

Imagerie Cellulaire et le Big Data

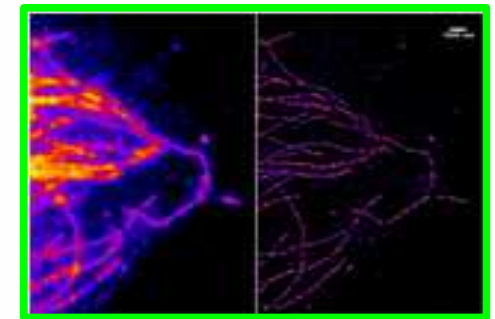
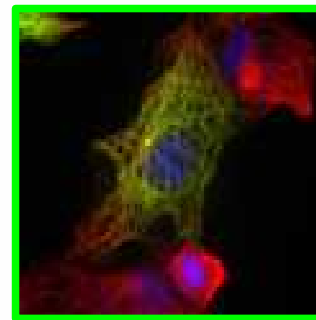


Plate-Forme Cochin Imagerie

- 13 systèmes d'acquisition
- 300 utilisateurs par an
- 1 serveur de transfère
- 4 stations d'analyse et de traitement d'image



Inserm

Institut national
de la santé et de la recherche médicale

Unité 1016



UMR 8104



Imagerie Cellulaire

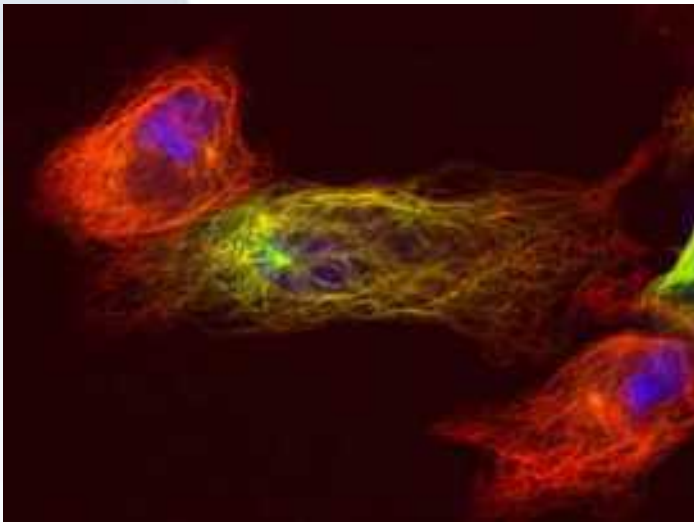


1 image : 1Mo

1 manip = 4 couleurs X 10
champs X 4 conditions =
160Mo

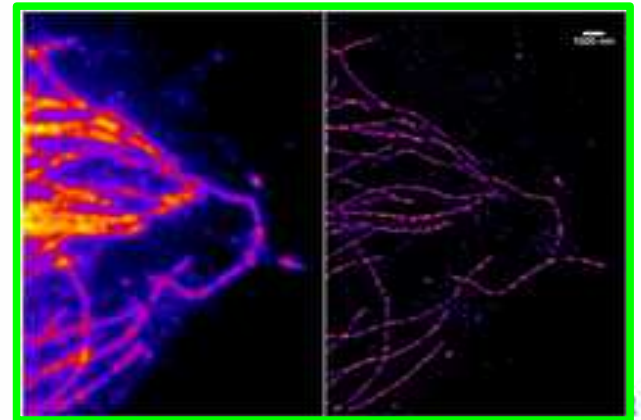
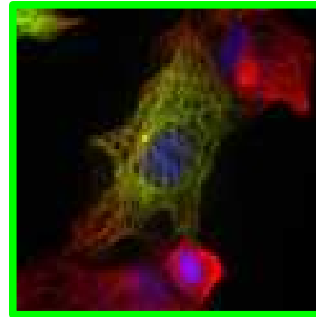
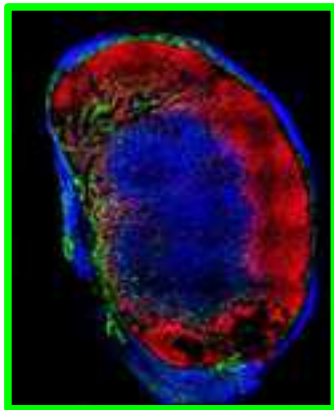
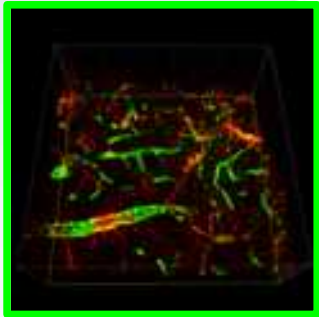
1 microscope = 5 manip / jour
= 4G /semaine = 200Go / an

