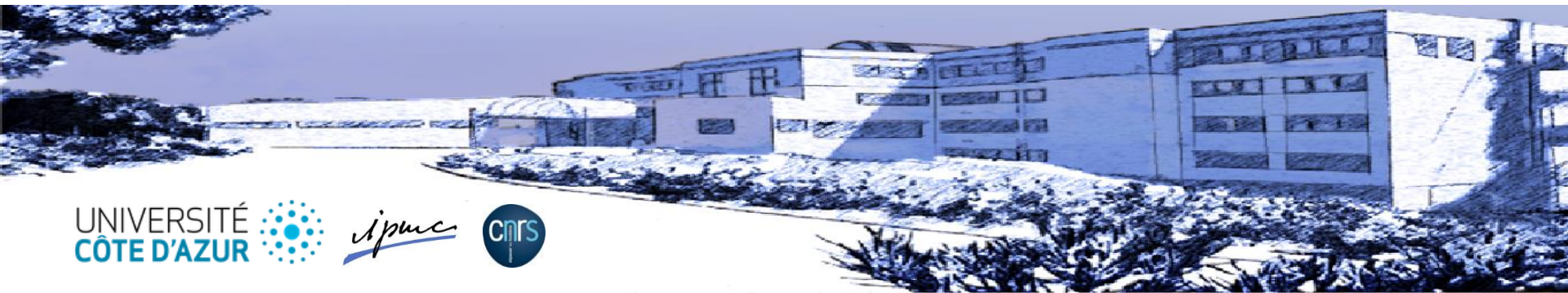# Spatial Transcriptomics session

Introduction

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Academics labs scientific priorities

Twitter survey a few weeks ago
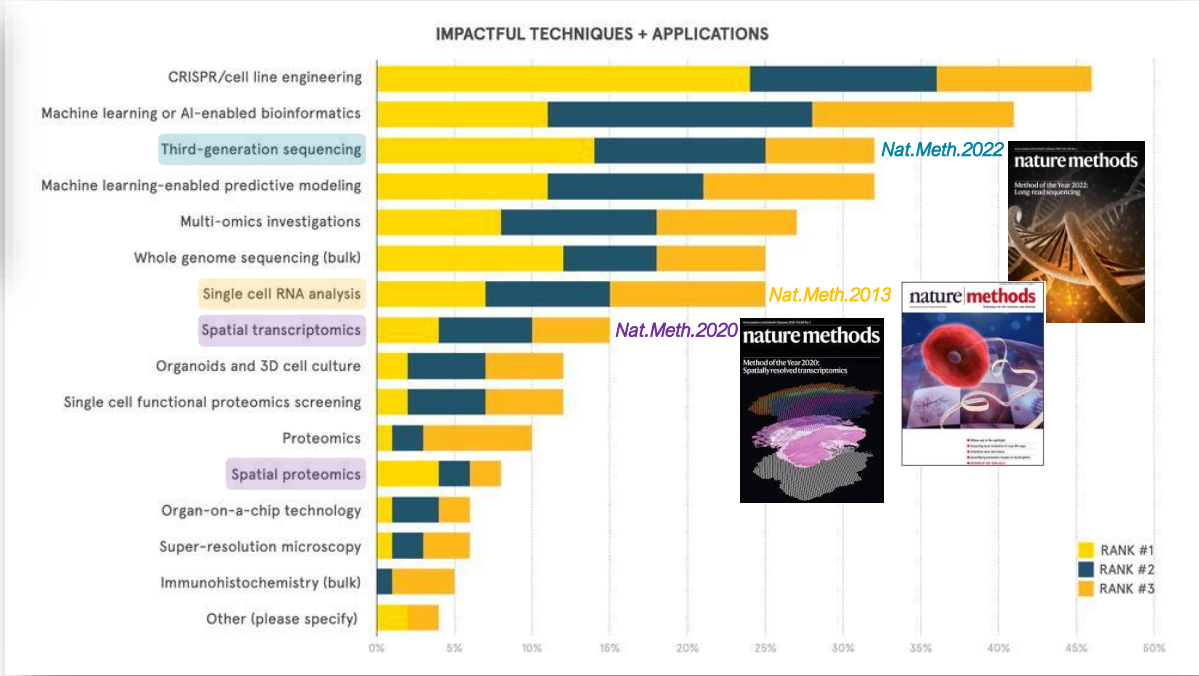
20 years of transcriptomics

