



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

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Flavie Woesteland, Aude Sivery, Marie Denoulet, Mathilde Brulé, Anaïs Horochowska, et al.. Development of a “ metastasis-on-a-chip ” to monitor extravasation during metastatic process in breast cancer. 1st ONCOLille Days, Nov 2022, Lille (France), France. hal-04545669

HAL Id: hal-04545669

<https://hal.science/hal-04545669>

Submitted on 14 Apr 2024

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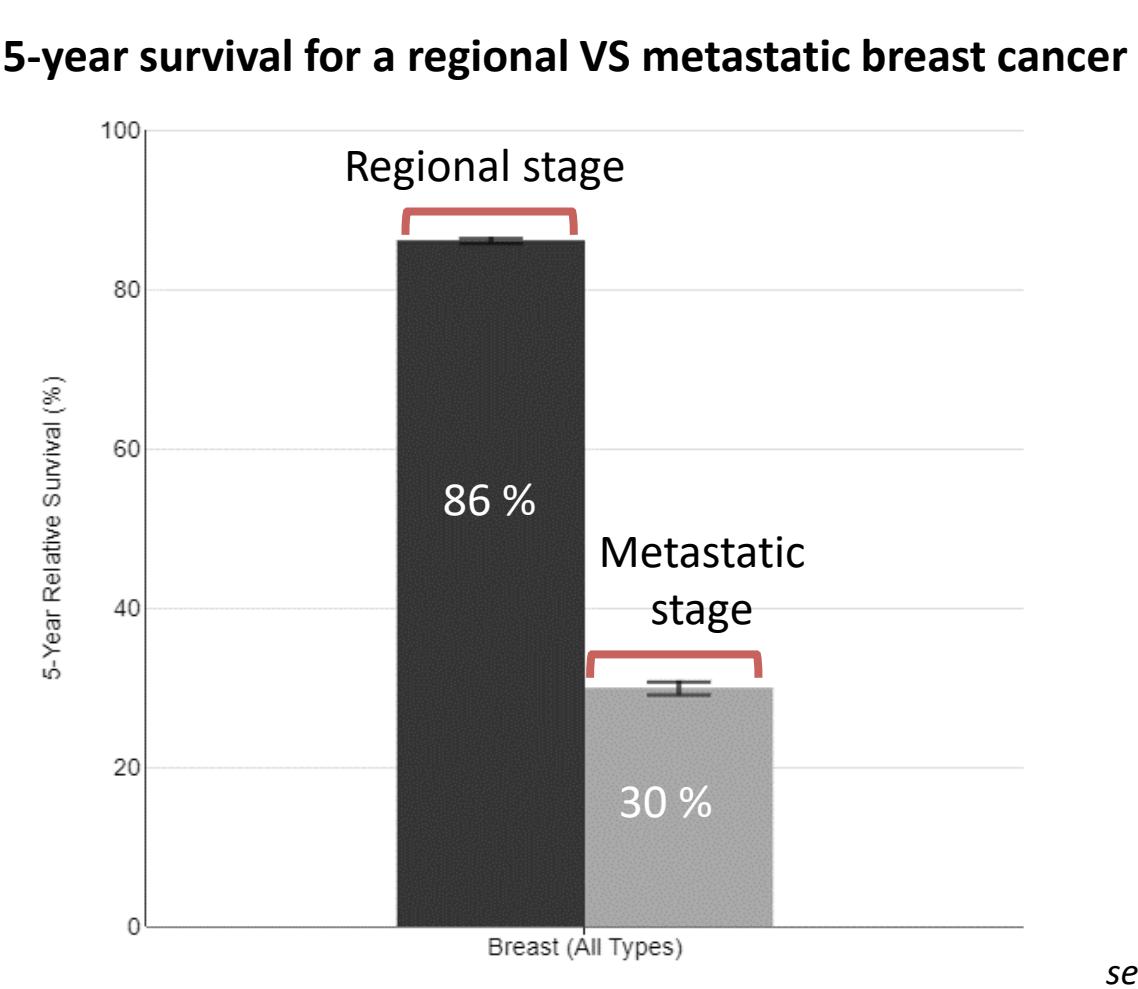
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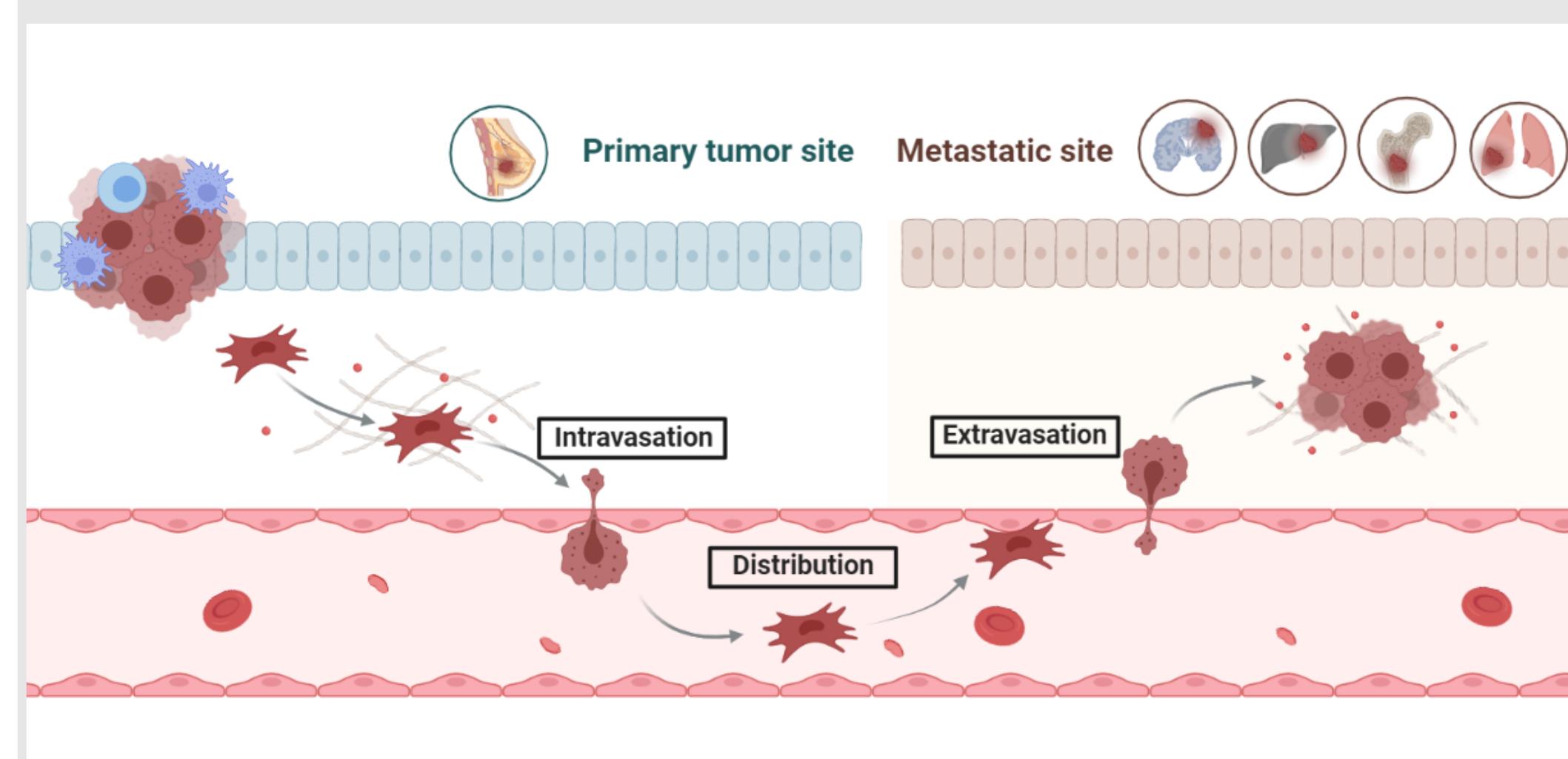
1 : Univ. Lille, CNRS, Inserm, CHU Lille, Centre Oscar Lambret, UMR9020 – UMR1277 - Canther – Cancer Heterogeneity, Plasticity and Resistance to Therapies, F-59000 Lille, France
 2 : Univ. Lille, CNRS, Centrale Lille, Junia, Univ. Polytechnique Hauts-de-France, UMR 8520 - IEMN - Institut d'Électronique de Microélectronique et de Nanotechnologie, F-59000 Lille, France
 3 : CNRS/IIS/Centre Oscar Lambret/Lille University SMMIL-E Project, CNRS Délégation Hauts-de-France, 43 Avenue le Corbusier, 59800 Lille, France
 4 : CNRS, IRL2820, Laboratory for Integrated Micro Mechatronic Systems, Institute of Industrial Science, University of Tokyo, 4-6-1 Komaba, Meguro-ku, Tokyo 153-8505, Japan

