AI LAB

1.3&4 – LET'S LOOK AT SOME DATA FOR REAL

FRANCESCA M. BUFFA

LAB STRUCTURE

- INTRODUCTION
- THE DATA
- THE AI-LAB CHALLENGE – PART 1
- PART 1 - SHARING AND DISCUSSION

- UNSUPERVISED LEARNING EXAMPLES
- THE AI-LAB CHALLENGE – PART 2
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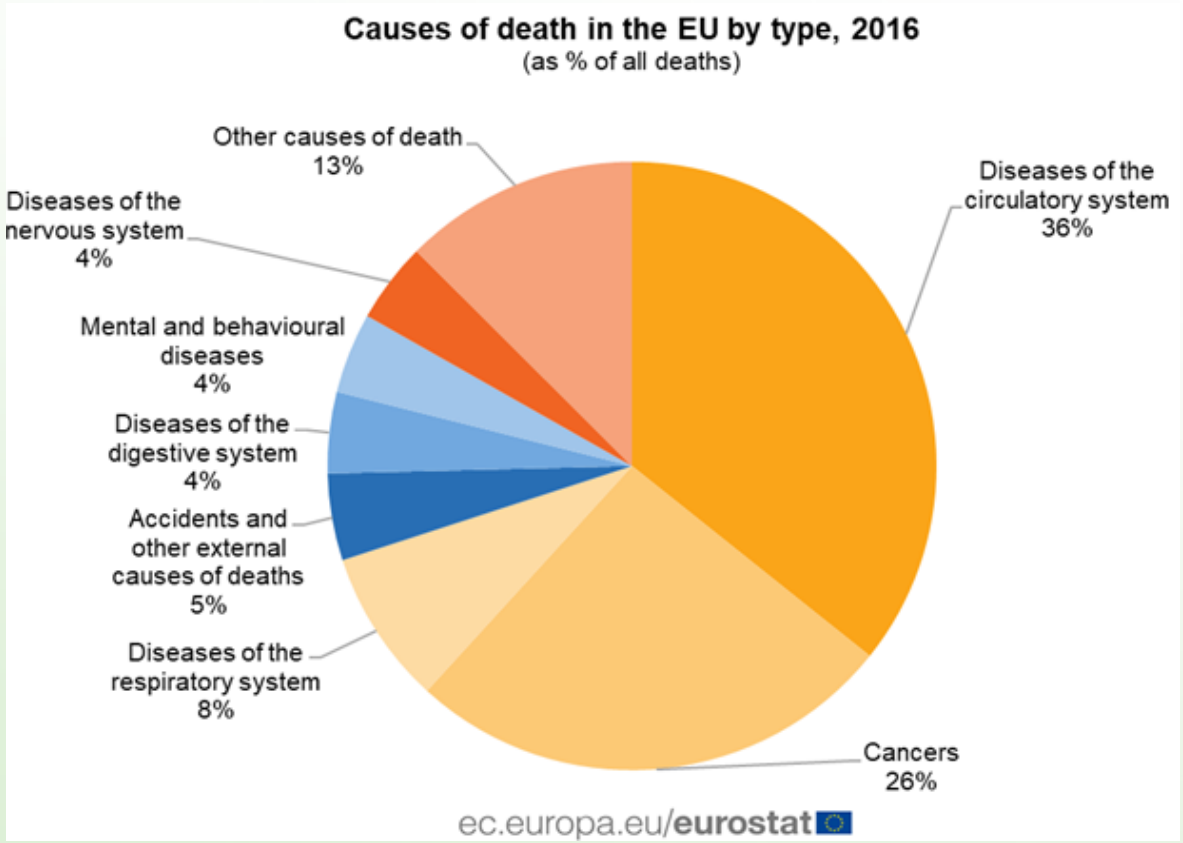
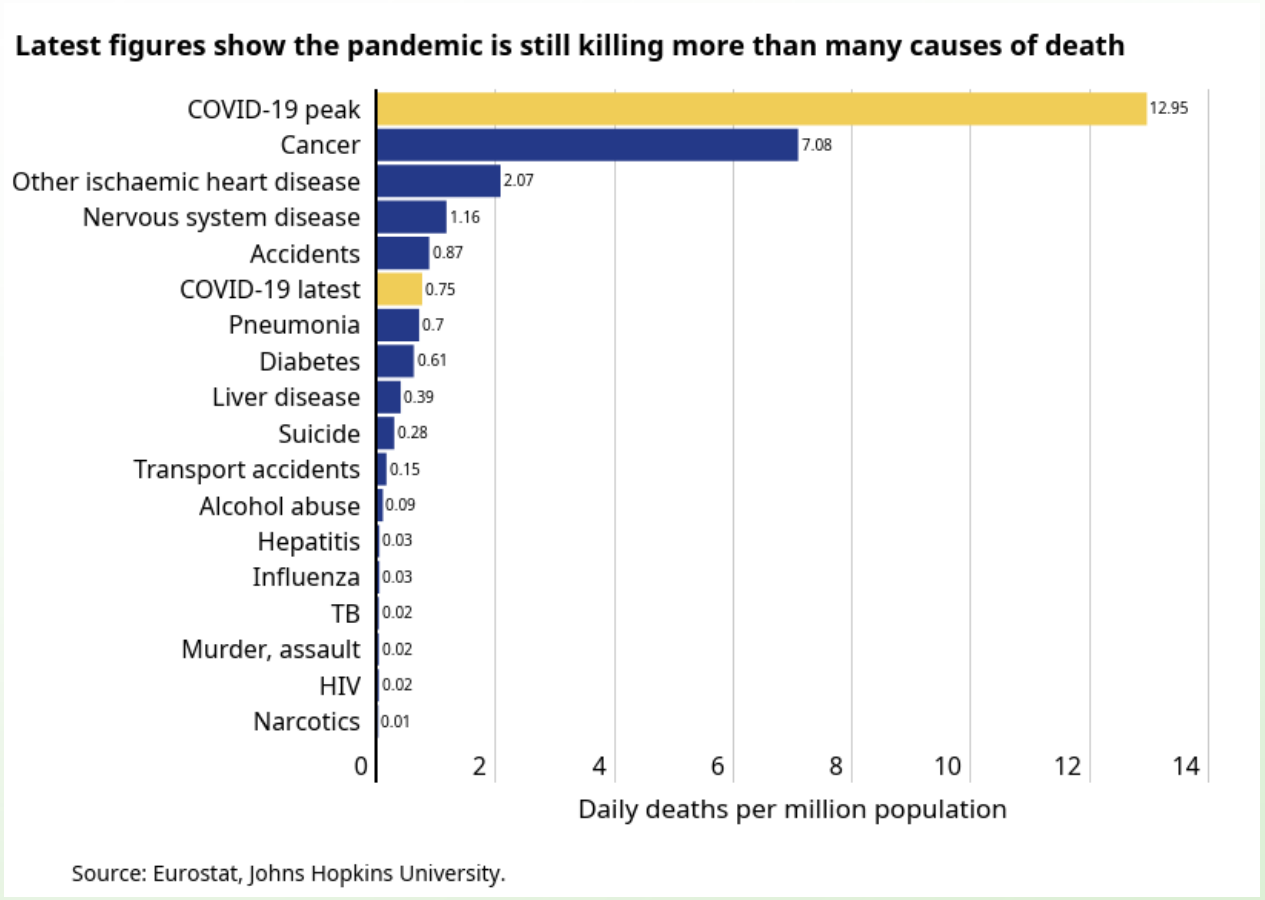
CHALLENGE - PART 1