Driven by microfluidics technological developments
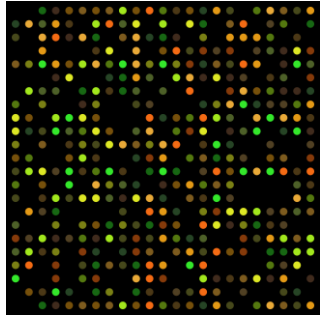
Early 2000's: DNA microarray

- Large-scale transcriptome
- Oligonucleotide probe tilling
- Fluorochrome signal analysis
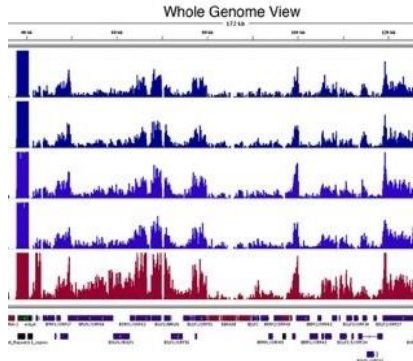- Bulk resolution
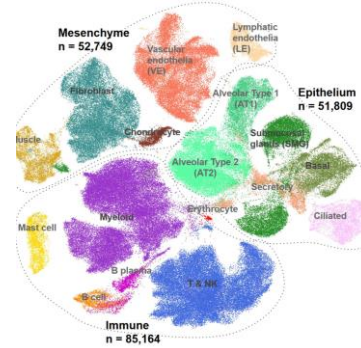
Cost : 4k€
20 samples
25k genes
0,5M matrix

Late 2000's: RNA sequencing

- Whole transcriptome
- Next Generation Sequencing
- Full-transcript coverage
- Bulk resolution

Cost : 4k€
20 samples
50k genes
1M matrix

Mid 2010's: Single-cell
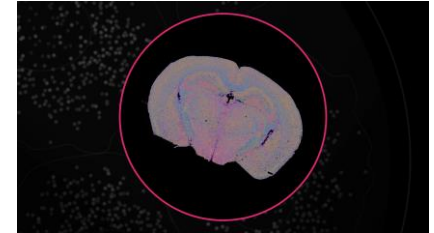
- Whole transcriptome
- Microfluidics + NGS
- 3p-end gene signal (UMI)
- Sensitivity (6%)
- Single-cell / state resolution

Cost : 4k€
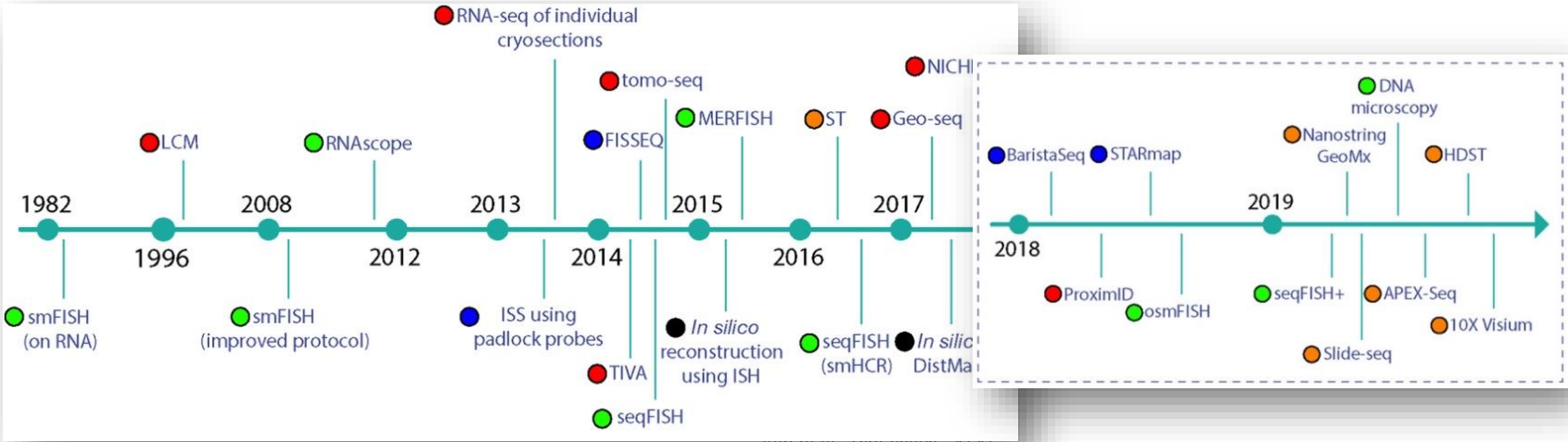5k cells
50k genes
250M matrix