Introduction

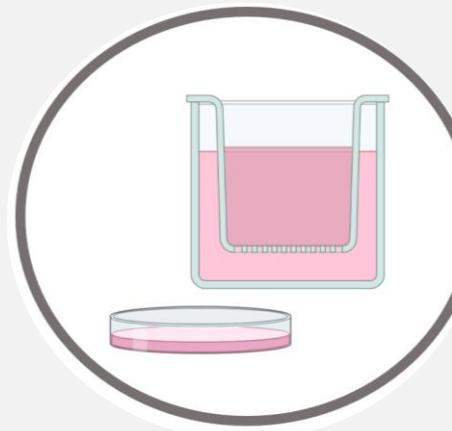
Metastasis is responsible for 90% of breast cancer mortality



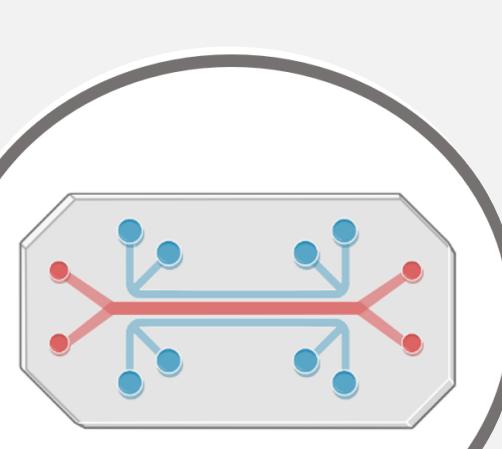
Metastasis is a dynamic process



How to study metastatic process & characterise metastatic cells ?



Cell culture

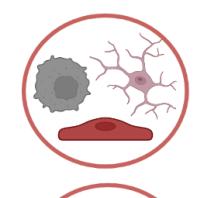
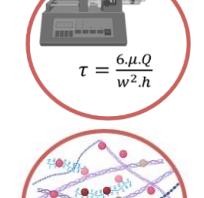
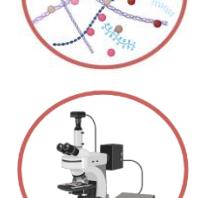
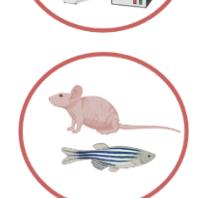
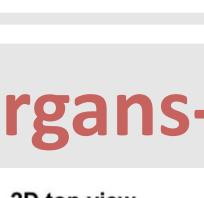


