一种新型单细胞新生RNA测序技术

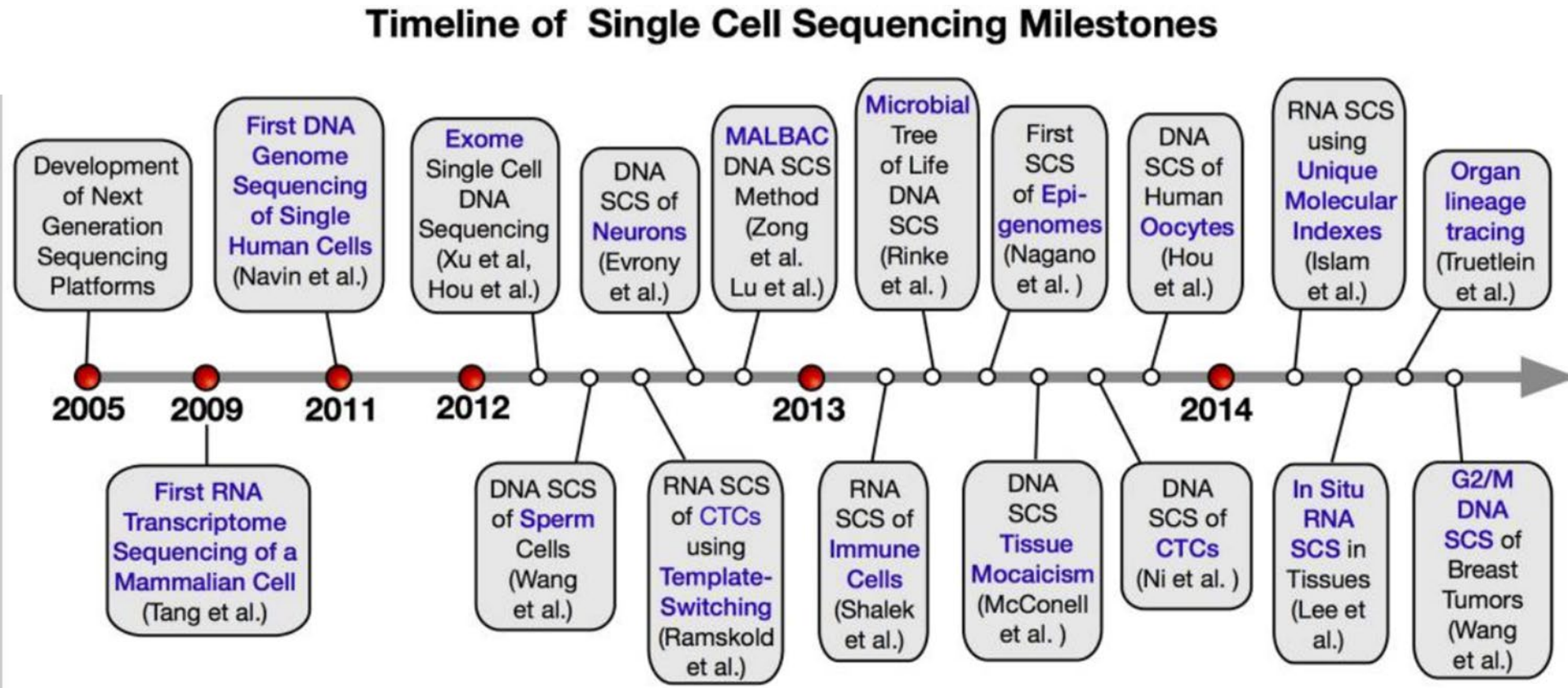
G09组期末汇报

汇报人：荣楠

2021.01.23

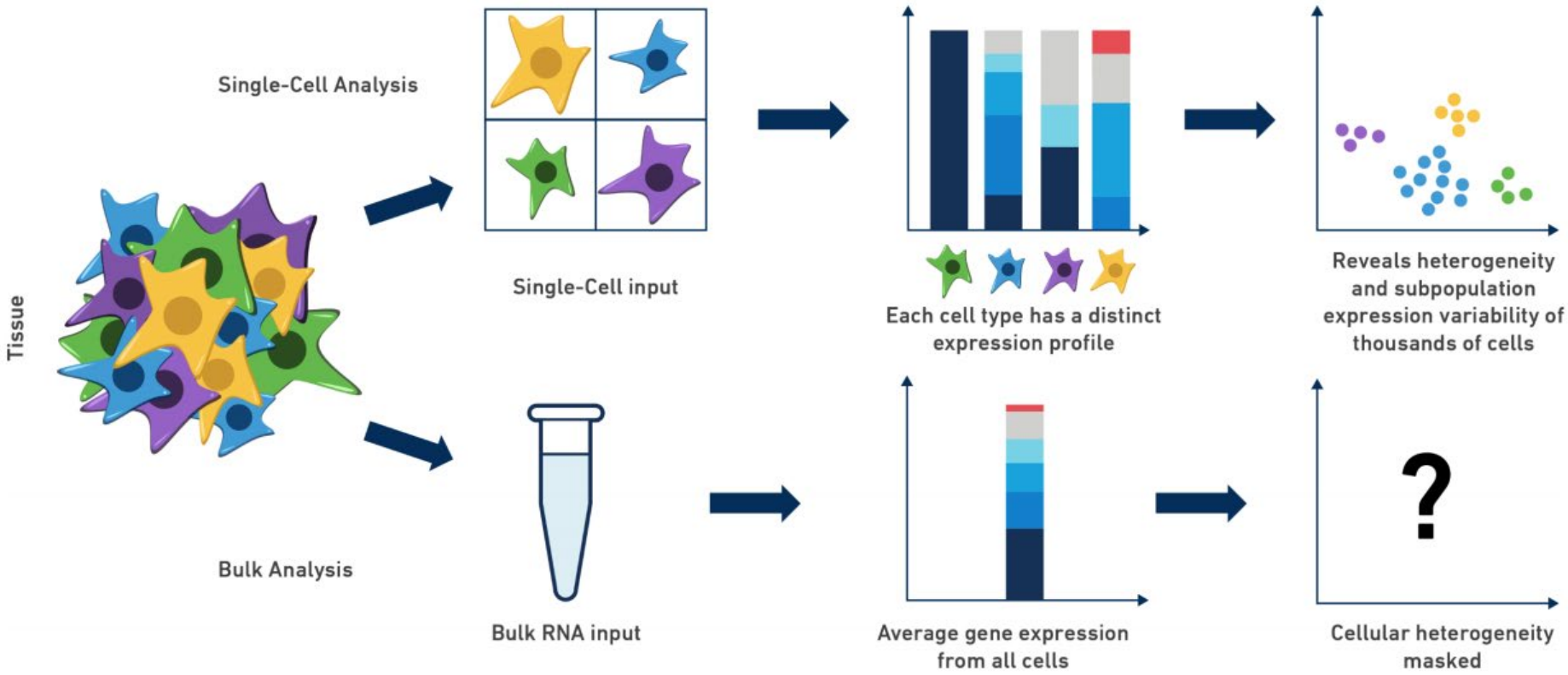
What is single-cell RNA sequencing ?