- DIVIDE INTO GROUPS, 4-5 PEOPLE PER GROUP IF POSSIBLE
- DOWNLOAD 3 GENE EXPRESSION MATRIXES FROM LINK-D
- THE DATA YOU WILL DOWNLOAD ARE CONFIDENTIAL AND FOR USE IN THIS COURSE ONLY
- LOOK AT THE DATA DISTRIBUTION (PLOT, CALCULATE DESCRIPTIVE STATISTICS, ETC)
- LOOK AT THE DATA STRUCTURE (PCA, CLUSTERING)
- COMPARE THE 3 DATASETS
- WRITE REPORTS WITH YOUR INITIAL COMPARISON OF THE 3 DATASETS,
- INCLUDE THE CODE YOU USED TO GENERATE THE REPORTS
- UPLOAD YOUR REPORTS TO LINK-U

SOME BACKGROUND: CANCER

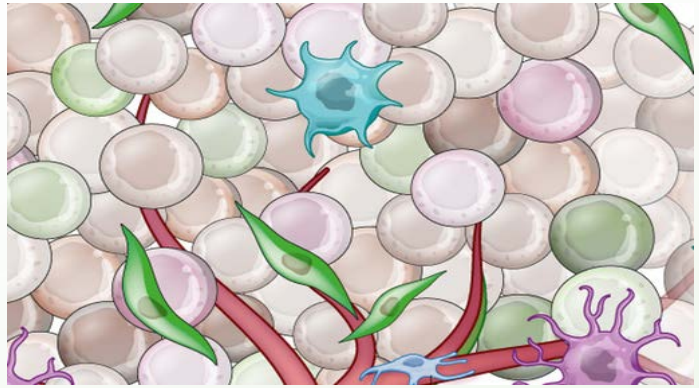




THE CHALLENGE

Cancer is a complex and heterogeneous disease

1. genetics
2. cell-cell signalling
3. microenvironment

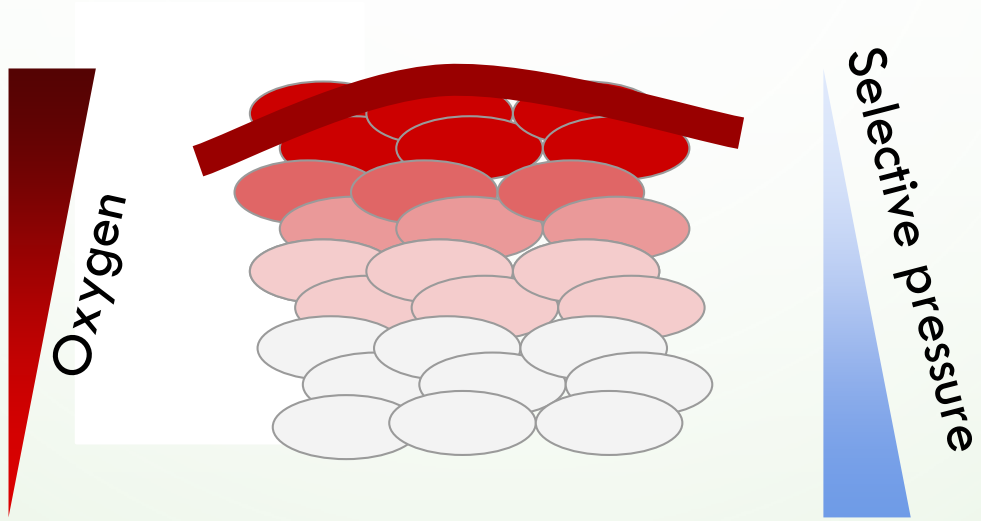


Many FDA approved drugs available

Cetuximab	*EGFR*
Bevacizumab	*VEGF*
Olaparib	*PARP*
Enzalutamide	*AR*
Pictilisib	*PI3K*