Animal model

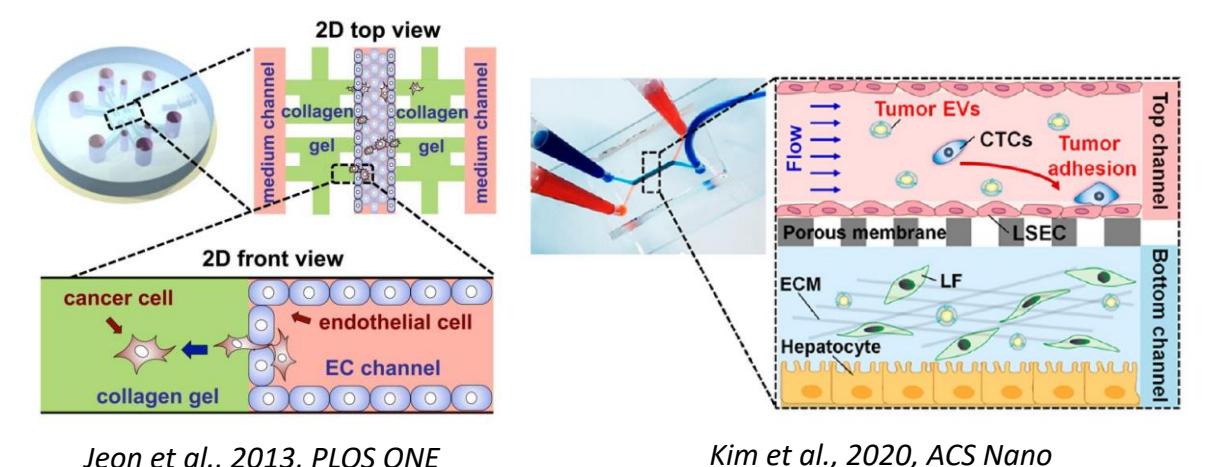
Organs-on-chip

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

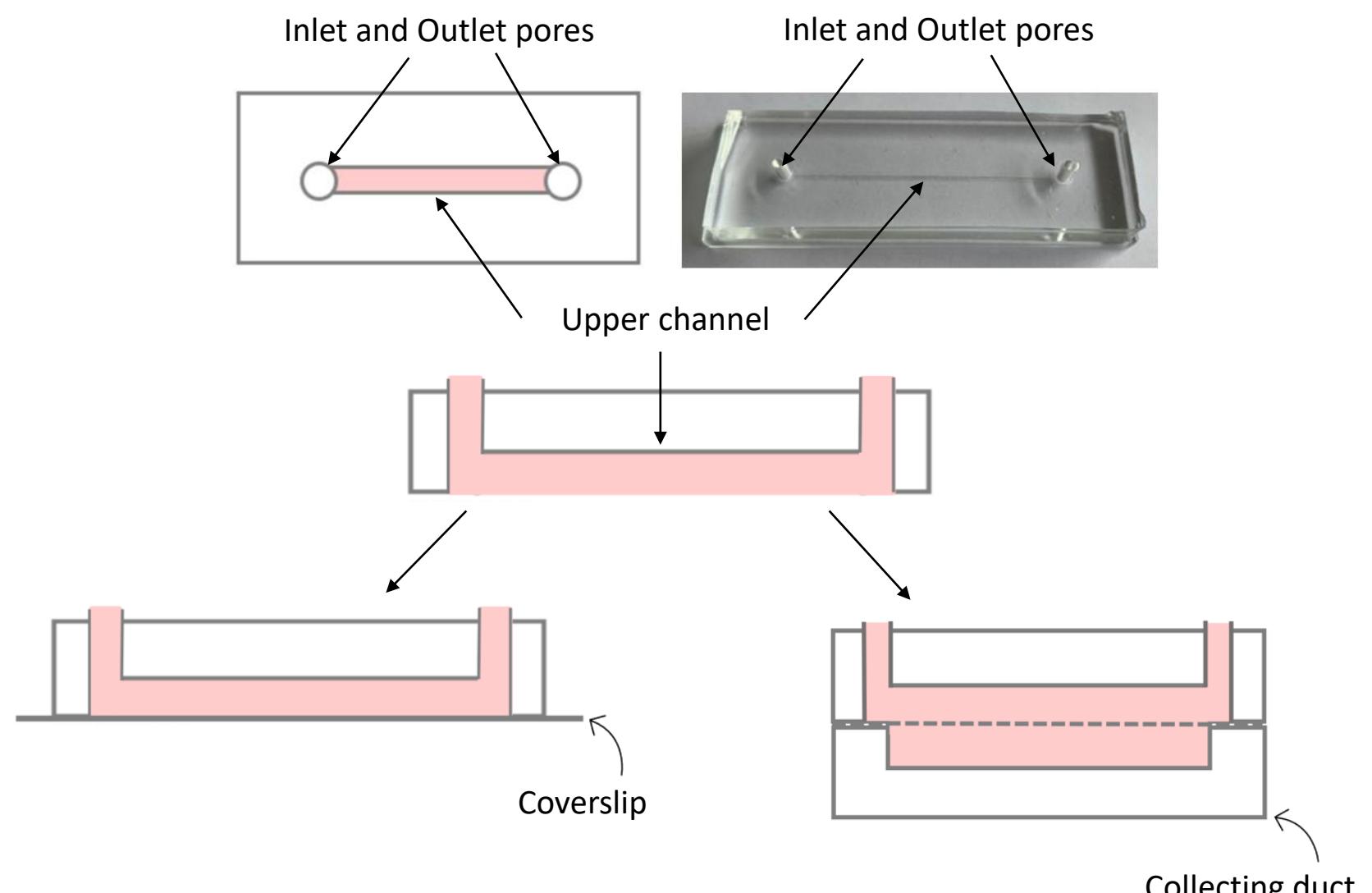
Organs-on-chip to study metastasis



Our « metastasis-on-a-chip » model

Materials & Methods

An innovative chip design



The upper channel can be fixed on different supports :