- Single-Cell RNA-Seq provides transcriptional profiling of thousands of individual cells.



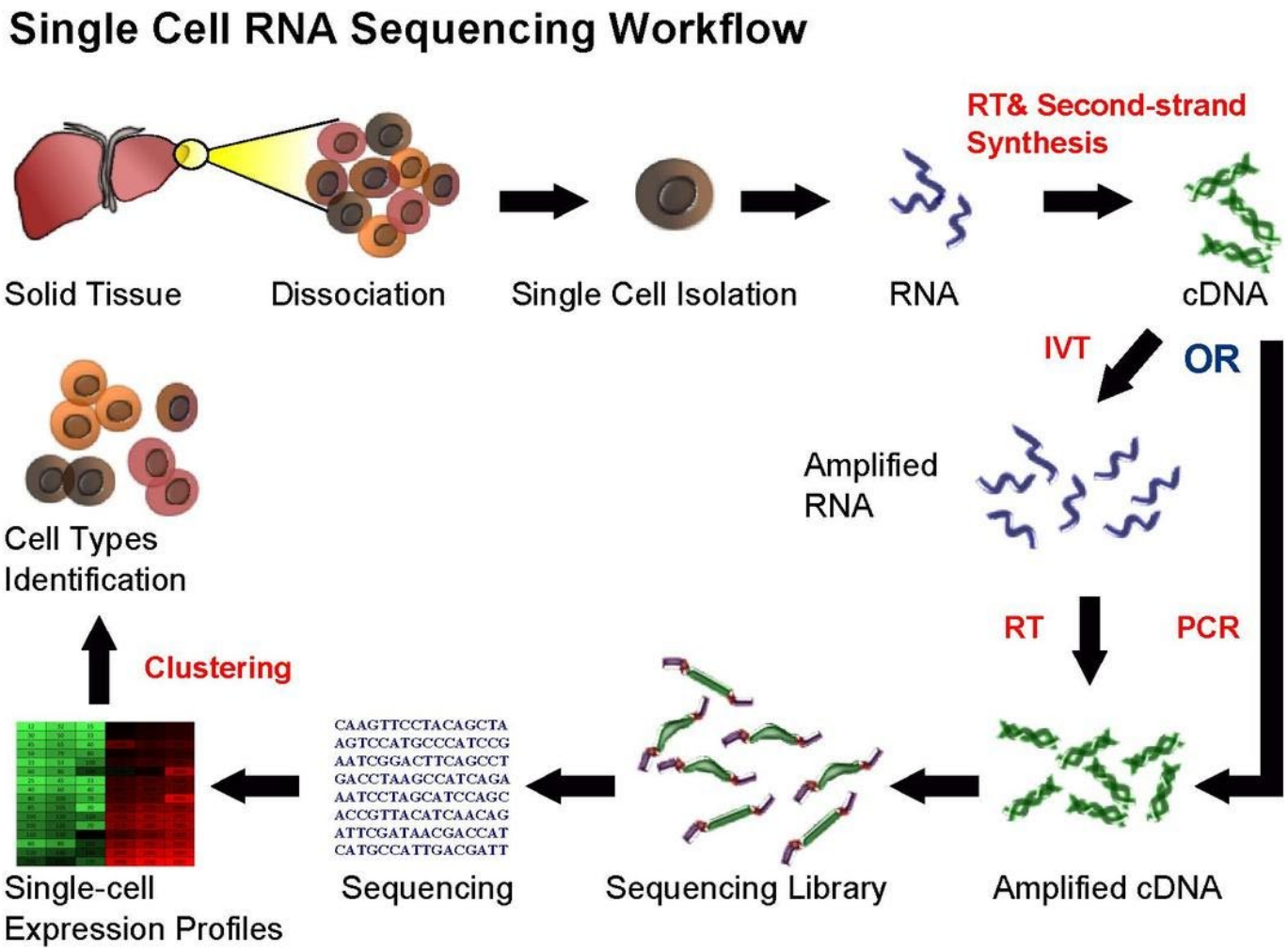
Wang, Y., & Navin, N. E. (2015)