1 plate-forme = 10 syst =
2To /an pendant 4 ans



Nouvelles techniques

- Deconvolution
- Lame virtuelle
- Super résolution
- Imagerie en flux

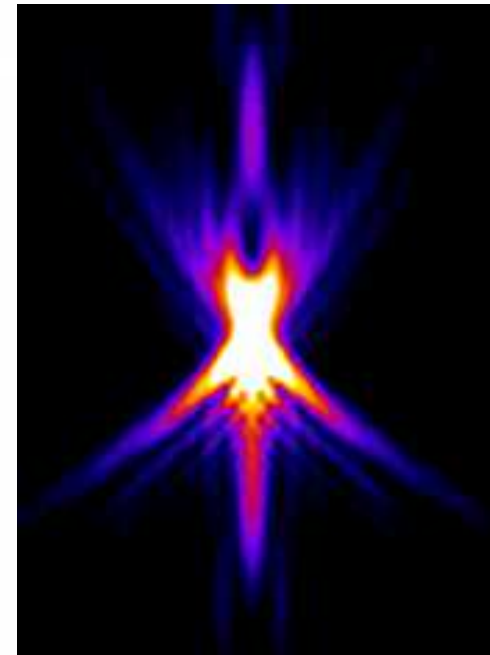
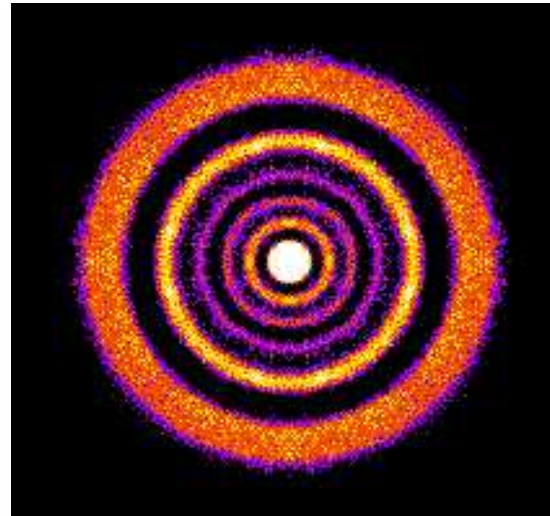


Restauration d'images par déconvolution 3D

○ →
bille de
200 nm



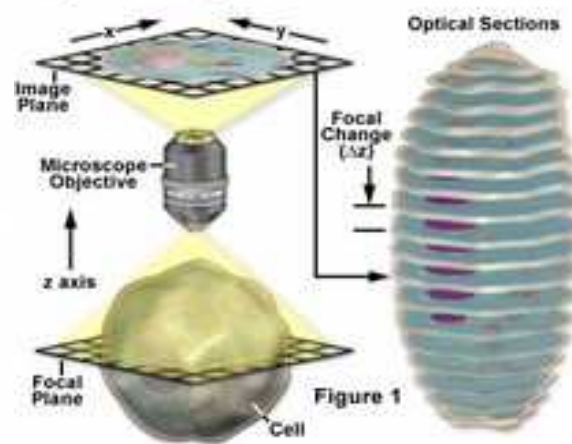
→
convolution



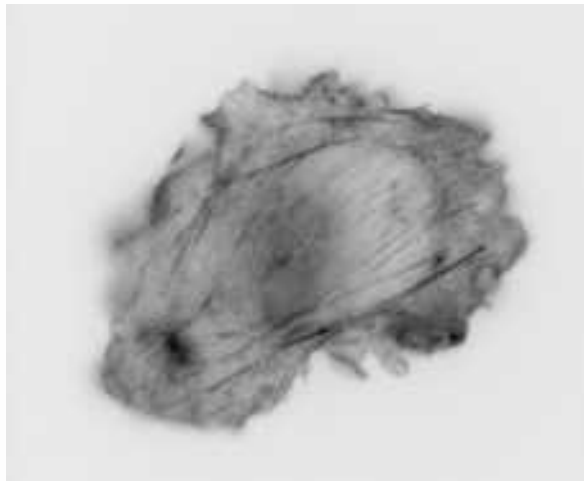
Restauration d'images par déconvolution 3D

- Acquisition en Z
 - ~ 100 images
 - 400 To /an

Acquisition of Optical Sections for Deconvolution

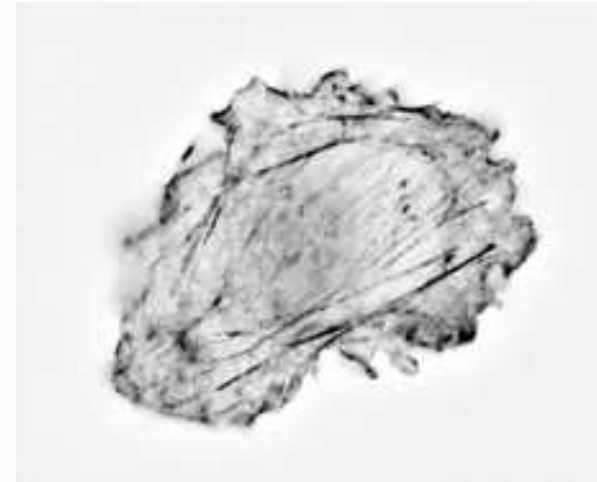


convolution



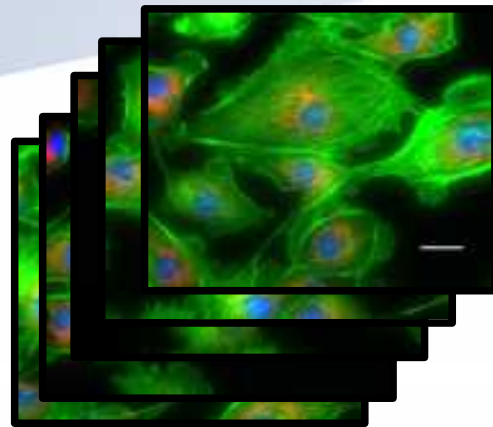
cellule COS actine

déconvolution



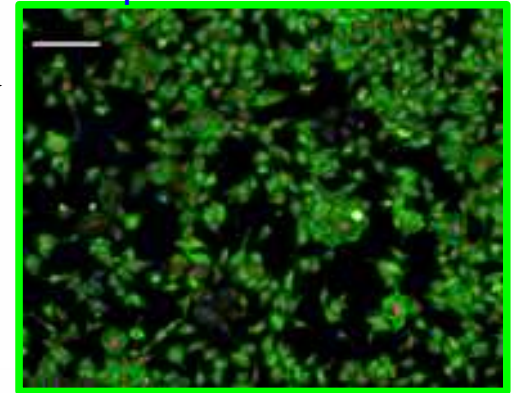
Lame virtuelle

objectif 100x
matrice 10x10



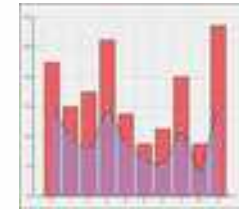
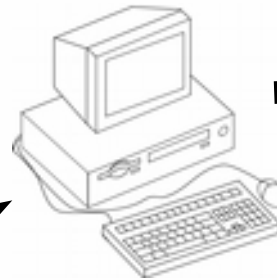
montage

