

# Microsystems to control cell environment for cancer research

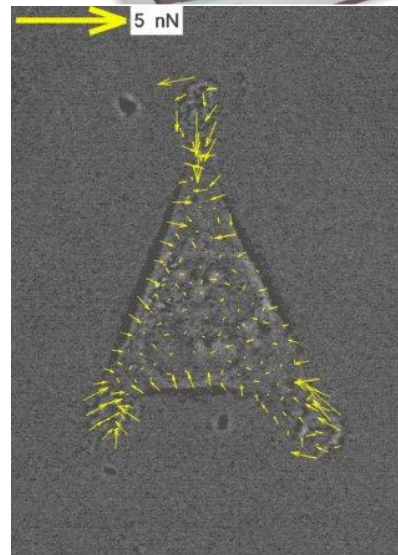
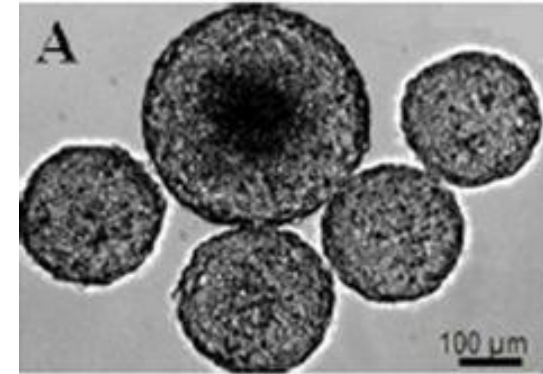
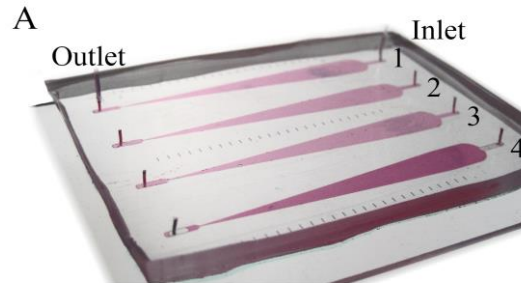
**Charlotte Rivière**

Hélène Delanoë-Ayari

Angélique Carlotta

Sylvain Monnier

Jean-Paul Rieu



Biophysic group



## Lab-on-Chip

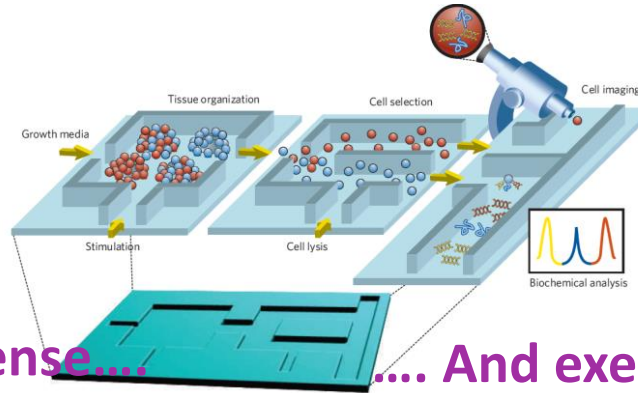
- ✓ Miniaturisation
- ✓ Point of care
- ✓ Personalized medicine

## Mechanobiology

- ✓ Role of mechanics in biology?
- ✓ Mechanotransduction

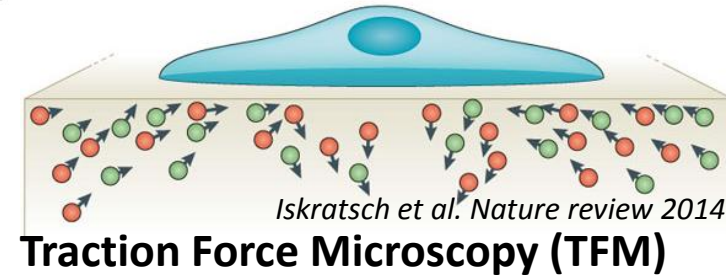
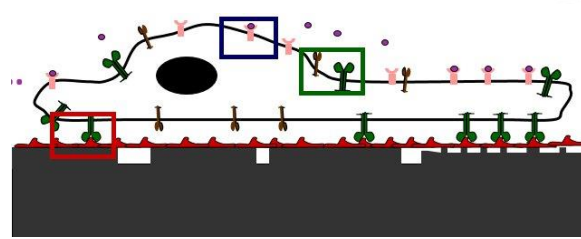
## Physics of cancer

New biomarkers ?

