Microsystems to control cell environment for cancer research

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Biophysic group
control and decipher cancer cells

Lab-on-Chip
✓ Miniaturisation
✓ Point of care
✓ Personalized medicine

Mechanobiology
✓ Role of mechanics in biology?
✓ Mechanotransduction

Physics of cancer
New biomarkers?

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

Iskratsch et al. Nature review 2014

Microfluidic devices

- High rigidity (Mpa) → Not physiologic
- Impermeable to small solubles molecules → Medium Conditionning?
- Control of nL to µL
- Easy to make

PDMS walls

Techniques and Know How facilities
NANOLYON R Fulcrand, IR

Our specificity: hydrogel-based microfluidic

- Very soft E ~ 1-2 kPa → Close to in vivo rigidity
- Permeable to small molecules → Medium renewal
- + fluorescent beads → Measure of cell-generated forces
- Tricky to handle
Towards drug resistance quantification

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

Hydrogel

Glass slide

Gradient application

Secretome collection

Sphéroïds in Collagen

Time-lapse Invasion follow-up

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

Undergoing project

Normalised Area occupied by cells

Time (min)
Thank you for your attention!

Biophysic group

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