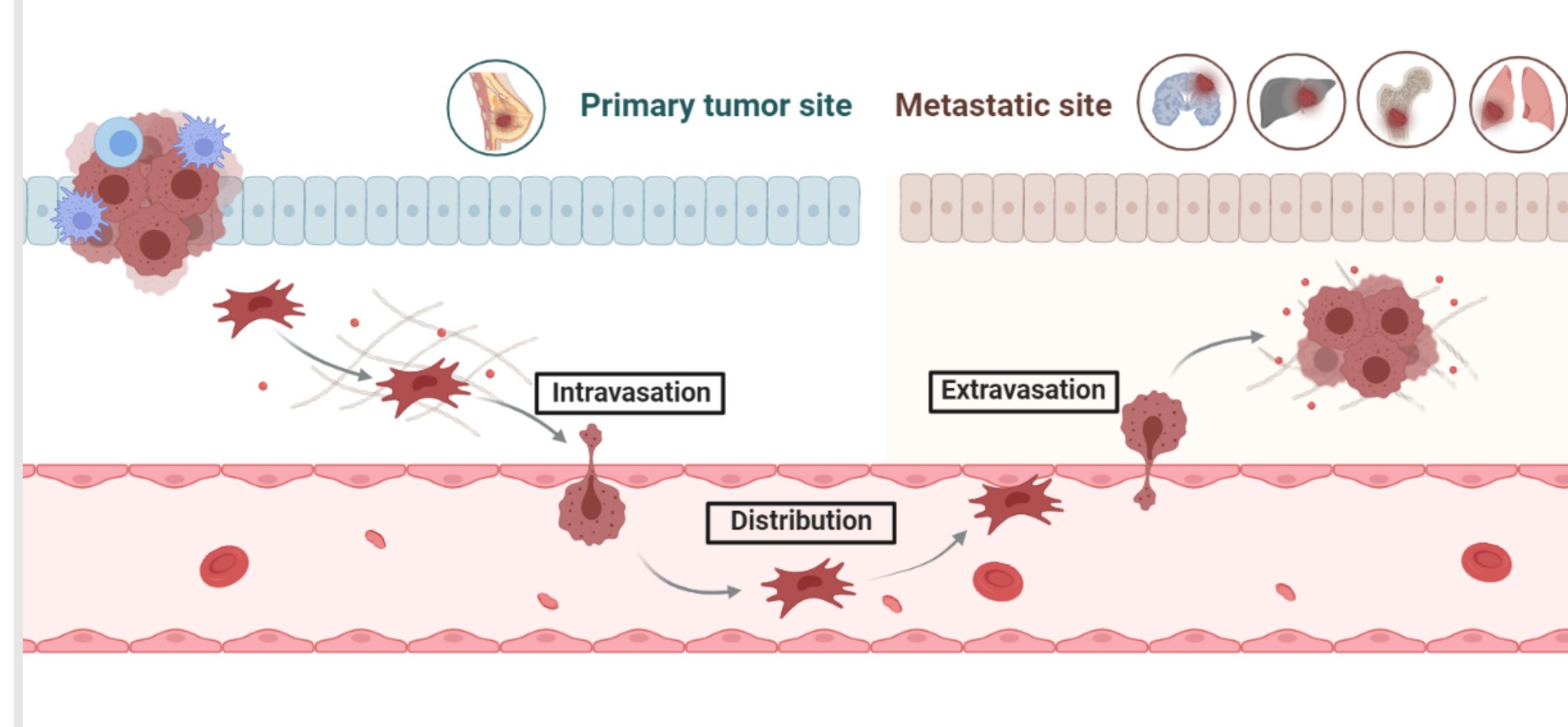
Introduction

Metastasis is responsible for 90% of breast cancer mortality

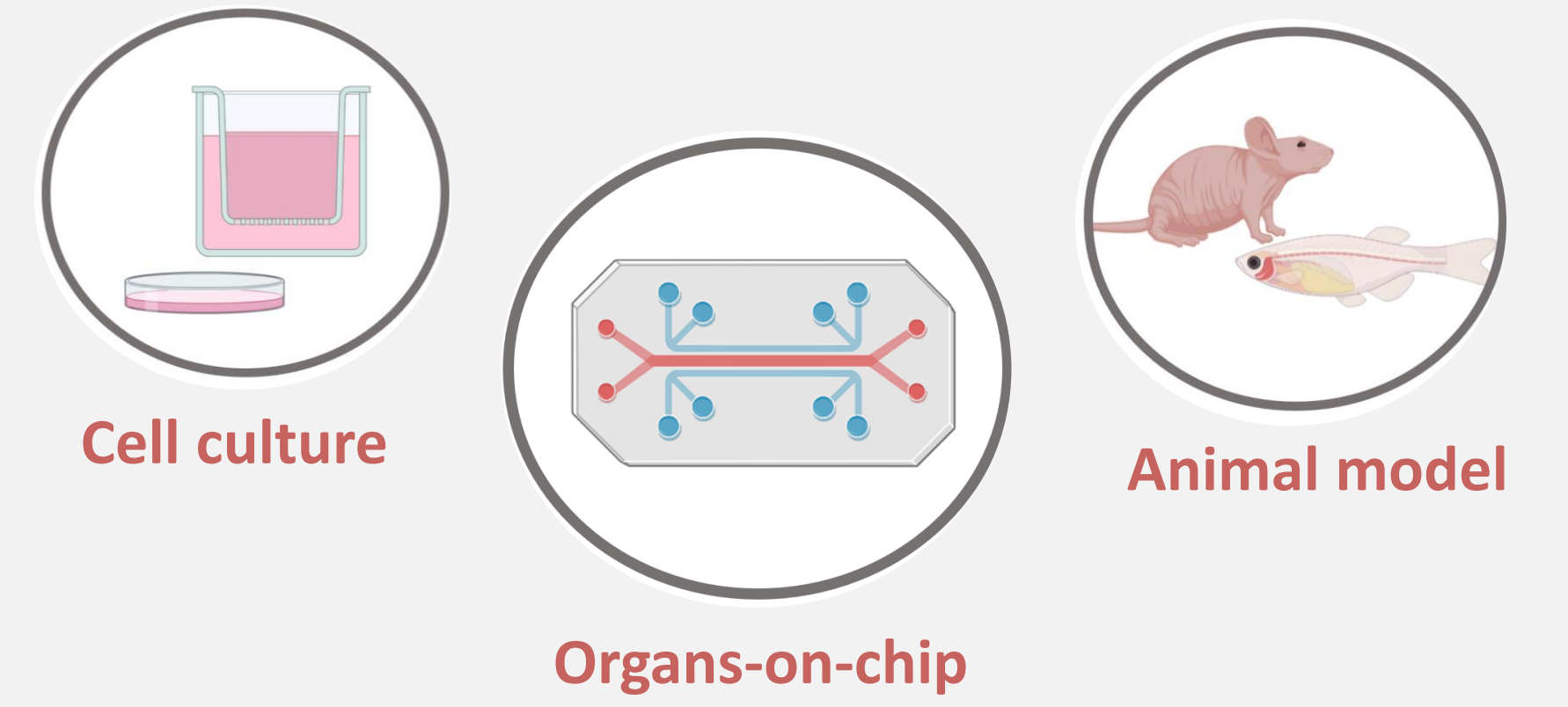
5-year survival for a regional VS metastatic breast cancer



Metastasis is a dynamic process



How to study metastatic process & characterise metastatic cells ?