Why we need single cells ?



Single-cell sequencing can detect **heterogeneous information** that cannot be obtained by sequencing of mixed samples.

How do we get single cell transcriptome information?

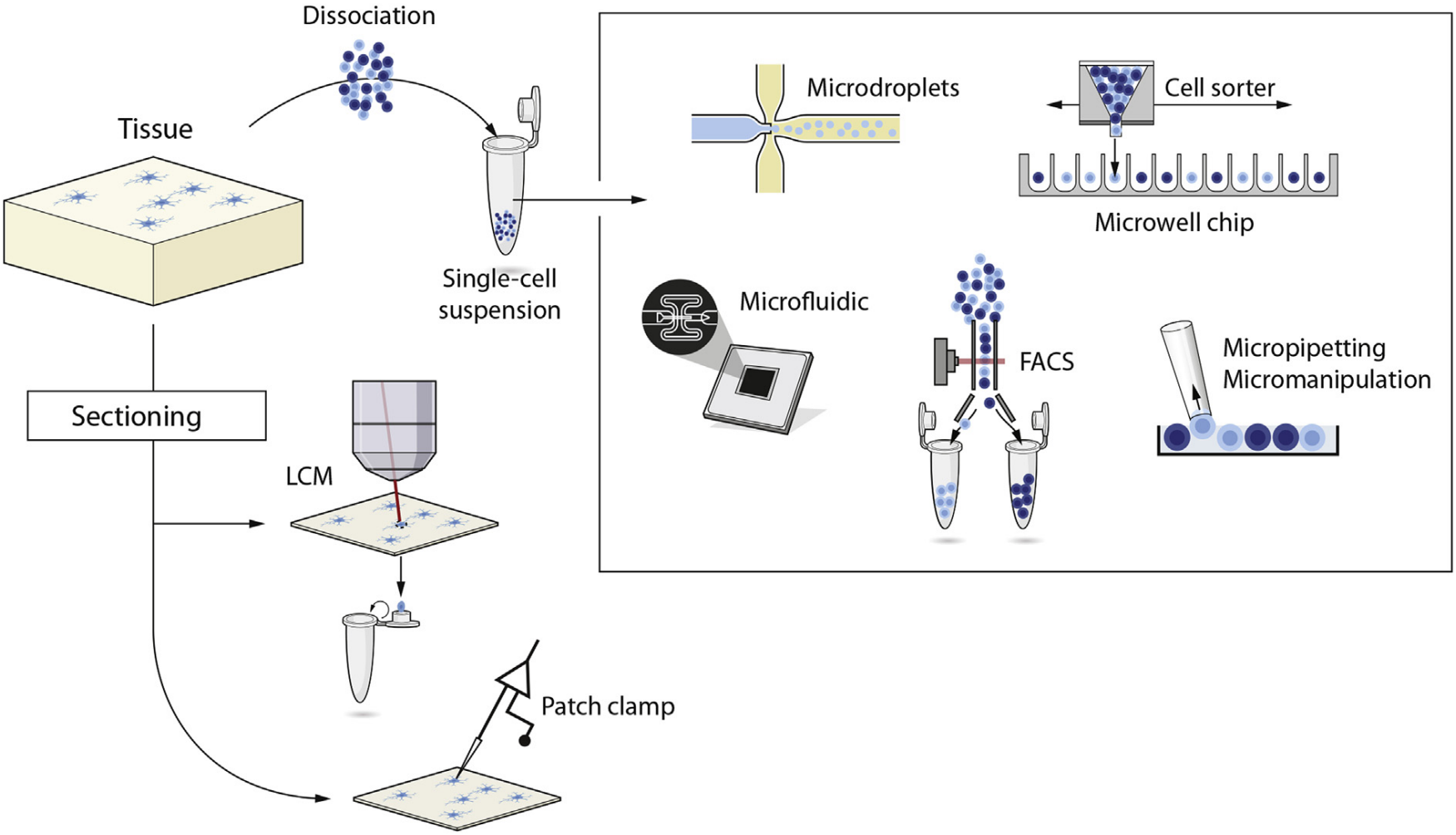


Key:

1. Single cell isolation
2. cDNA amplify
3. barcode

TCACNNNNNNATCTCGT

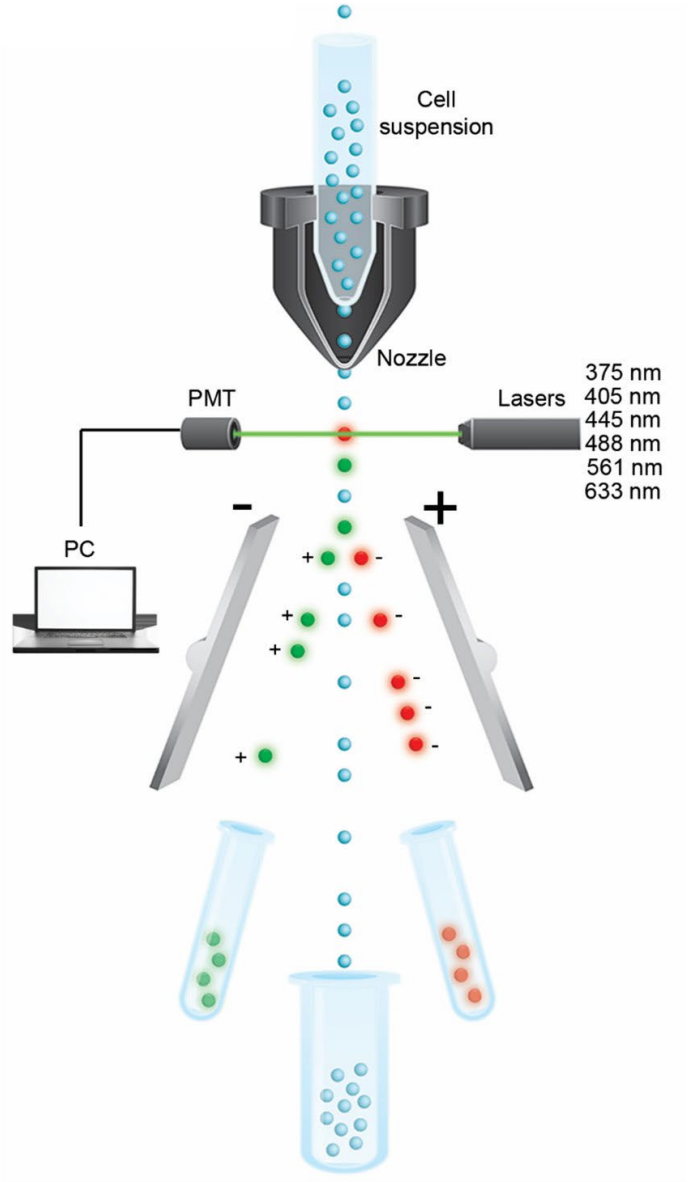
How to get a single cell ?



How to get a single cell ?

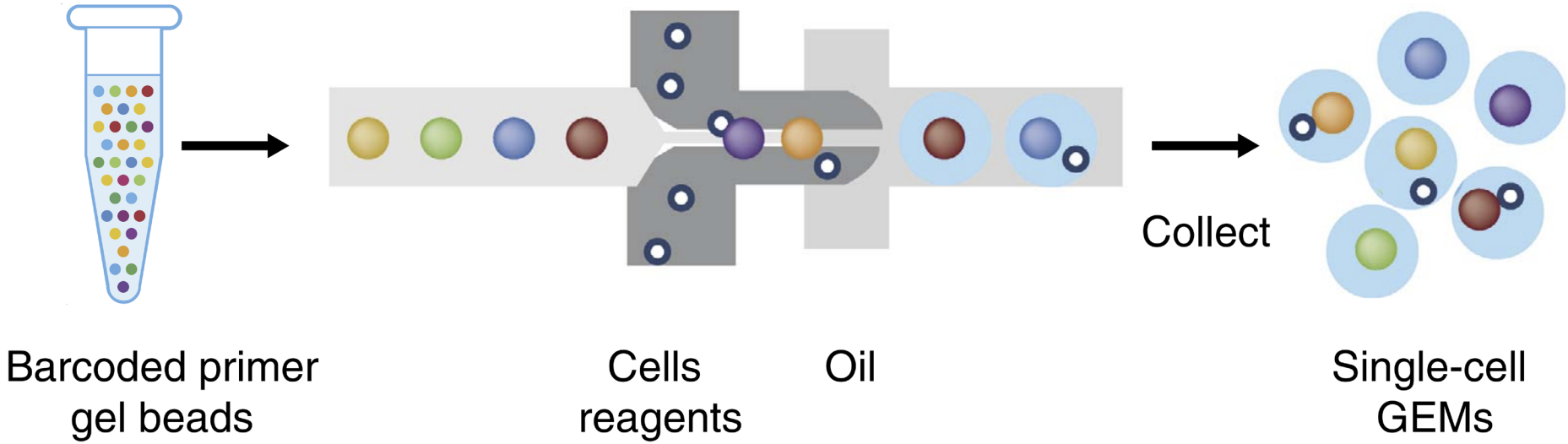
Florescent Activated Cell Sorting (FACS)