→ Therapeutic resistance

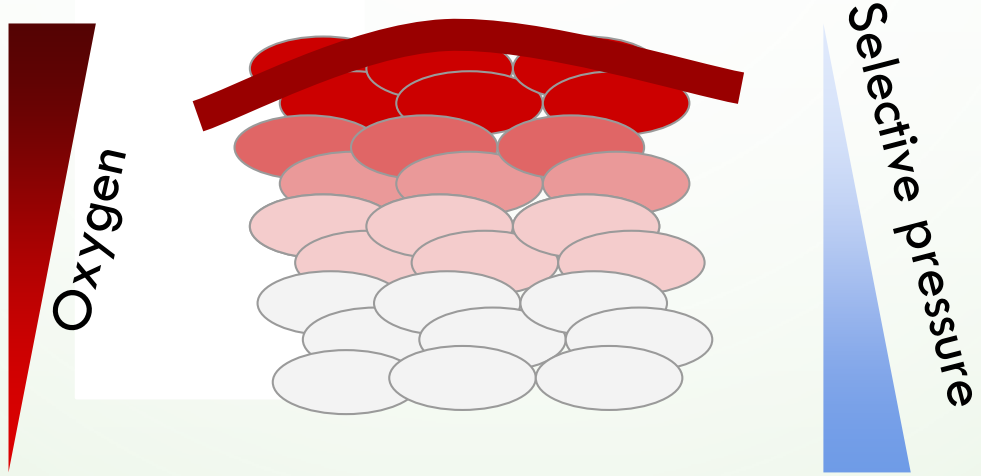
A hypoxic tumour microenvironment



A hypoxic tumour microenvironment

Hypoxia key trait of the tumour microenvironment
Genome Med (2011)

Key methodology to identify hypoxic tumours
Cancer Cell (2013)