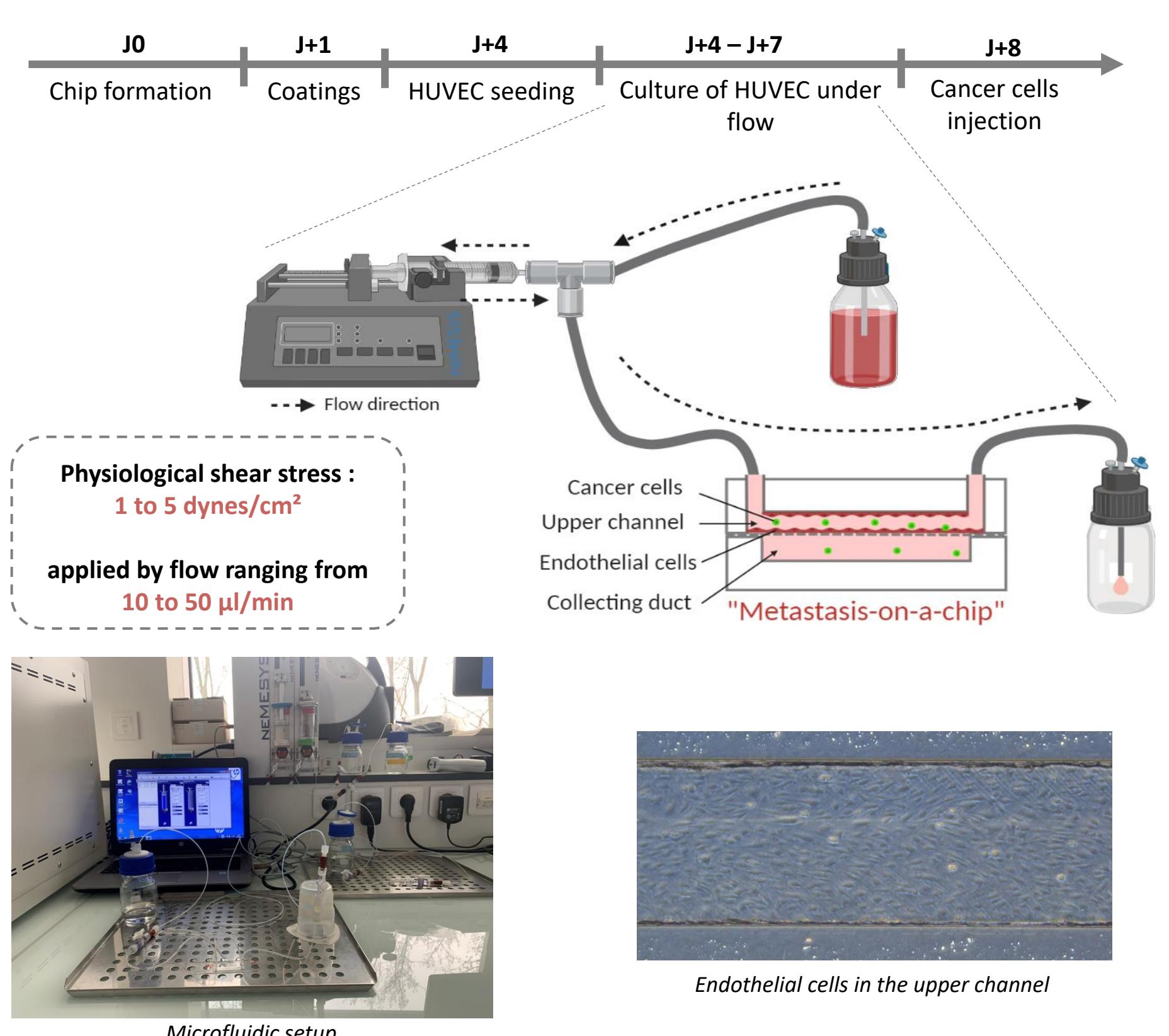
Coverslip

Membrane +
Collecting duct

Determine conditions to obtain an endothelial structure

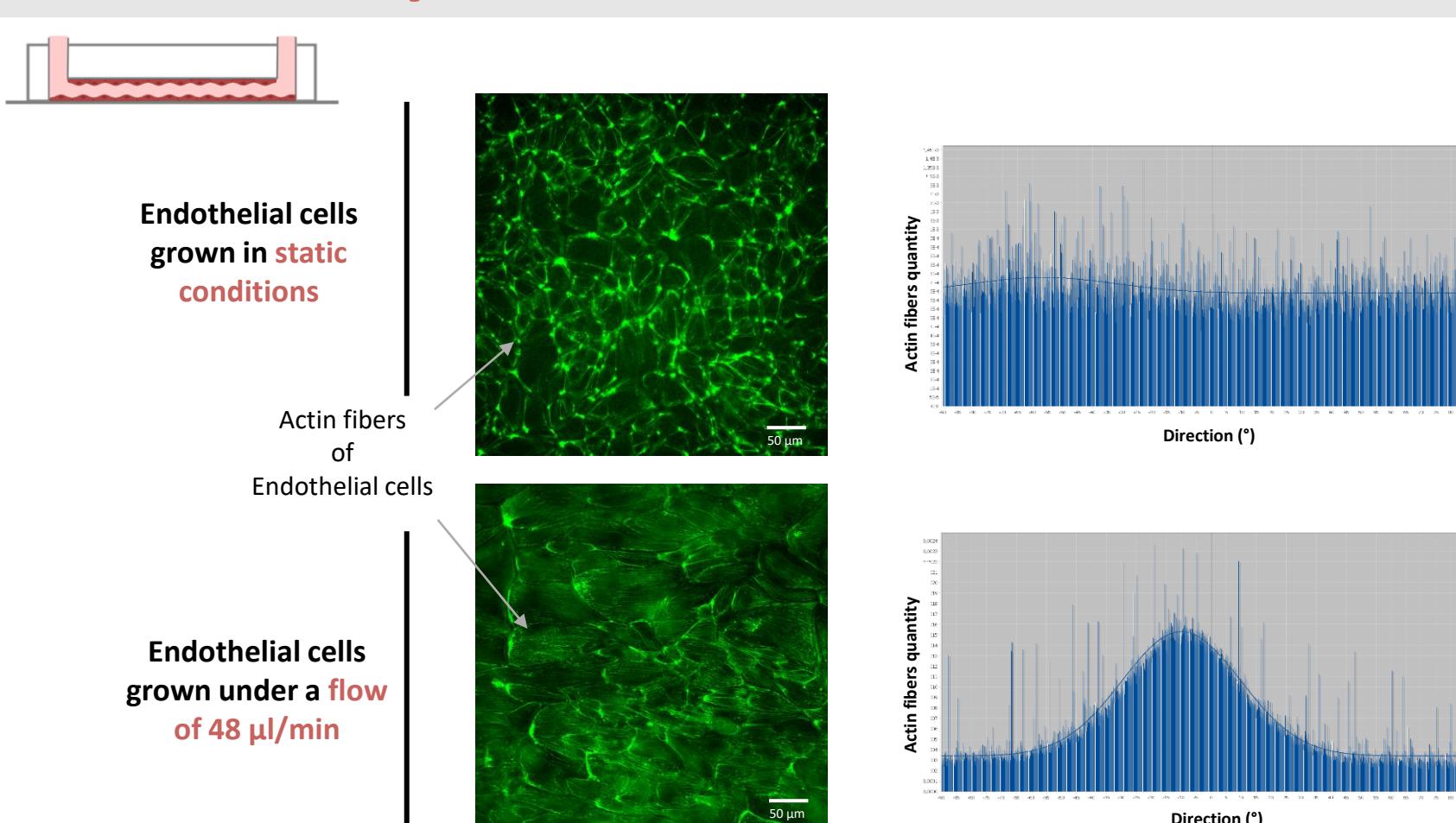