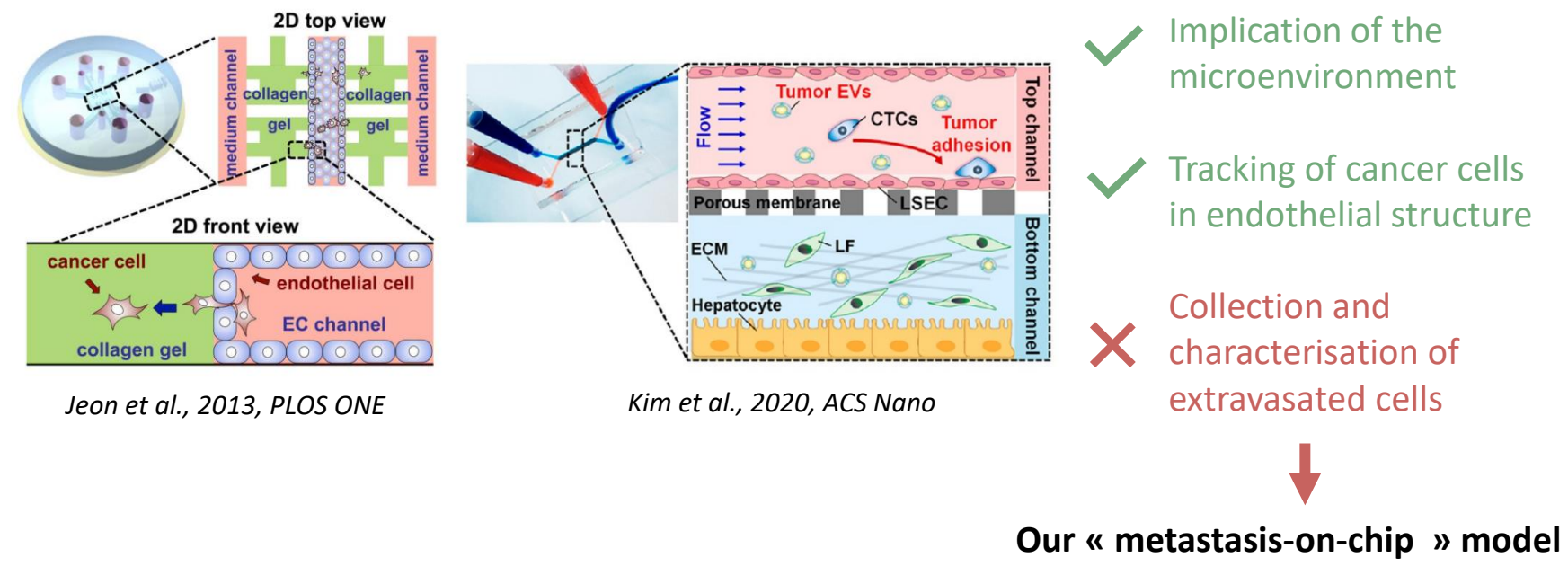


Organs-on-chip

An interesting tool to...

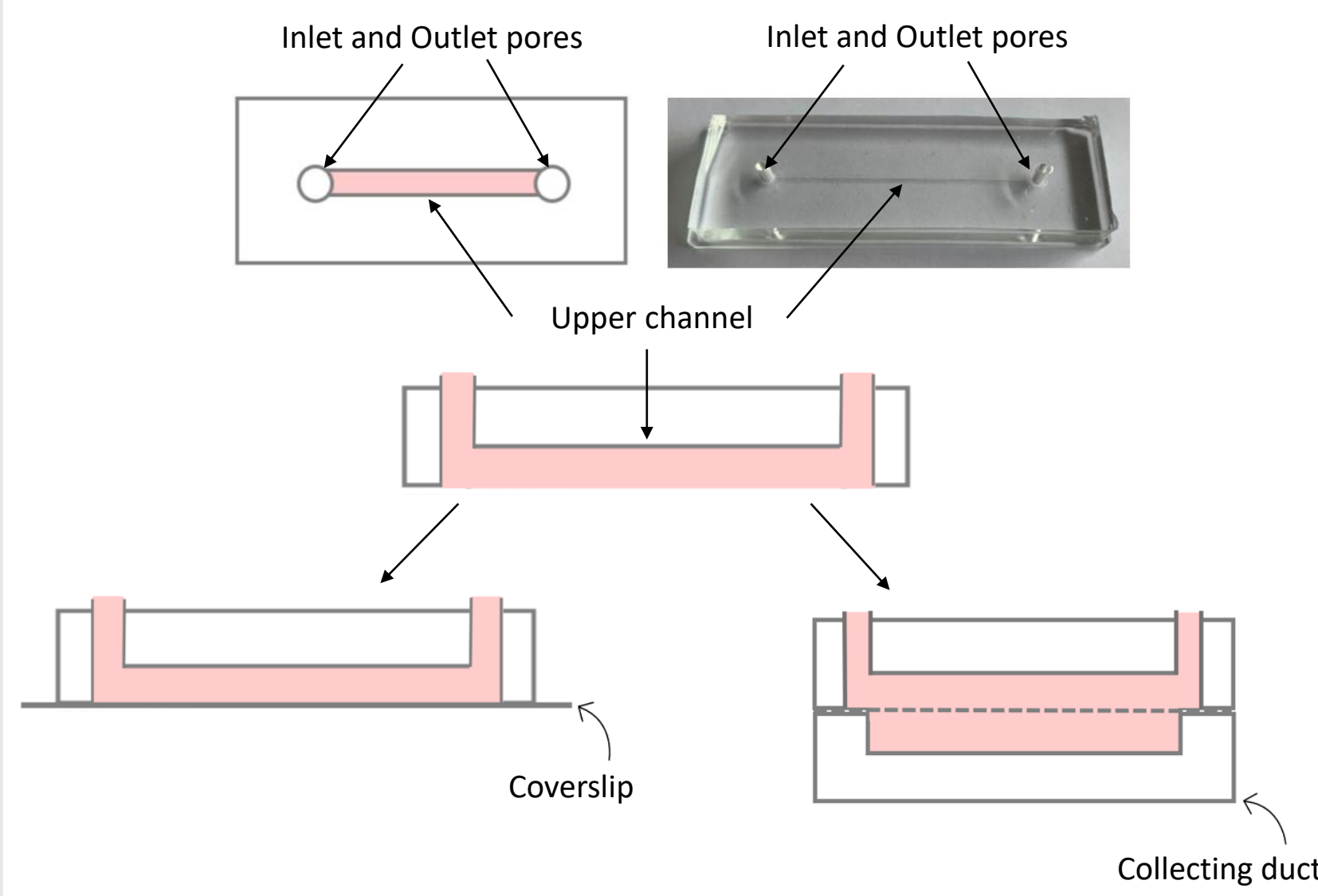
- ...co-culture different cell subtypes
- ...mimic *in vitro* physiological conditions
- ...control the microenvironment
- ...realize time lapse microscopy
- ...reduce animal testing