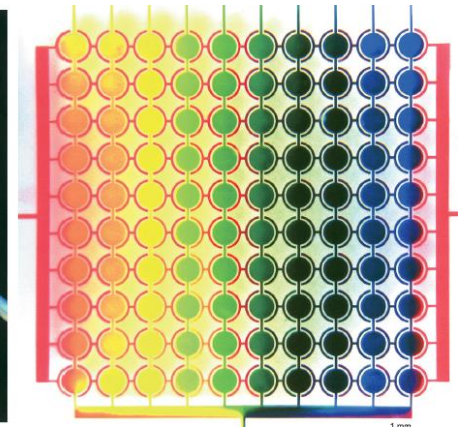
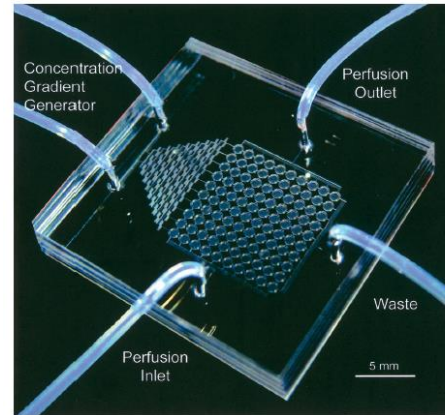
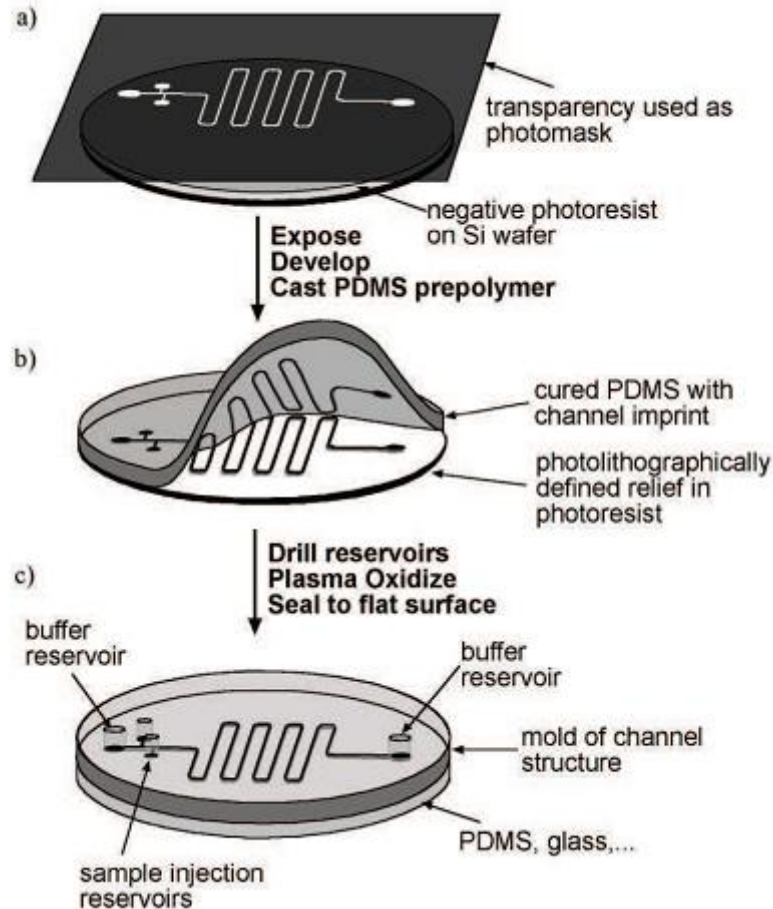


*El-Ali et al. Nature, 442 (2006)*

Cells Sense... .... And exerce forces



- Cell Shape, deformability
- Migration, Invasion index
- Cell Stiffness
- Cell adhesion strenght
- ...