2020's : Spatial

- 500-1000 gene targets
- Imaging analysis
- Multiplexing FiSH (single molecule)
- Sensitivity (30-80%)
- Sub-cellular resolution

Cost : 4k€
250k cells
1k genes
250M matrix
+ Spatial dimension

Spatial transcriptomics

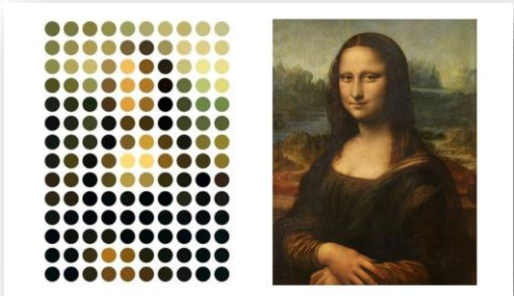Timeline

Asp et al., BioEssays, 2020

- Section 1. Technologies based on microdissected gene expression
- Section 2. *In situ* hybridization technologies
- Section 3. *In situ* sequencing technologies
- Section 4. *In situ* capturing technologies

Spatial transcriptomics (2019-2022)

Visium is widely adopted by academics

- Deconvolution tools can be use to recover proportion of single cell type

- Visium HD single cell resolution ?
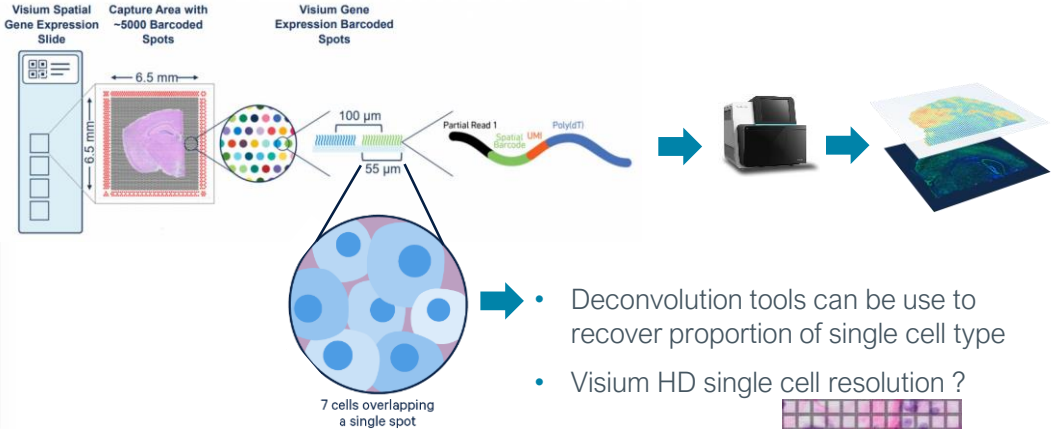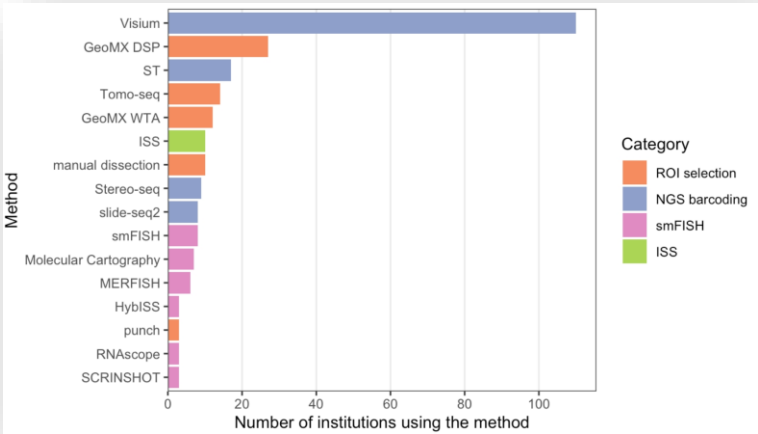
But is not the ideal readout for spatial biology
(Akoya credit rough caricature)
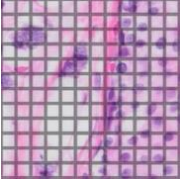
Spatial transcriptomics imaging (2023)