100 µm



10 µm

fluorescences
colorants



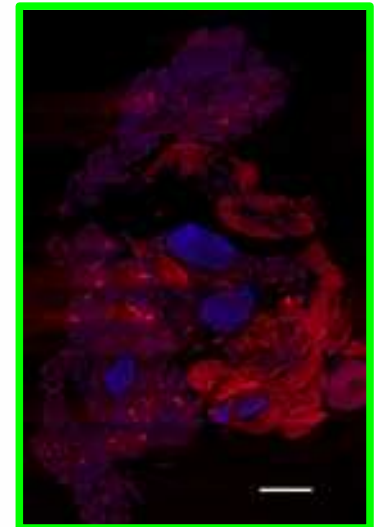
Quantification
comptage
segmentation
surface
co-localisation
statistiques

objectif 10x
matrice 8x15



100 µm

montage



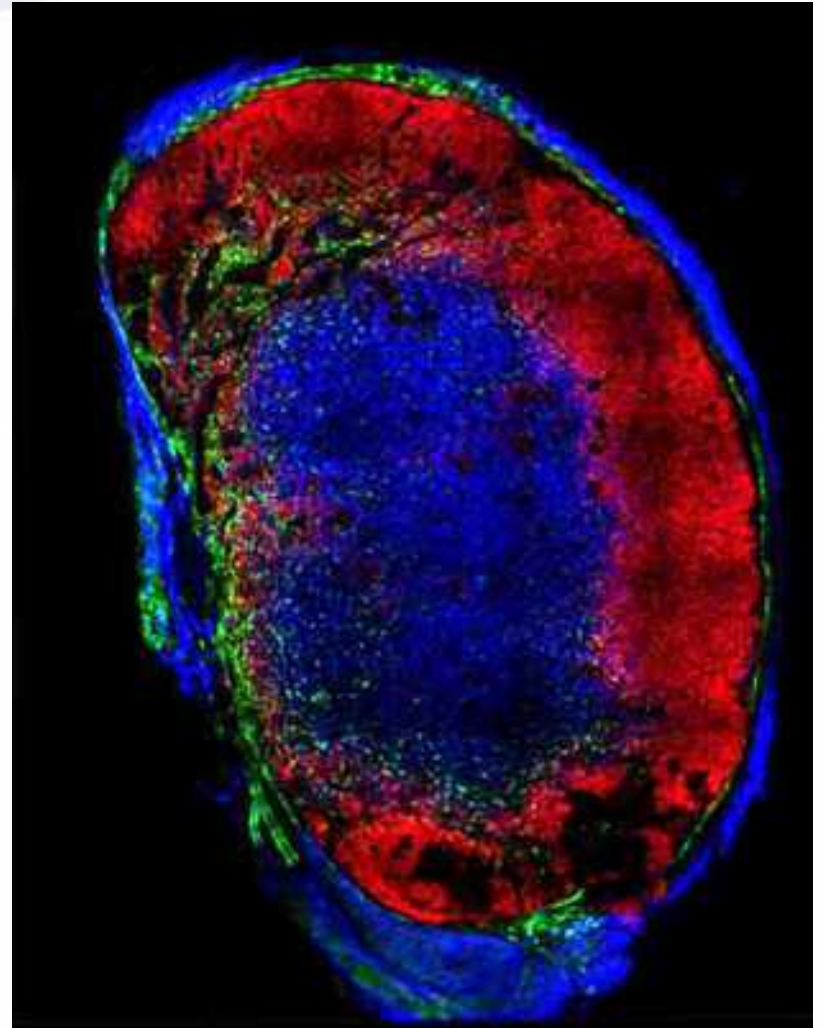
1 mm



1 manip = 1 à 10 Go

Liens entre la cellules
et l'organe

- imagerie du petit animal
- clinique



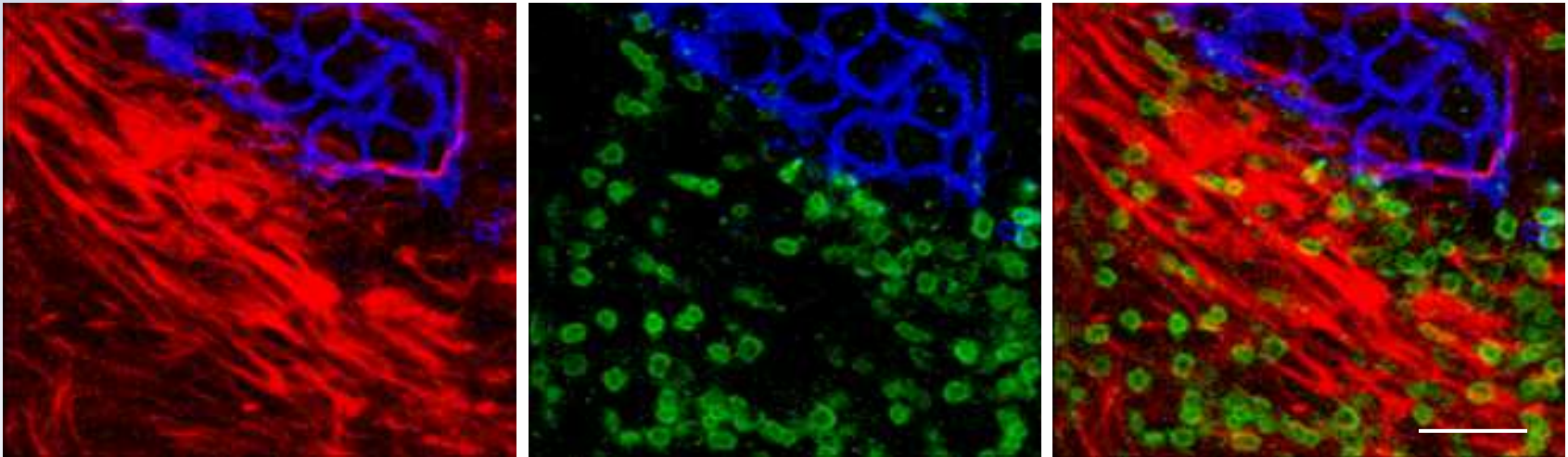
Peranzoni Elisa : ganglion murin, rouge
lymphocytes B, vert fibroblastes, bleu lymphocytes T