Organs-on-chip to study metastasis



Materials & Methods

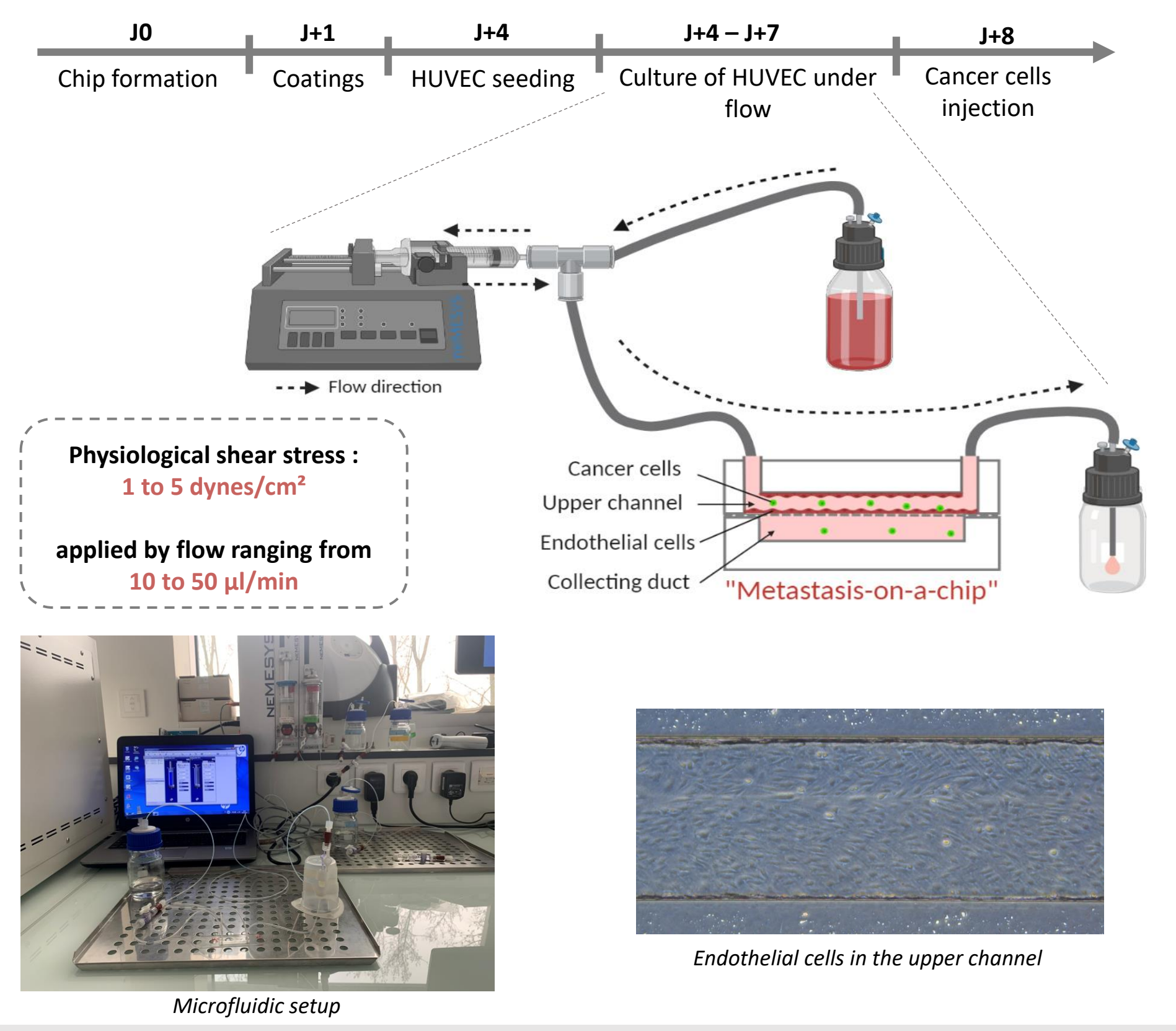
An innovative chip design



The upper channel can be fixed on different supports :