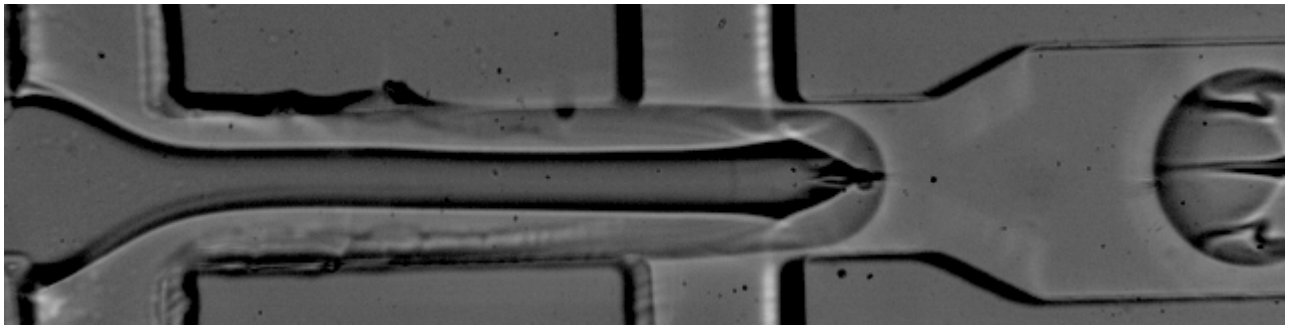
- High purity of the sorted population;
- Sort as many as 300,000 cells per minute;
- Machine can be set to ignore droplets containing dead cells.



How to get a single cell ?