Collect extravasated cells

Culture of endothelial cells under flow

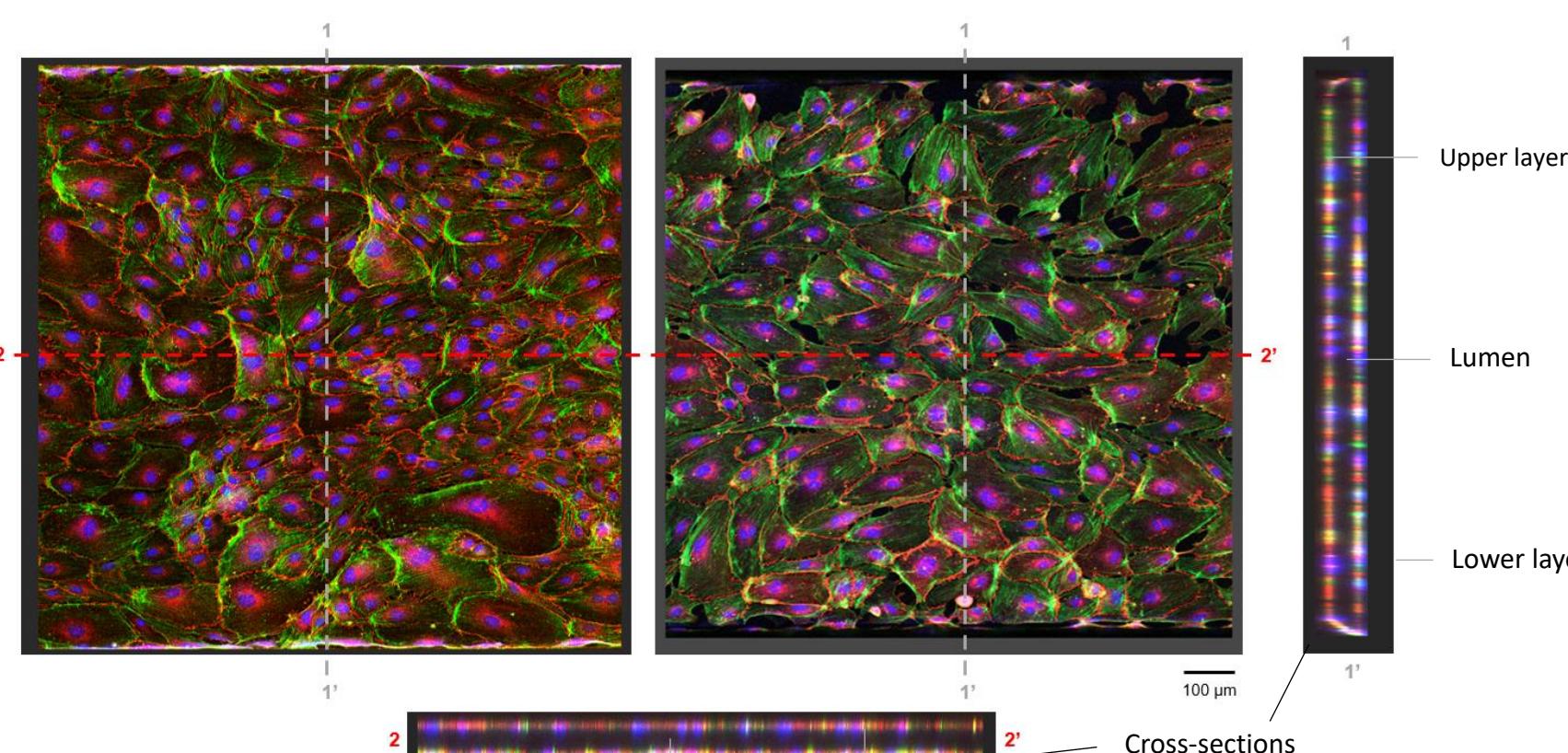


Results

Analysis of the endothelial structure

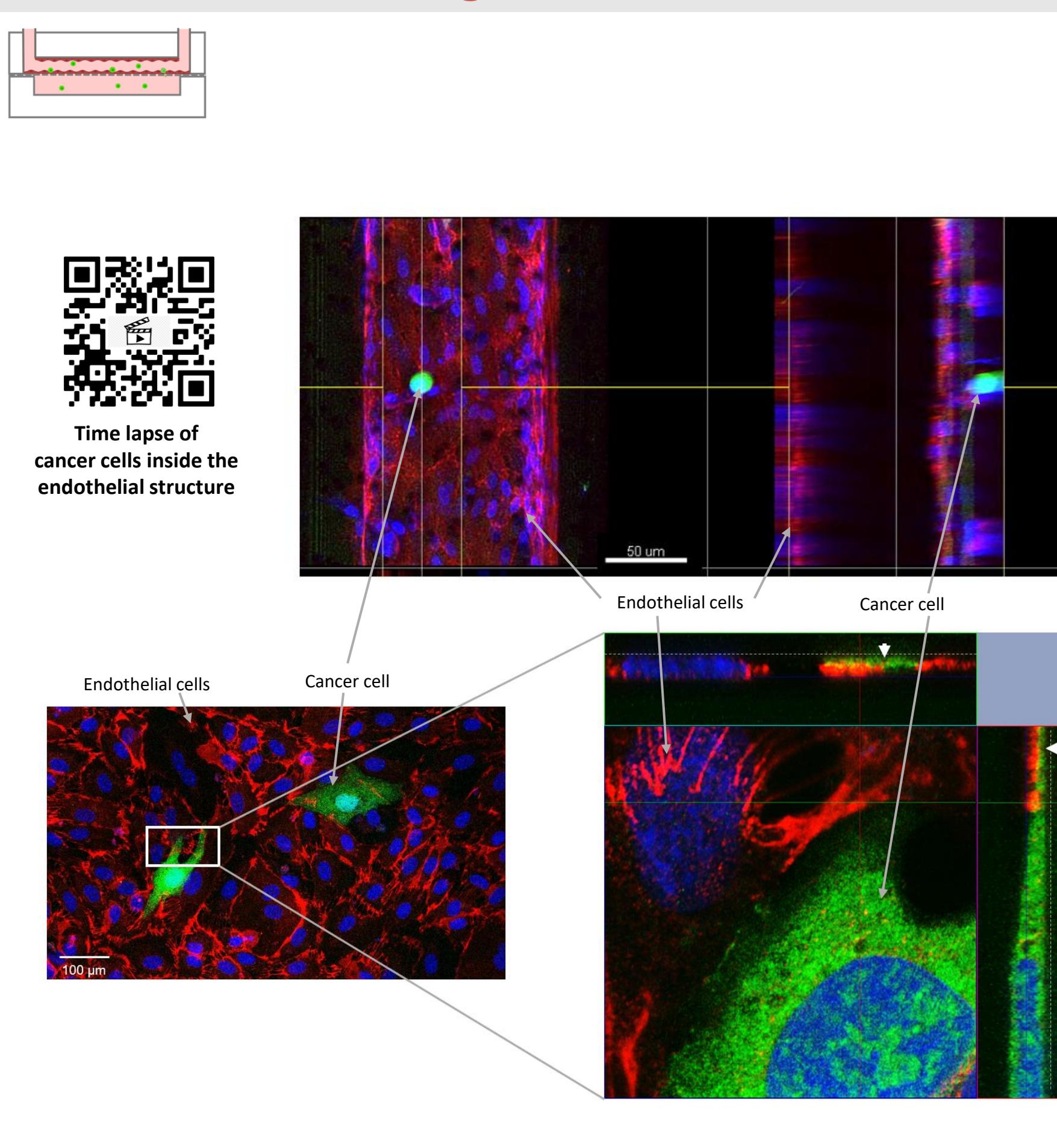