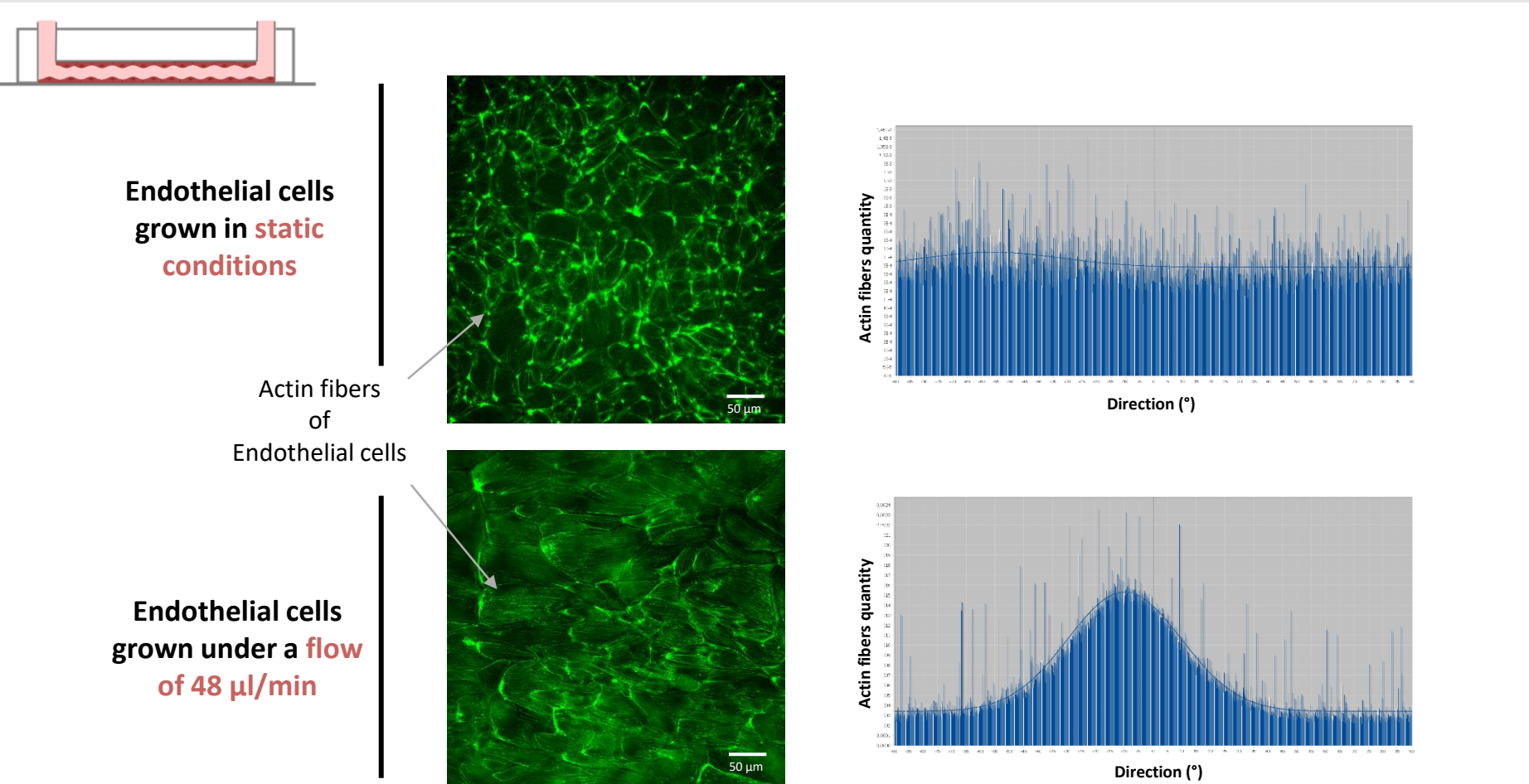
- Coverslip
 - Membrane + Collecting duct
- Determine conditions to obtain an endothelial structure
- Collect extravasated cells