Microscopie *in situ*

SHG (Second Harmonic Generation)

collagène I et III, fibrogénèse, μ tubules, sarcomères, os

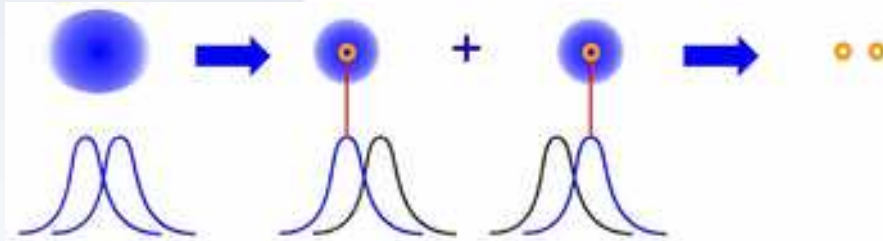
SHG EpCAM CD3 EpCAM



Liens entre cellules et structures

Super Resolution

Pointillisme
PALM STORM



microscopie
standard

clignotements

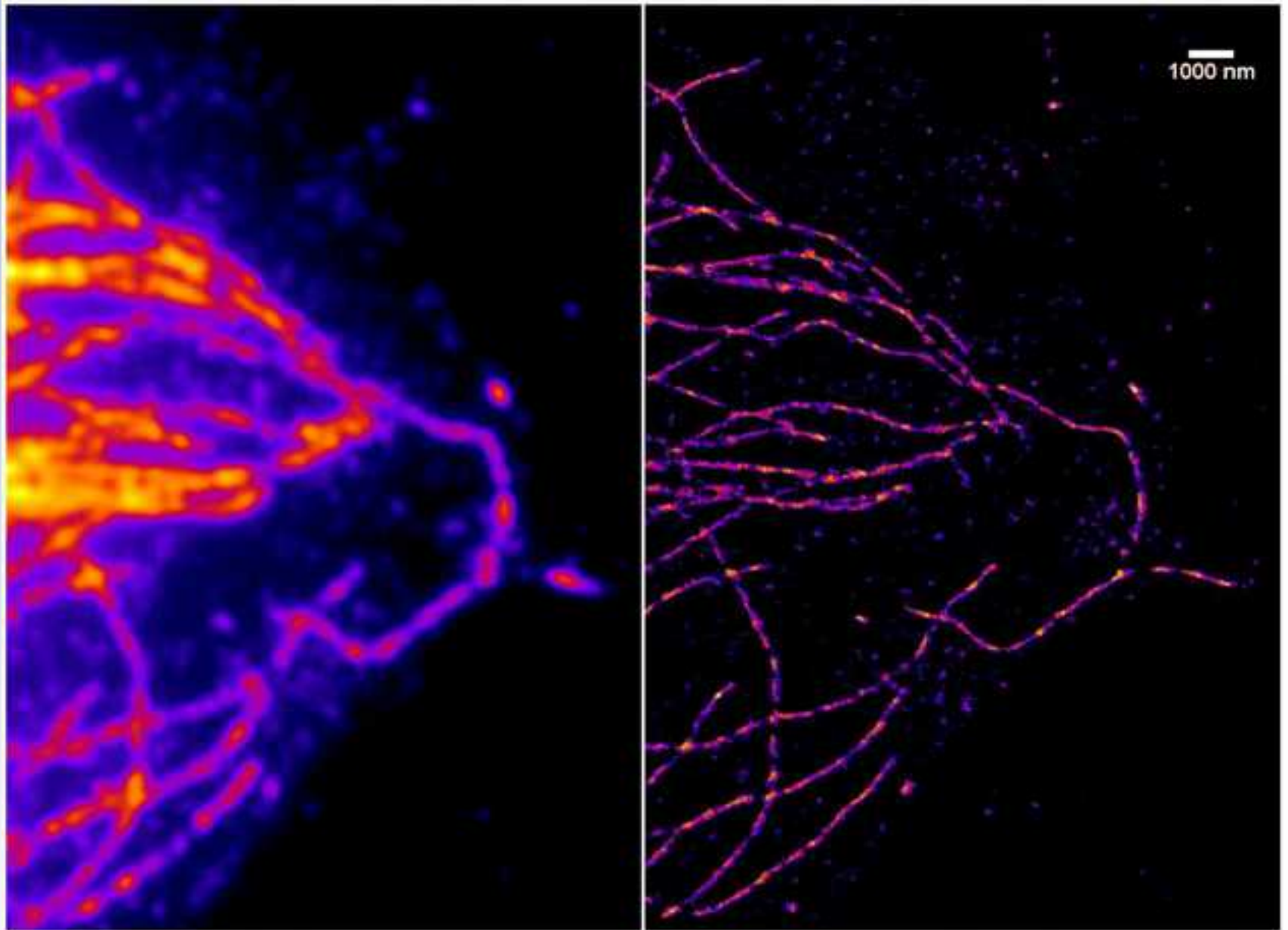


Acquisition 15Hz

Σ de
50 000
Images

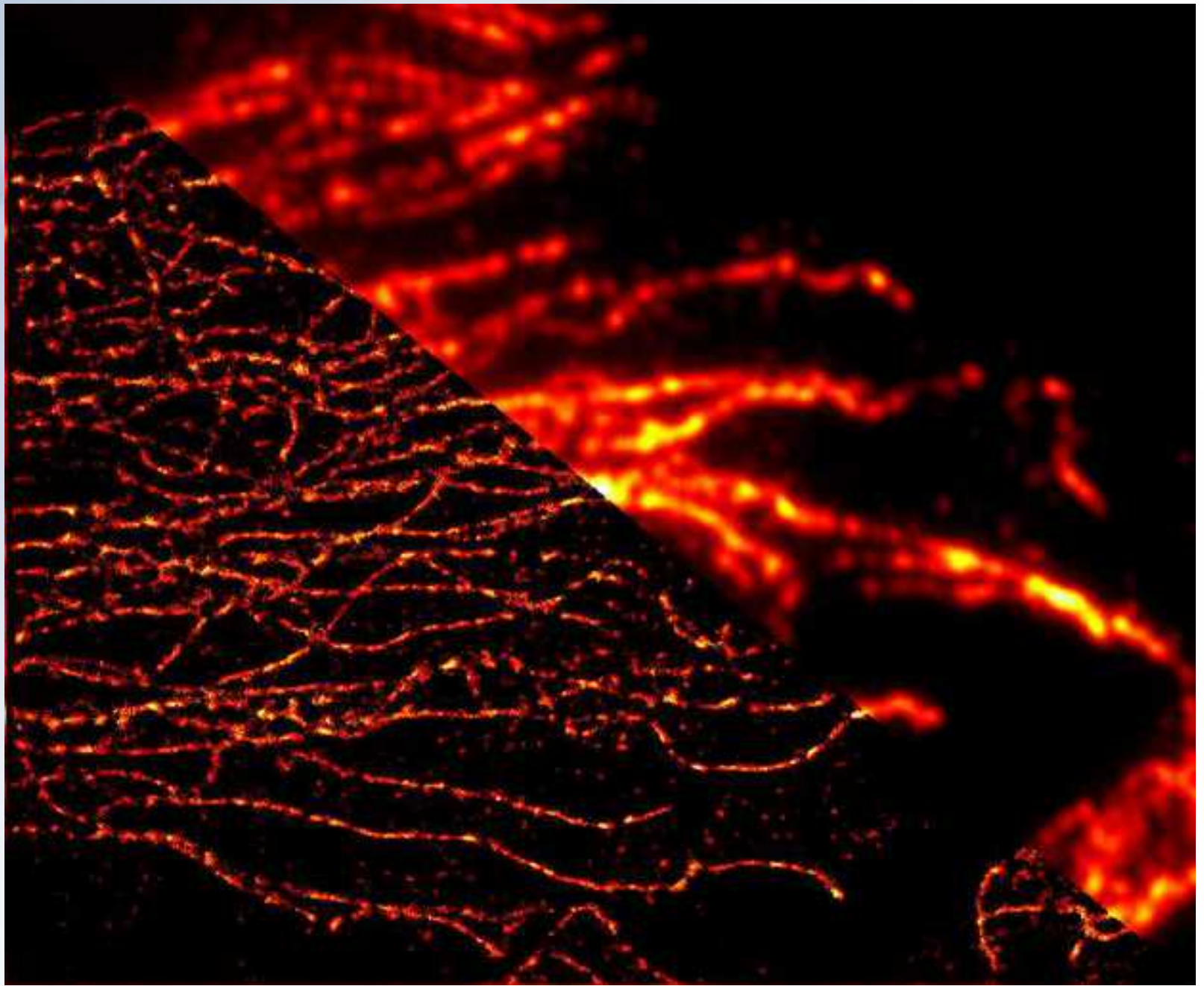


extrait La Parade
Georges Serrat



HBMEC μ tubules A647

Béatrice Durel



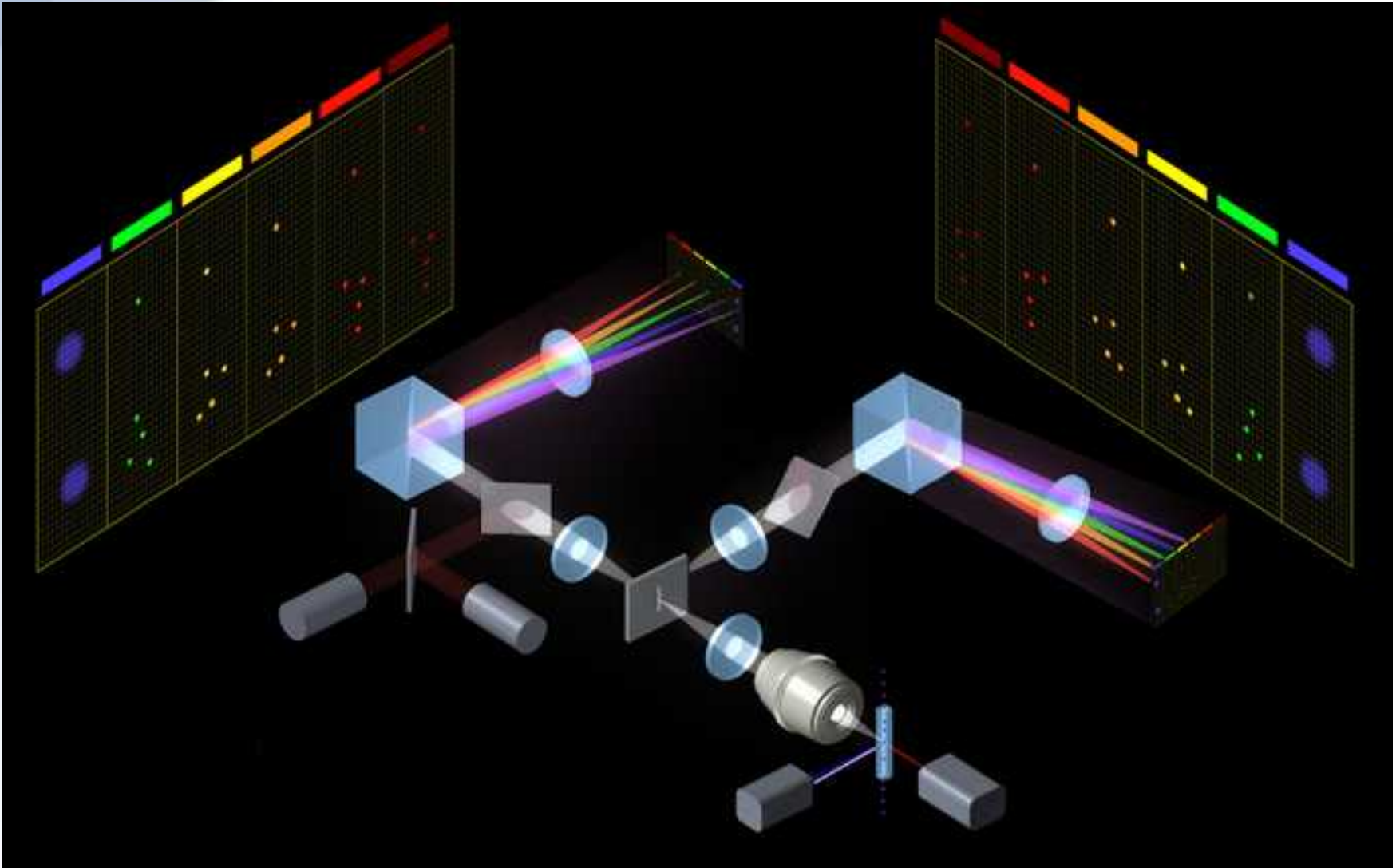
HBMEC μ tubules A647 Béatrice Durel

Imagerie en Flux