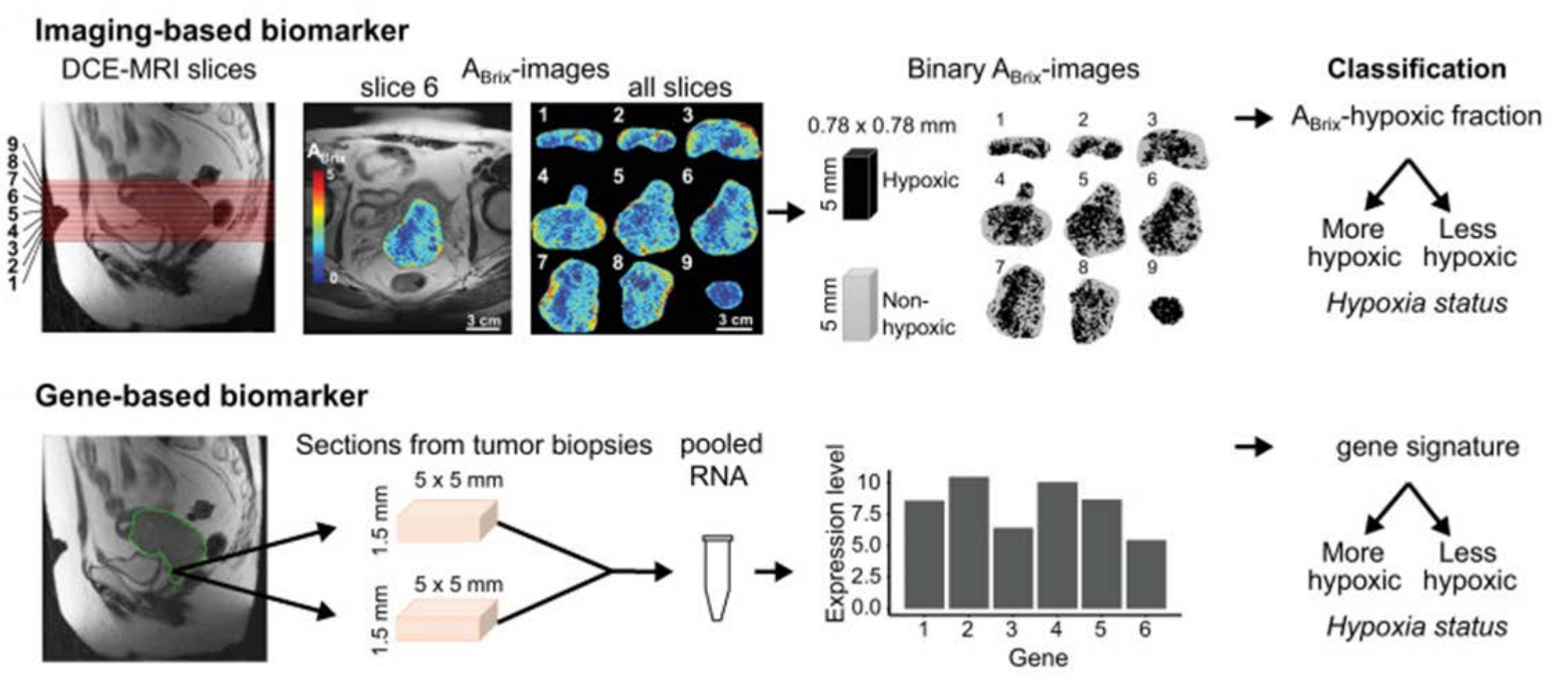


Hypoxia, poor prognosis and treatment resistance
JNCI (2011)

Hypoxia, genomic