No more sequencing for true single-cell resolution

- Lower gene targets (from whole transcriptome to 500-1,000 genes)
- Higher sensitivity (from <10% to 30-80%)
- Same imaging area range (from 40 to 16-100mm2)
- Higher resolution (from 55 µm to subcellular)

WHOLE SECTION　　　**WIDE FIELD OF VIEW**　　　**SUB-CELLULAR**
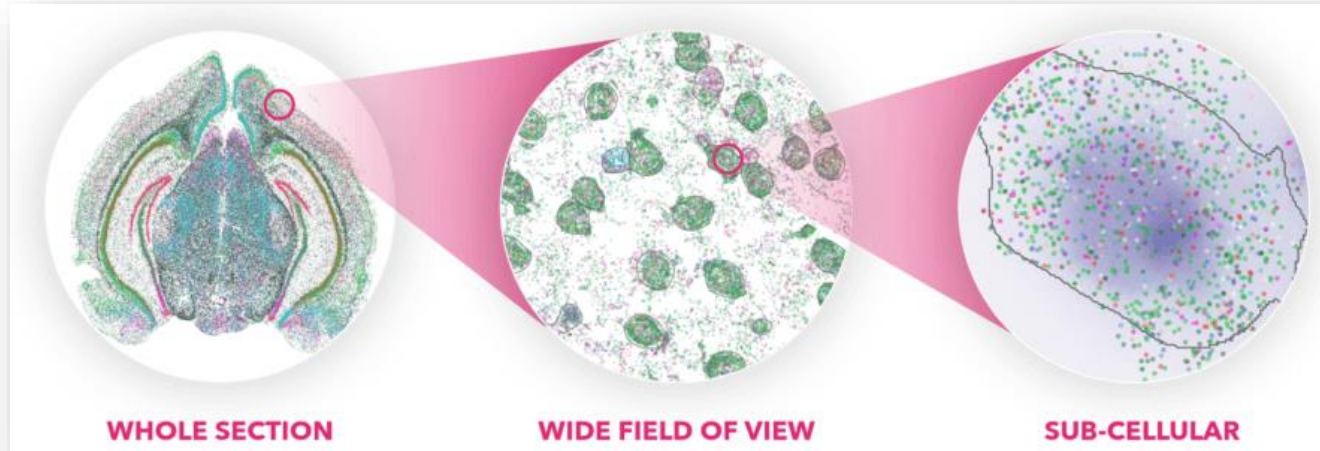
Nanostring cosMx

Vizgen Merscope

10xGenomics Xenium

Spatial transcriptomics session

Spatial Transcriptomics		
9h15-9h25	Introduction to the transcriptomic session	K. Lebrigand (IPMC, Valbonne)
9h25-9h40	"Xenium: High Performance In Situ Made Fast and Easy"	A. Castro (10x Genomics)
9h40-9h55	« The Hyperion Imaging System™ to explore Complex Biological Systems – Applications presented by AMK BIOTECH »	S. Thambirajah (Standard BioTools) A. Meghraoui (AMKbiotech)
9h55-10h25	« Multiplexed Spatial profiling of adult Skeletal Muscle »	Lorenzo Giordani (Centre de Recherche en Myologie, Paris)
Coffee break & stands		
11h-11h15	« Single Cell Spatially Resolved Transcriptomic Imaging with MERSCOPE »	M. Ploquin (Vizgen)
11h15-11h45	Single-cell to Spatial isoform transcriptomics	K. Lebrigand (IPMC, Valbonne)