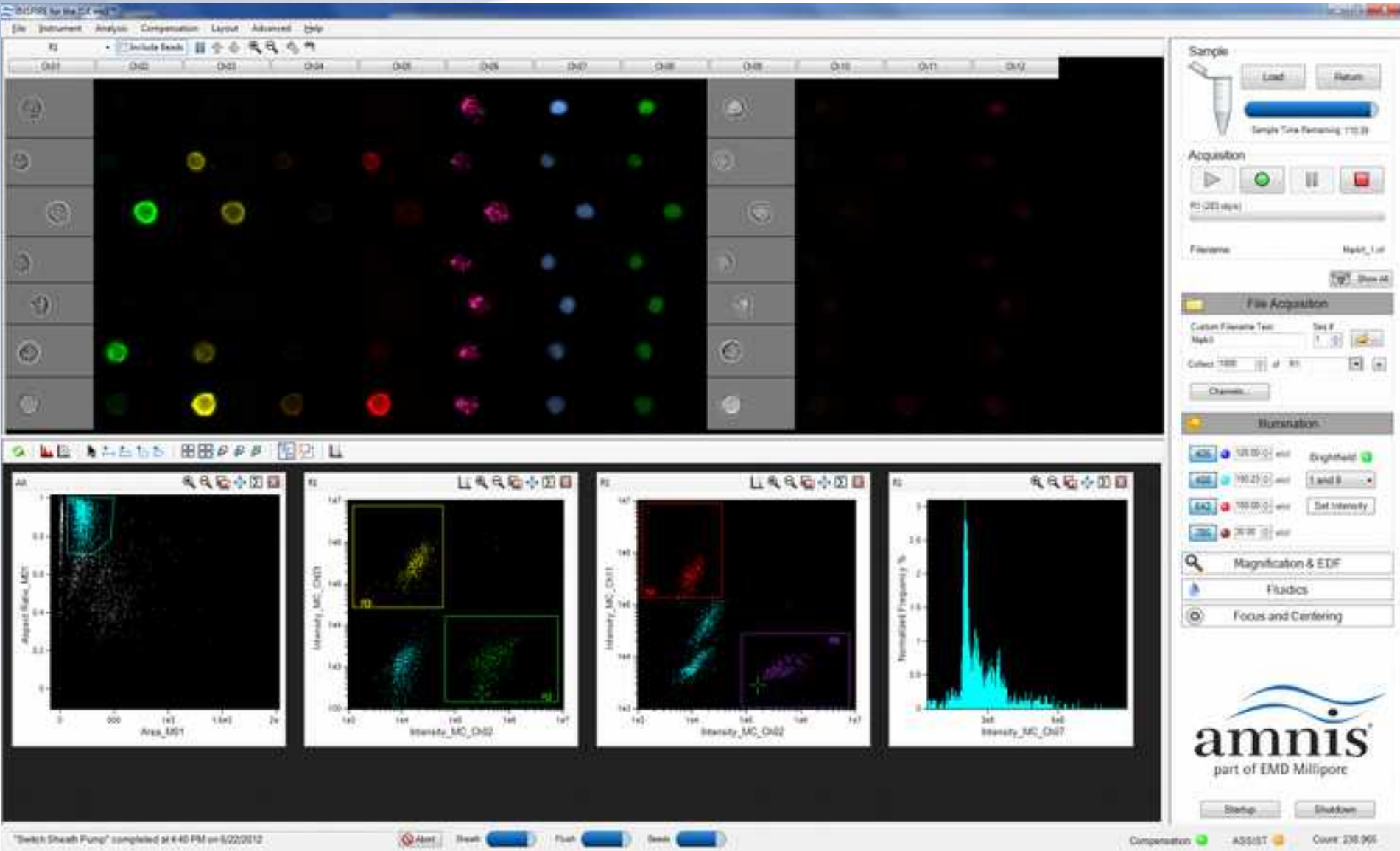


| | Flow Cytometry | Microscopy | ImageStreamx |
|---------------------|---|---|--|
| High speed | + | - | + |
| Statistical power | + | - | + |
| Imaging | - | + | + |
| Information content | - | + | + |
| Research benefit | Objective, statistical