instability and selective pressure
Genome Biology (2016)

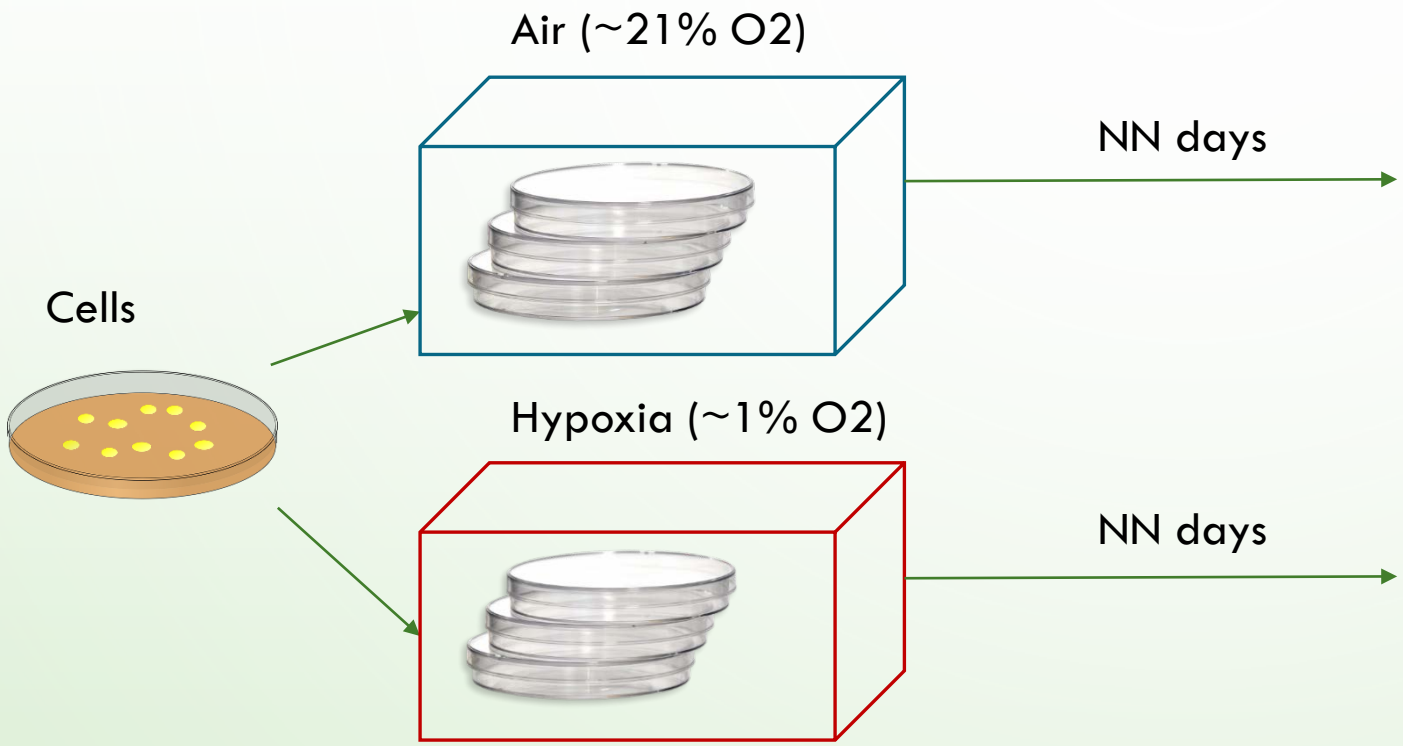
Can we identify hypoxic cells?