Alignment of actin fibers of endothelial cells under flow conditions

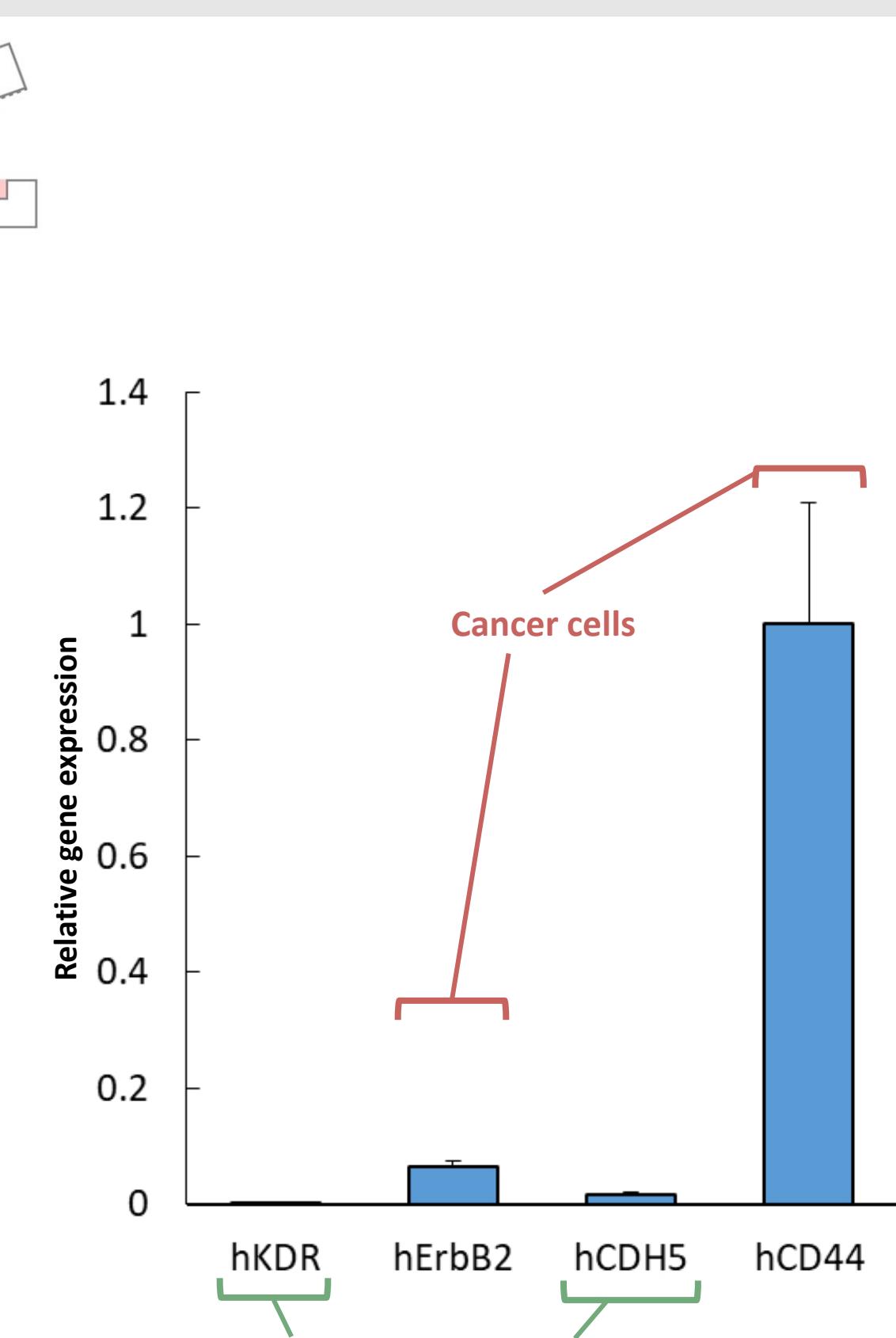


Obtention of a complete, confluent & 3D endothelium-like structure

Monitoring the extravasation



Characterisation of extravasated cells



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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