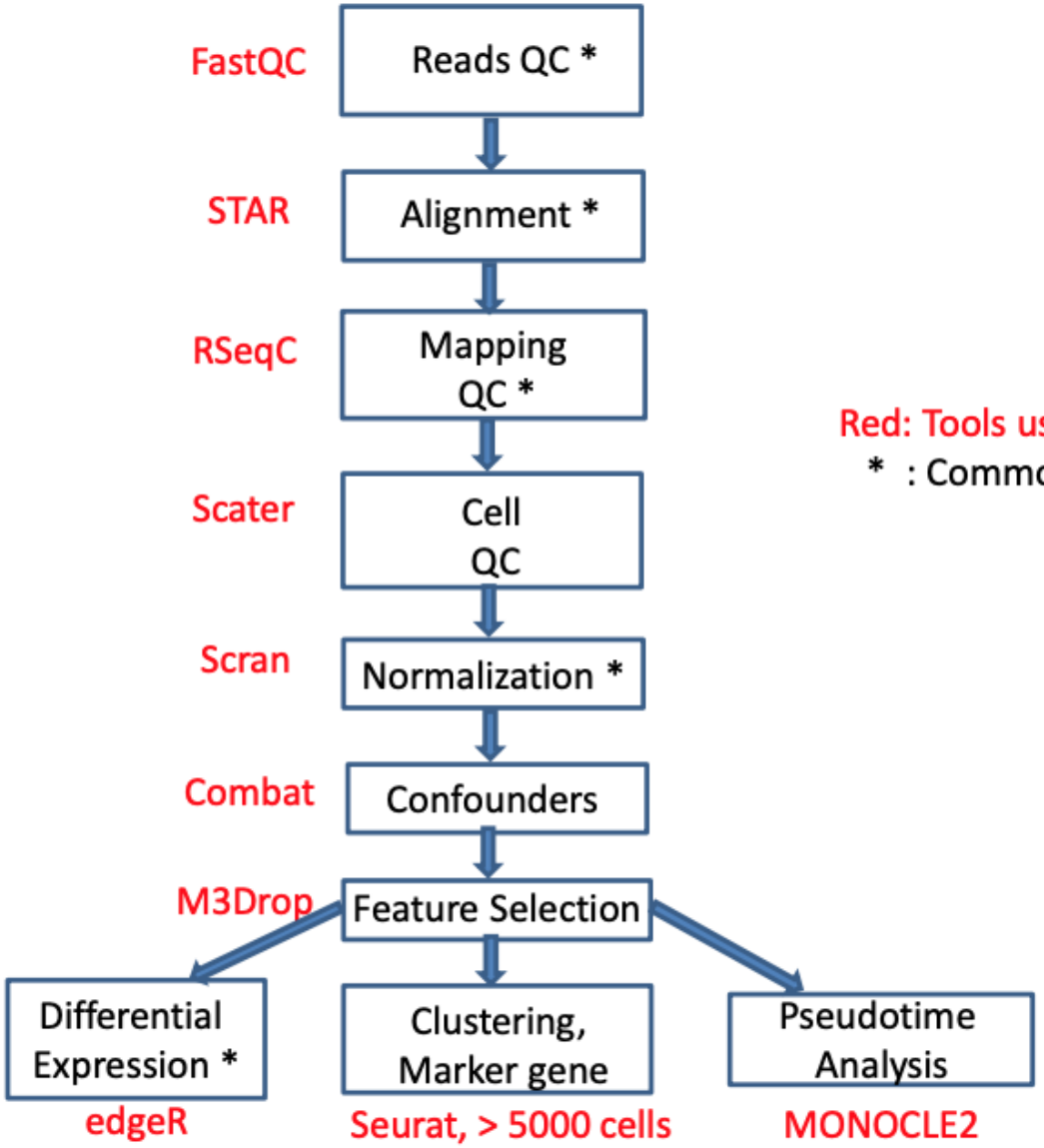
Microfluidic chip



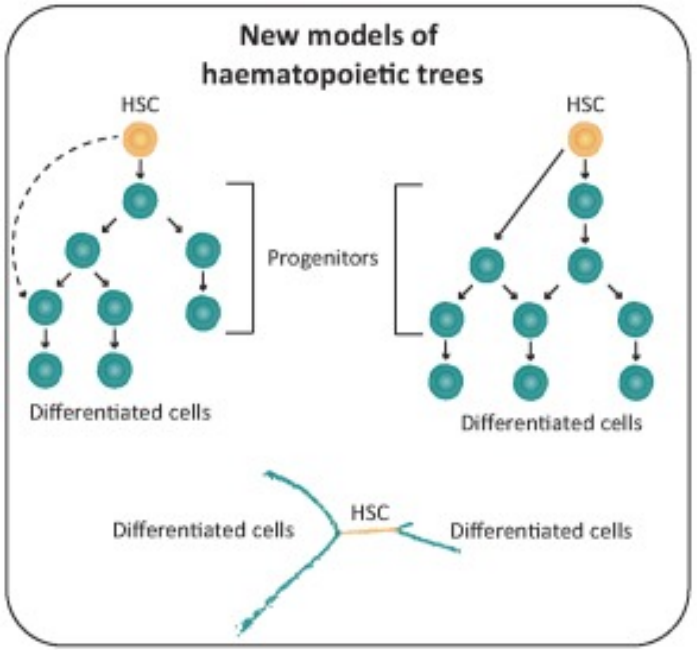


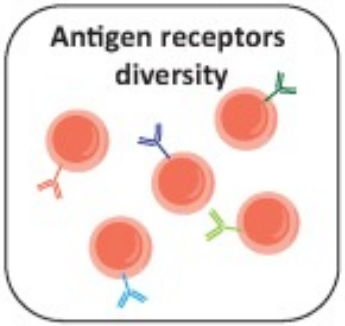
Zheng, GZ. *et al.* (2017)

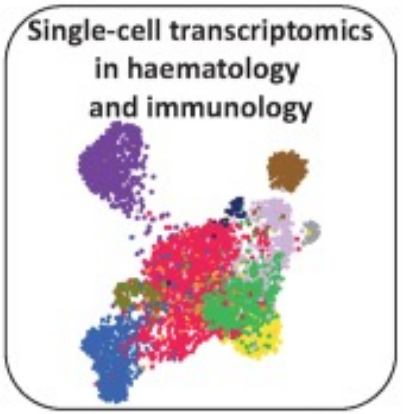
Typical scRNA-seq data analysis process

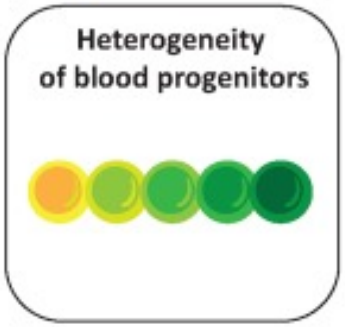


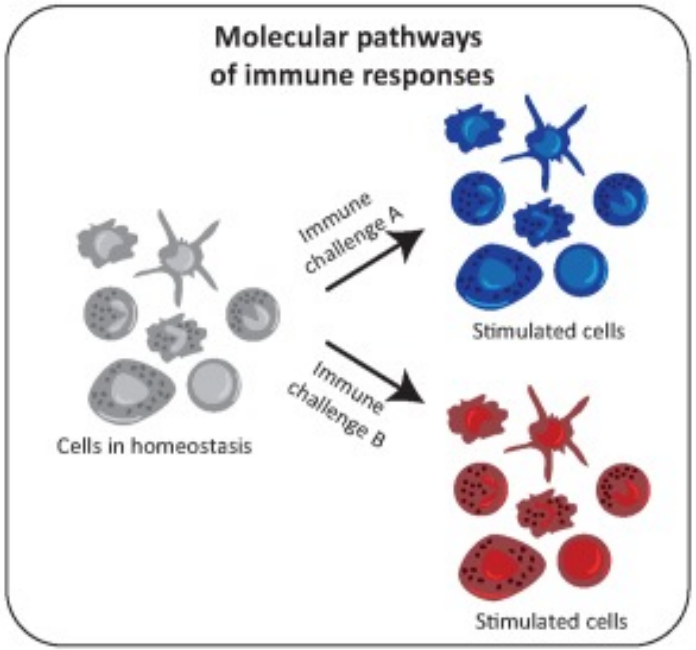
Applications of scRNA-seq in haematology and immunology