HOW DO WE MEASURE HYPOXIA IN TUMOURS?



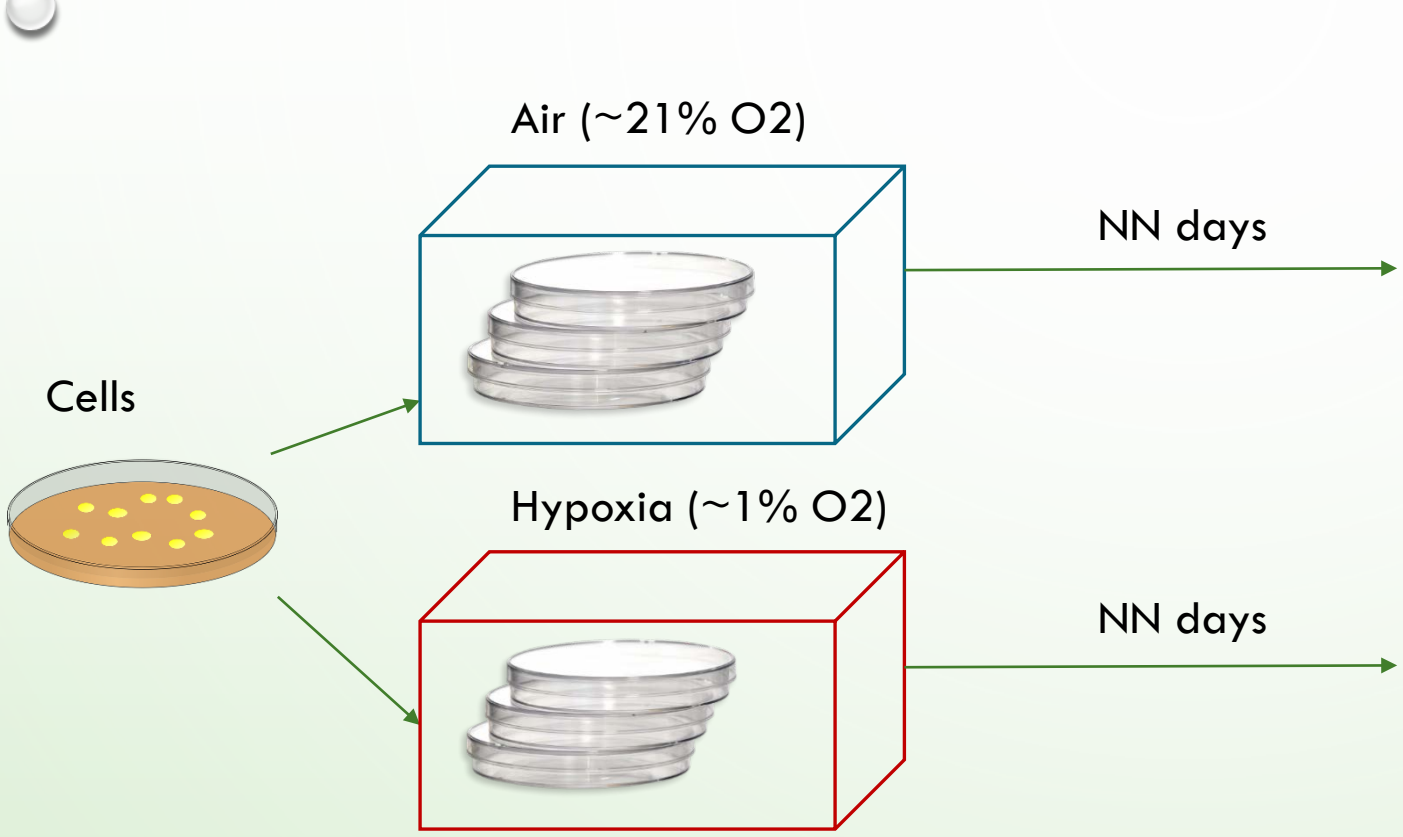
Adapted from https://www.thelancet.com/journals/ebiom/article/PIIS2352-3964(20)30216-4/fulltext