discrimination of cells based on intensity | Discrimination of cells based on appearance | Objective, statistical discrimination of cells based on appearance |

ImageStreamXMKII Optical Layout



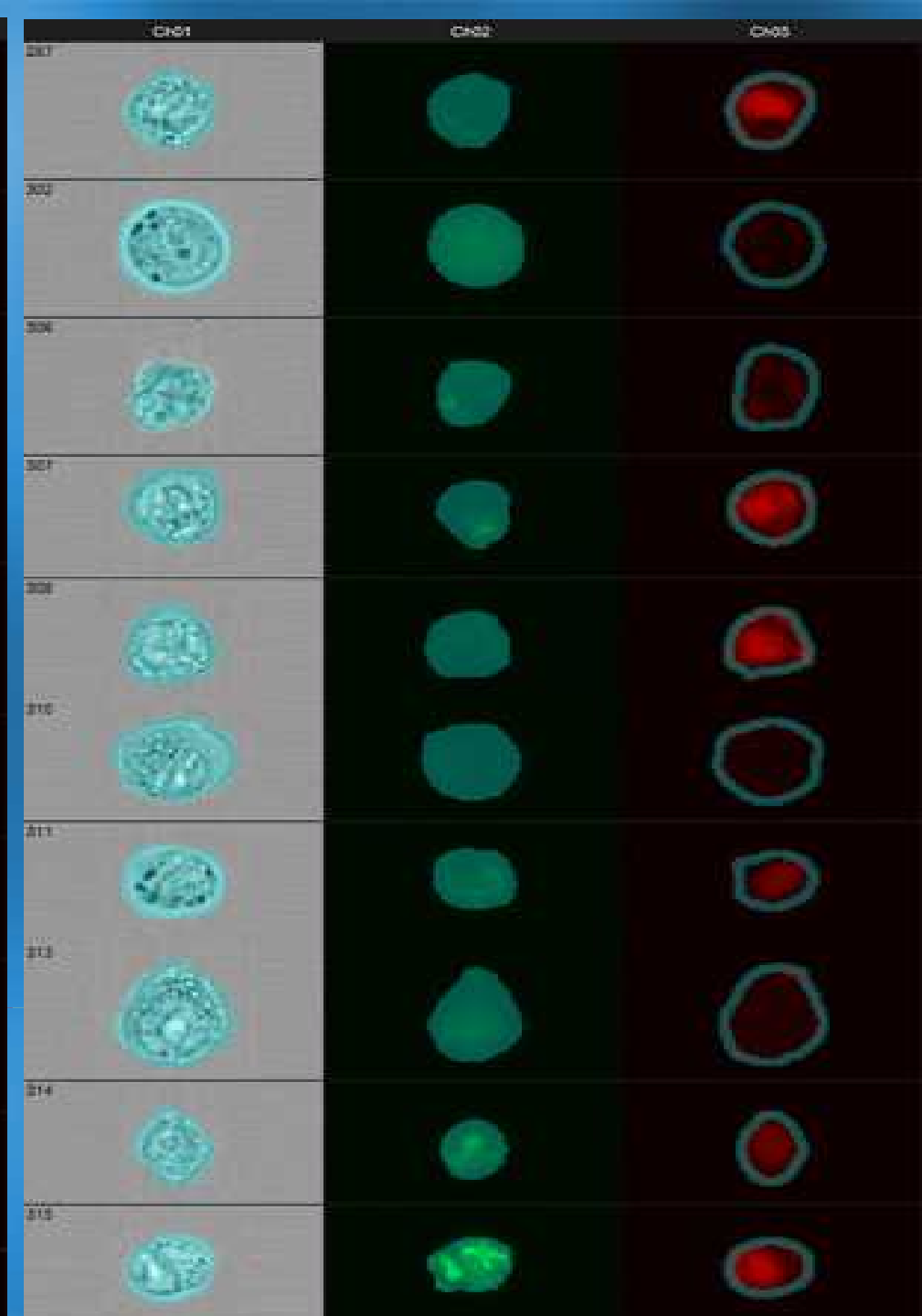
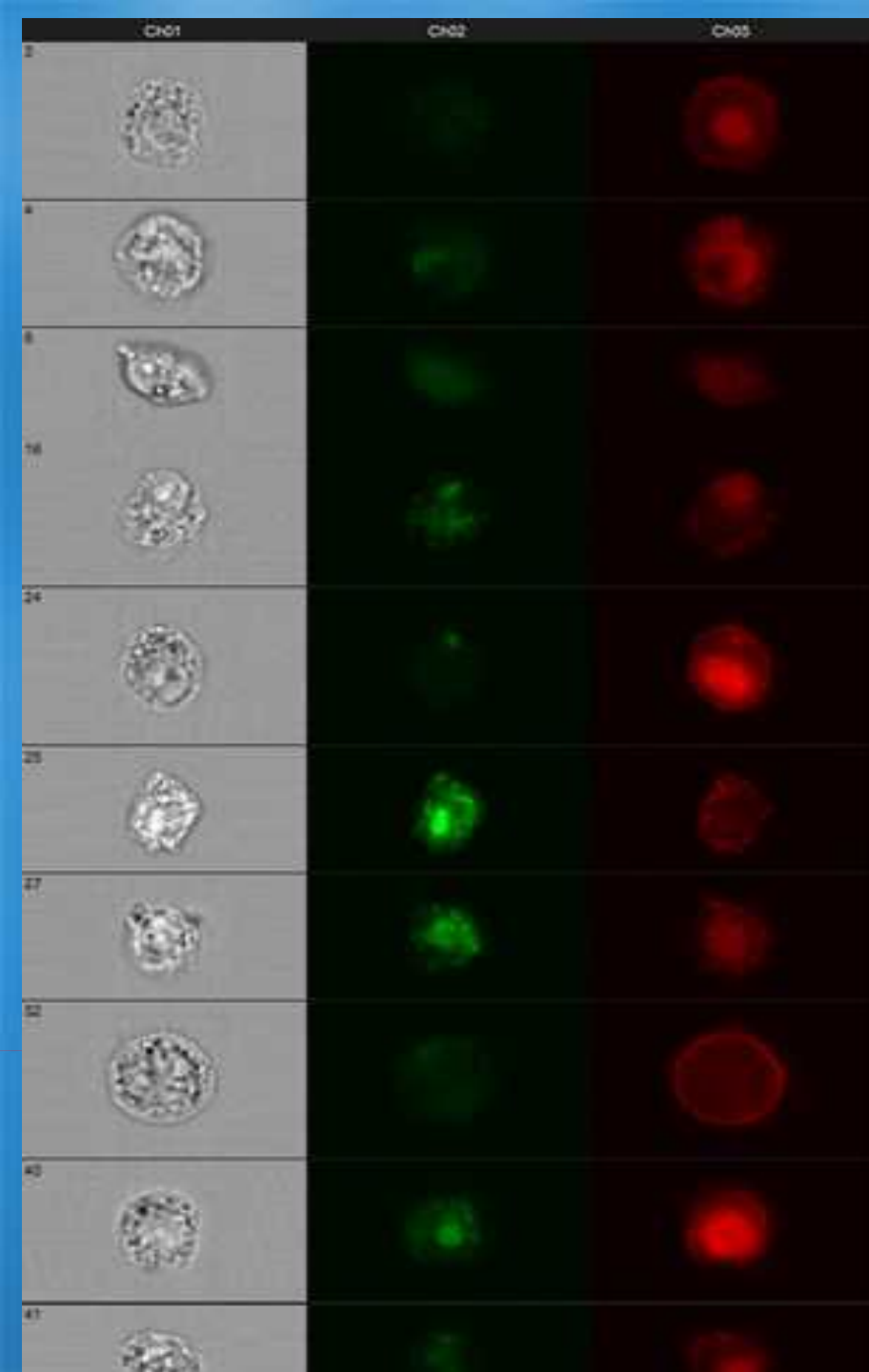
Data Acquisition MKII