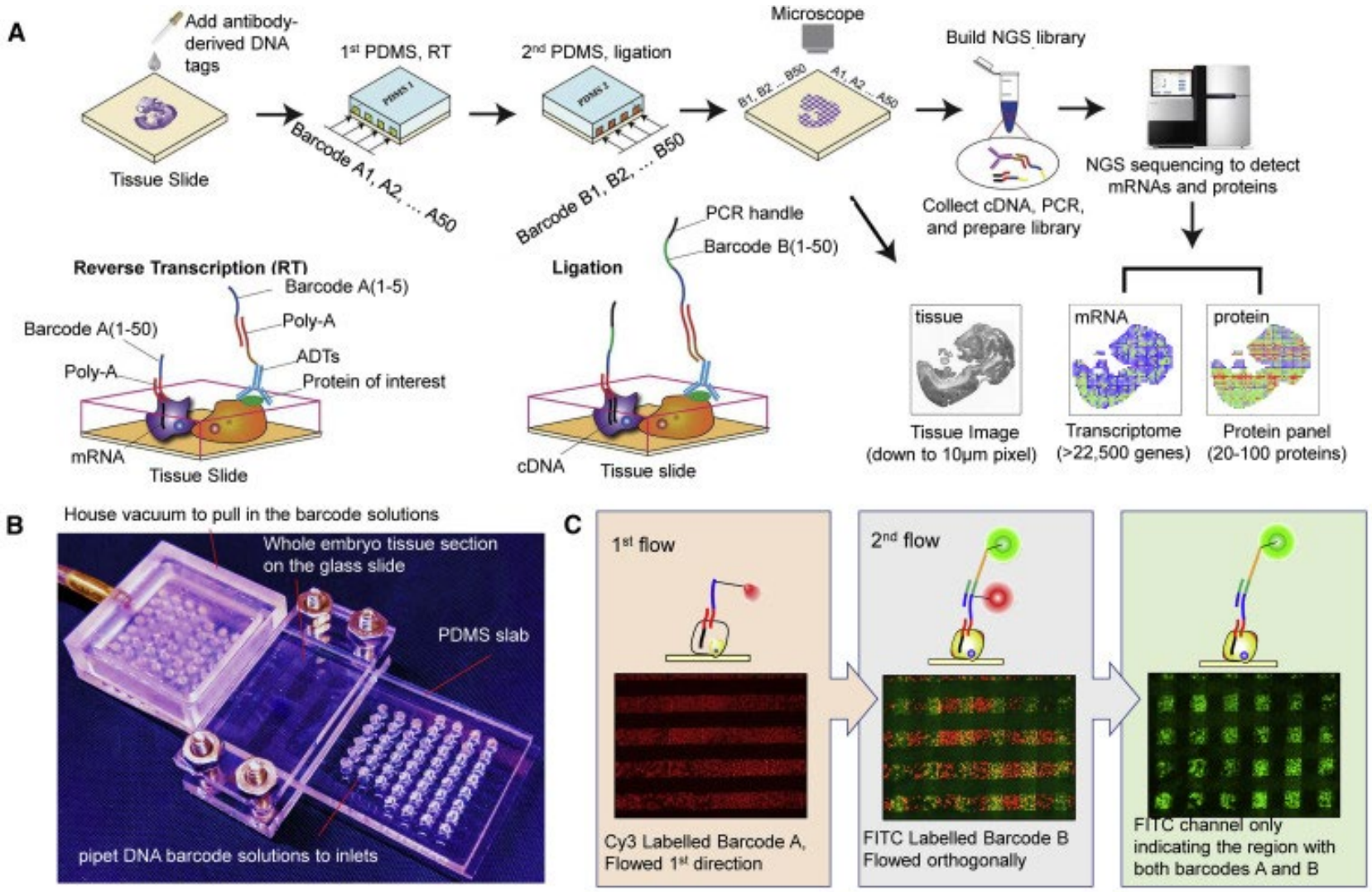


Spatial

Temporal

Ranzoni et al., 2019

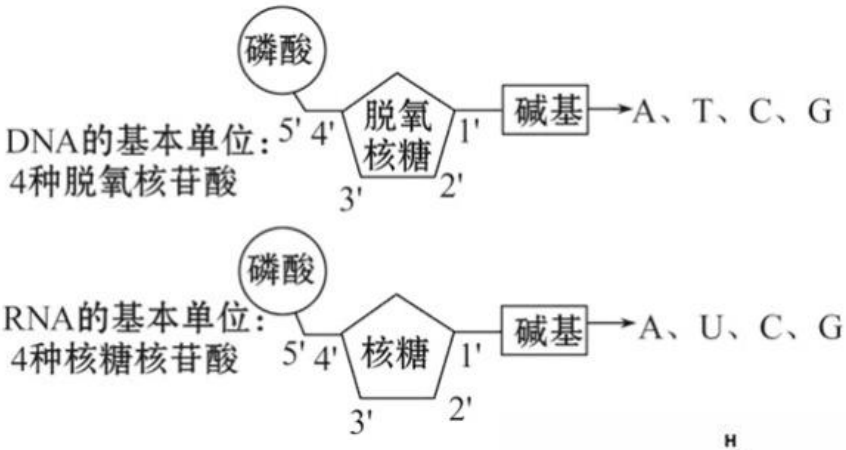
DBiT-seq: Single cell sequencing technology with spatial location information

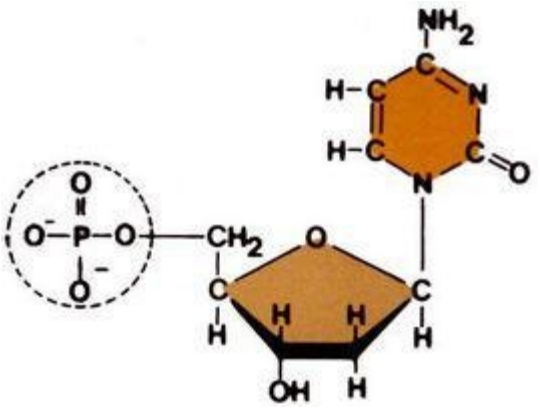


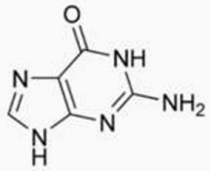
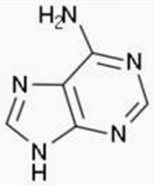
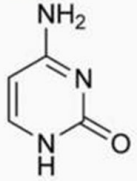
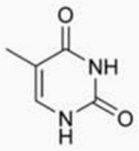