*Hung, et al. Biotech. Bioeng. 89 (2005).*

✓ Control of nL to  $\mu$ L

## PDMS walls

✓ Easy to make

✓ High rigidity (Mpa)

→ *Not physiologic*

✓ Impermeable to small solubles molecules

→ *Medium Conditioning?*

**Techniques and Know How facilities**

**NANOLYON**

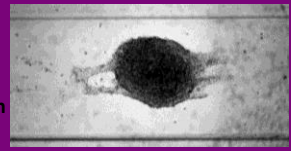
**R Fulcrand, IR**

- ✓ **Tricky to handle**
- ✓ Very soft  $E \sim 1-2$  kPa
- *Close to in vivo rigidity*
- ✓ Permeables to small molecules
- *Medium renewal*
- ✓ + fluorescent beads
- *Measure of cell-generated forces*

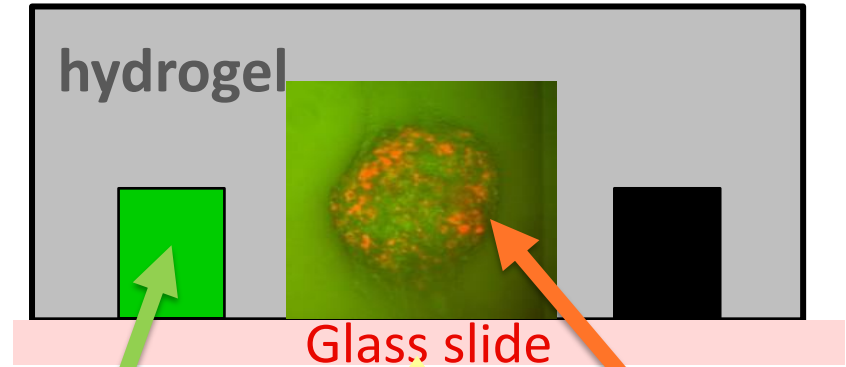
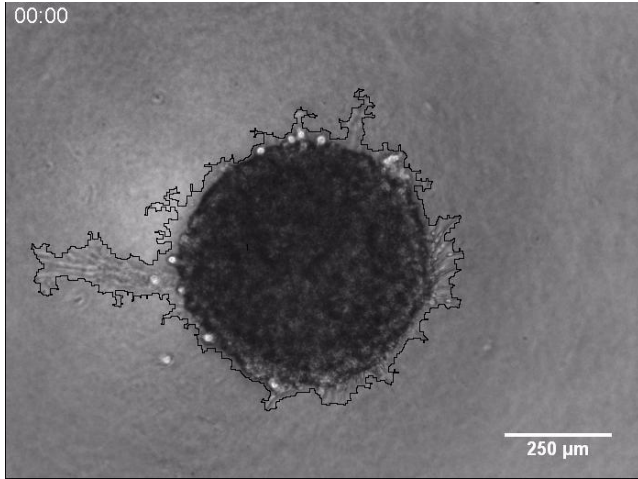


# Towards drug resistance quantification

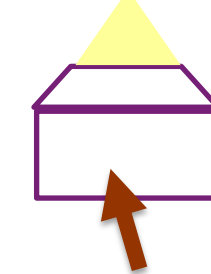
250  $\mu\text{m}$



## 3D invasion Quantification in environment close to *in-vivo* in agarose

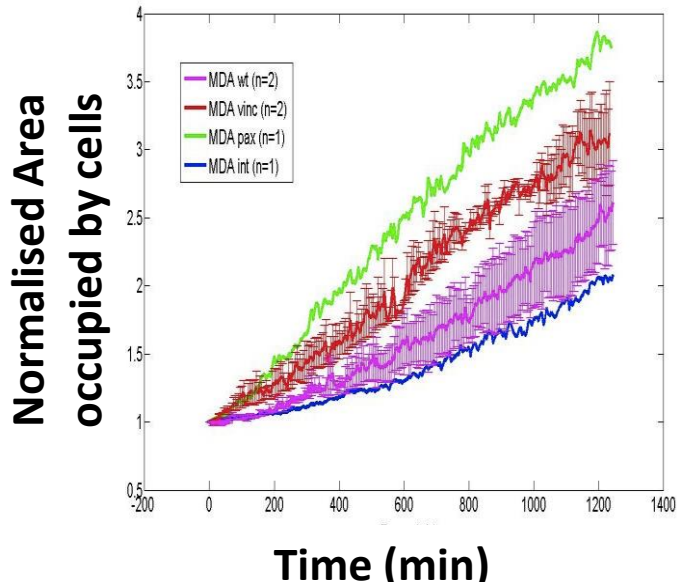


Gradient  
application  
Secretome  
collection



Time-lapse Invasion  
follow-up

Sphéroïds in  
Collagen



Colorectal Cancer Cells  
(Collab. CRCL: JJ Diaz, H. Mertani)

Undergoing project

# Thank you for your attention!

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