amnis[®]
part of EMD Millipore

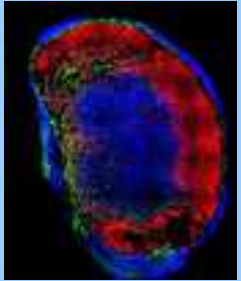
Startup Shutdown

Compensation ASSIST Count: 238,965



multi-dimensions
multi-échelles

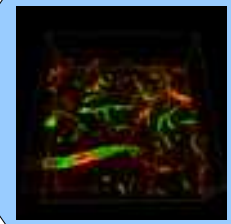
scan slide



organe
biopsie
coupe

mm

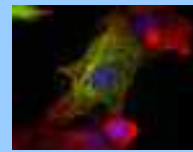
in situ



SHG
profondeur

μm

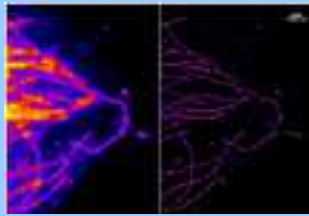
in vivo



mvt cell
mvt mol
TIRF
FRET
PA-PF

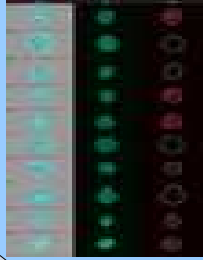
L2 L3

super-resolution



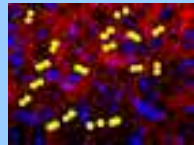
nm

imagerie en flux



Interactions
coloc
translocation
morpho
cycle

traitement
d'images



deconvolution
quantification
macro

100 To / an

Sauvegarde
Archivage
Liens

Cochin Imaging Facility

thank

PALM STORM

- [Béatrice Durel](#)
- Mébarek Témagoult
- Déborah Sitbon
- Anaïs Bourges
- Mariano Gonzalez
- Niedergang lab
 - Floriane Herite
- Bourdoulous lab
 - Valentina Covarelli
 - Nawal Maissa
- Benmerah lab

quality

- Béatrice Durel
- Yousra Lottin

multi-photon SHG OPO

- [Thomas Guilbert](#)
- [Valérie Drouet](#)
- Mathilde Bruge
- Camille Lebugle
- Emmanuel Donnadiou

deconvolution

- Jérôme Touvier
- Cécile Fort

scan slide

- Camille Lebugle
- Kompheak Eav