Culture of endothelial cells under flow

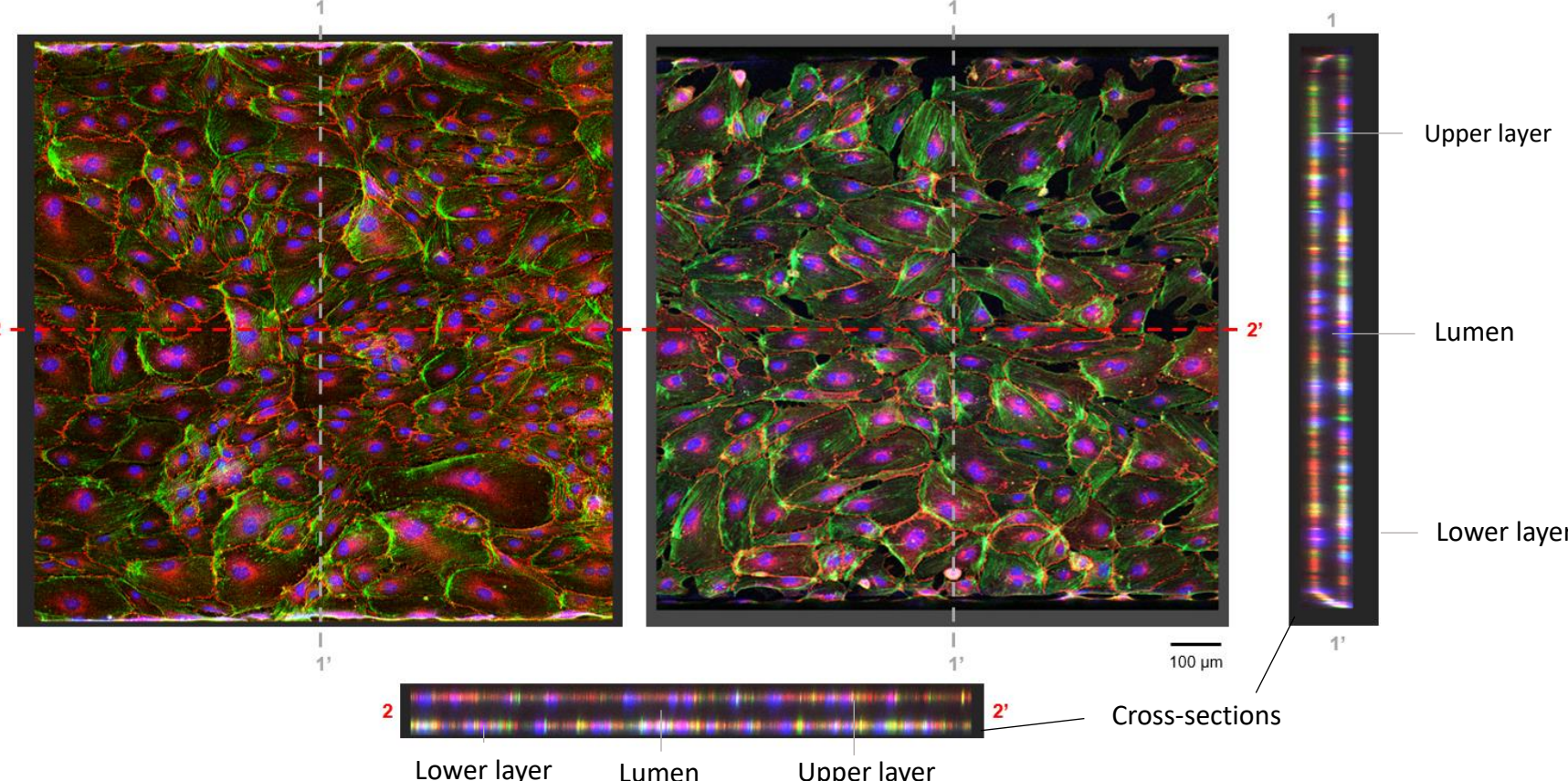


Results

Analysis of the endothelial structure

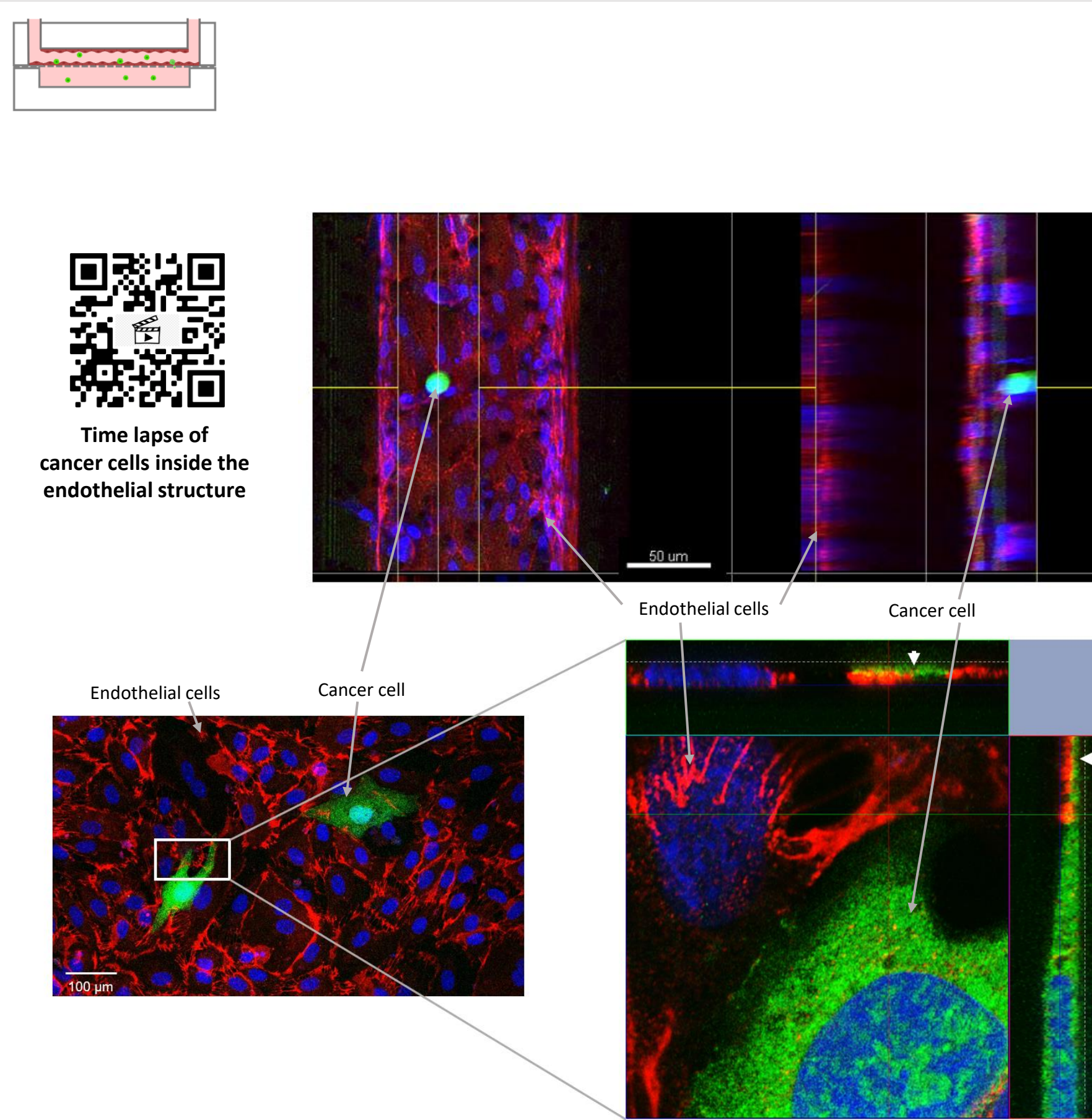


Alignment of actin fibers of endothelial cells under flow conditions



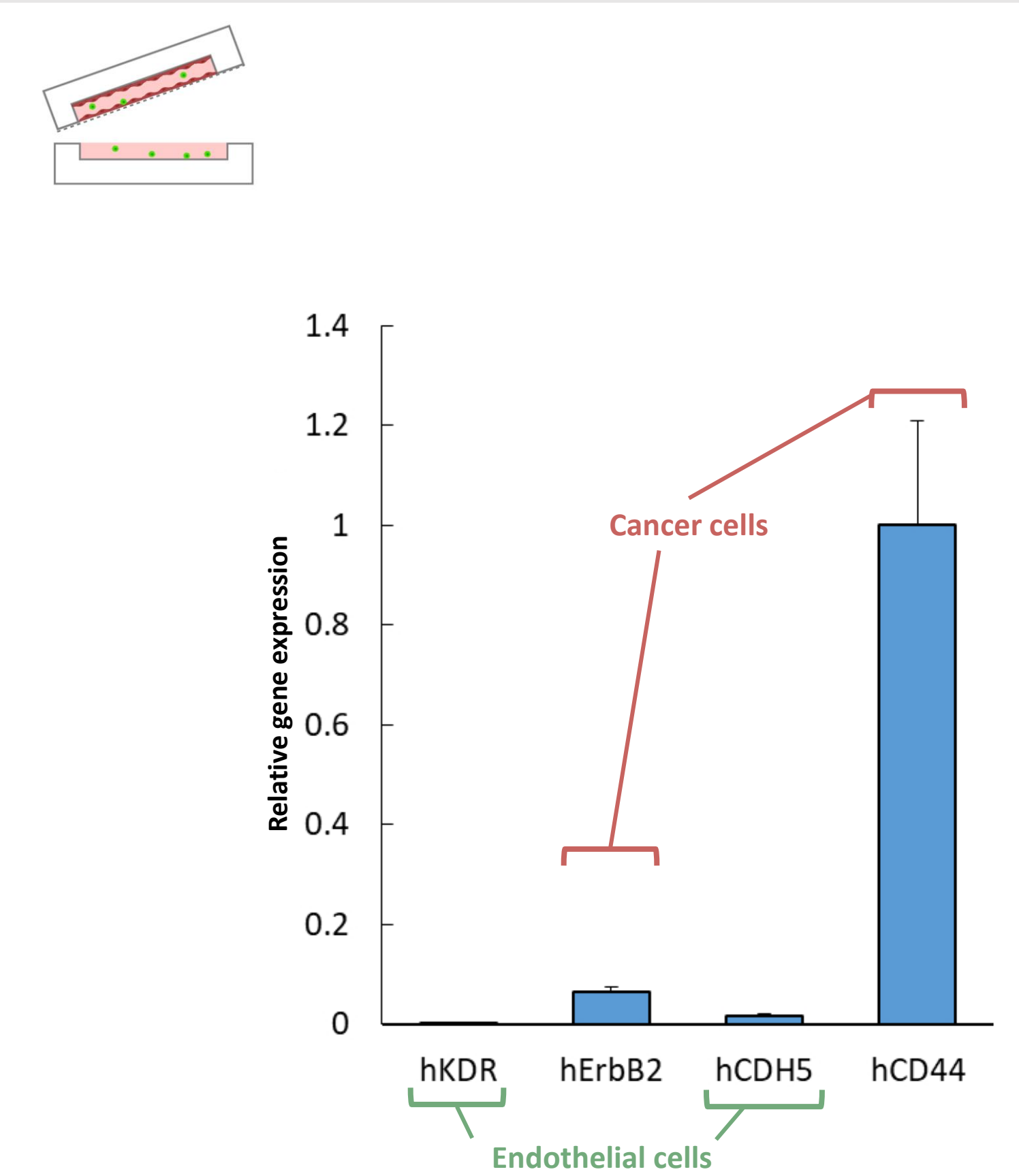
Obtention of a complete, confluent & 3D endothelium-like structure

Monitoring the extravasation



Following of the extravasation of cancer cells through the endothelial structure

Characterisation of extravasated cells



Genes expressed specifically in tumor cells found in the collecting duct

Conclusion

Development of an **innovative adaptative** design of chip combined with **microfluidic tool** to study **metastasis** *in vitro* under more physiological conditions

Perspectives

Analyse extravasated cells
Improve the collecting duct to mimic a metastatic niche

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