DERIVE GENE BASED BIOMARKER IN THE LAB

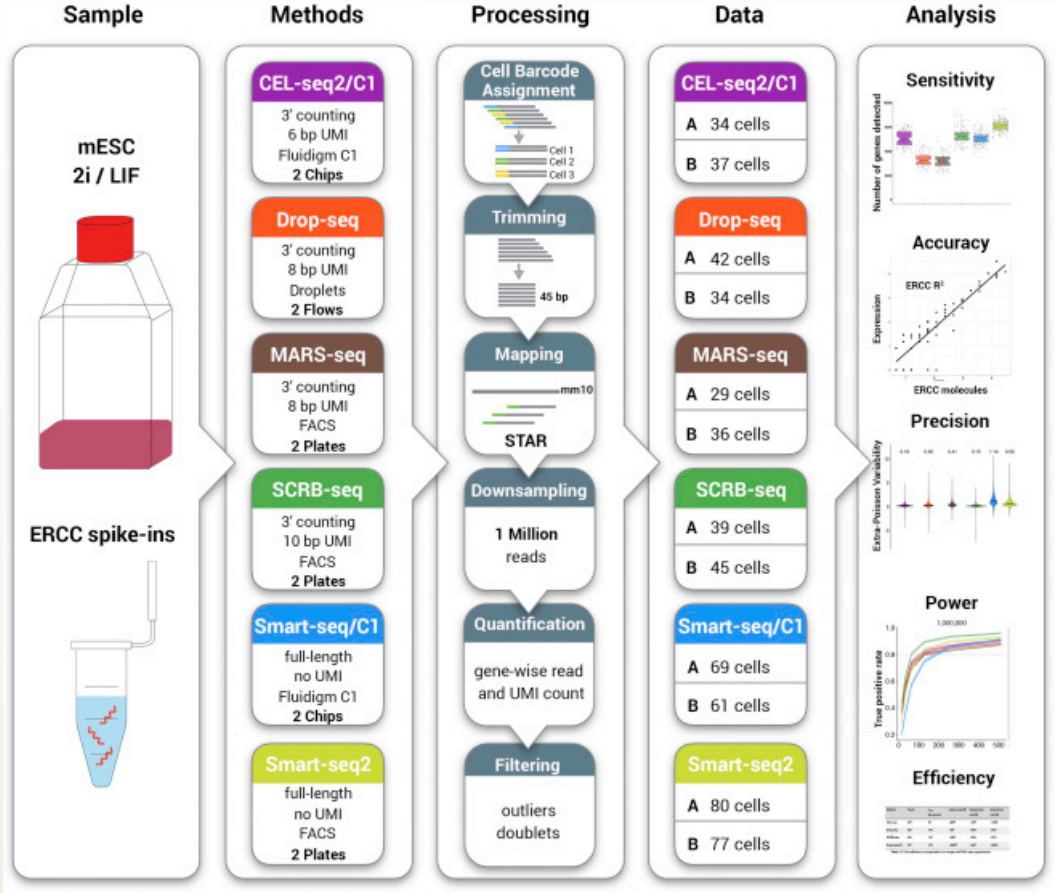


Sequencing/Omics
Imaging
Others

THE EXPERIMENTS WE WILL ANALYSE



Single-cell RNA sequencing



https://www.sciencedirect.com/science/article/pii/S1097276517300497

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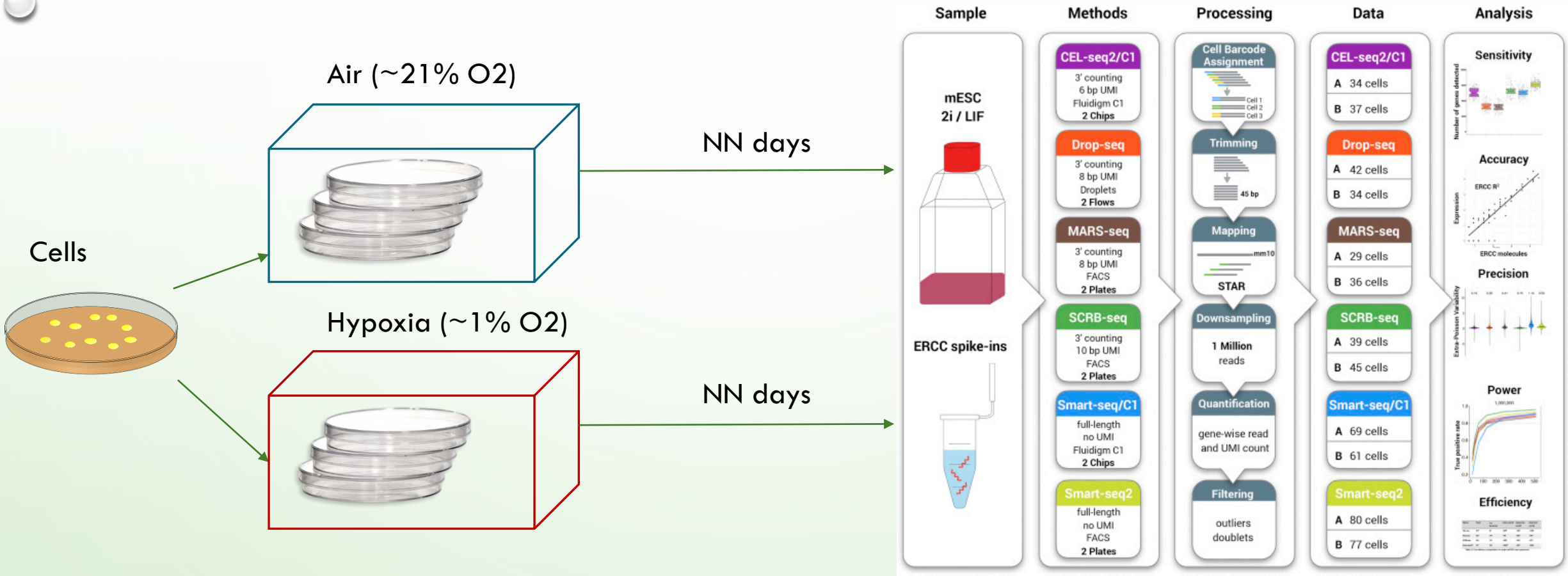
Single-cell RNA sequencing



https://www.sciencedirect.com/science/article/pii/S1097276517300497

https://emea.illumina.com/science/sequencing-method-explorer/kits-and-arrays/drop-seq.html

https://emea.illumina.com/science/sequencing-method-explorer/kits-and-arrays/smart-seq-nanocage-cagescan.html

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