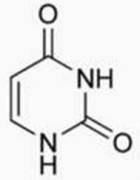
Liu Y , Yang M , Deng Y , et al. Social Science Electronic Publishing.2020

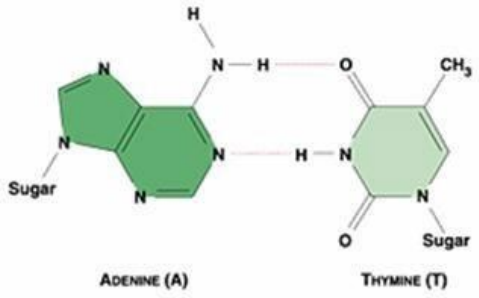
How to get dynamic information of single cell ?

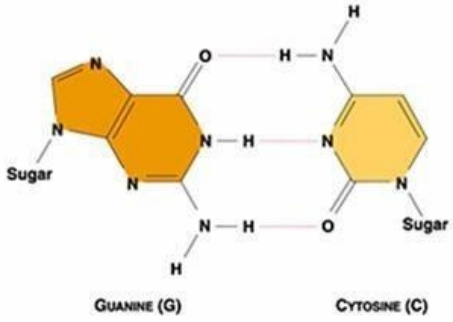
Structure of deoxynucleotides and base pairing

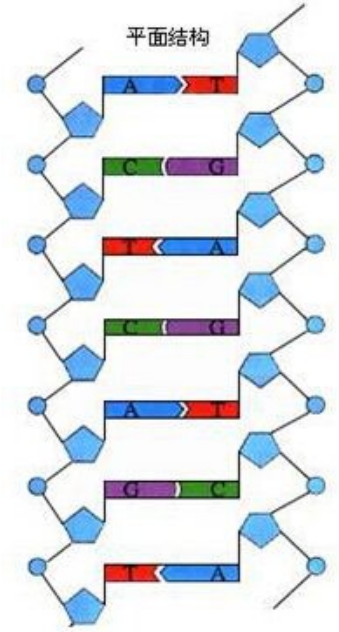


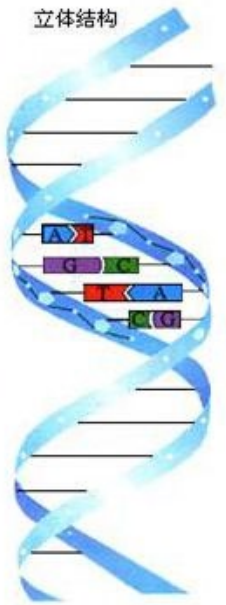


鸟嘌呤（G）	腺嘌呤（A）	
		
⇕	DNA ⇕ RNA	
胞嘧啶（C）	胸腺嘧啶（T）	尿嘧啶（U）
		

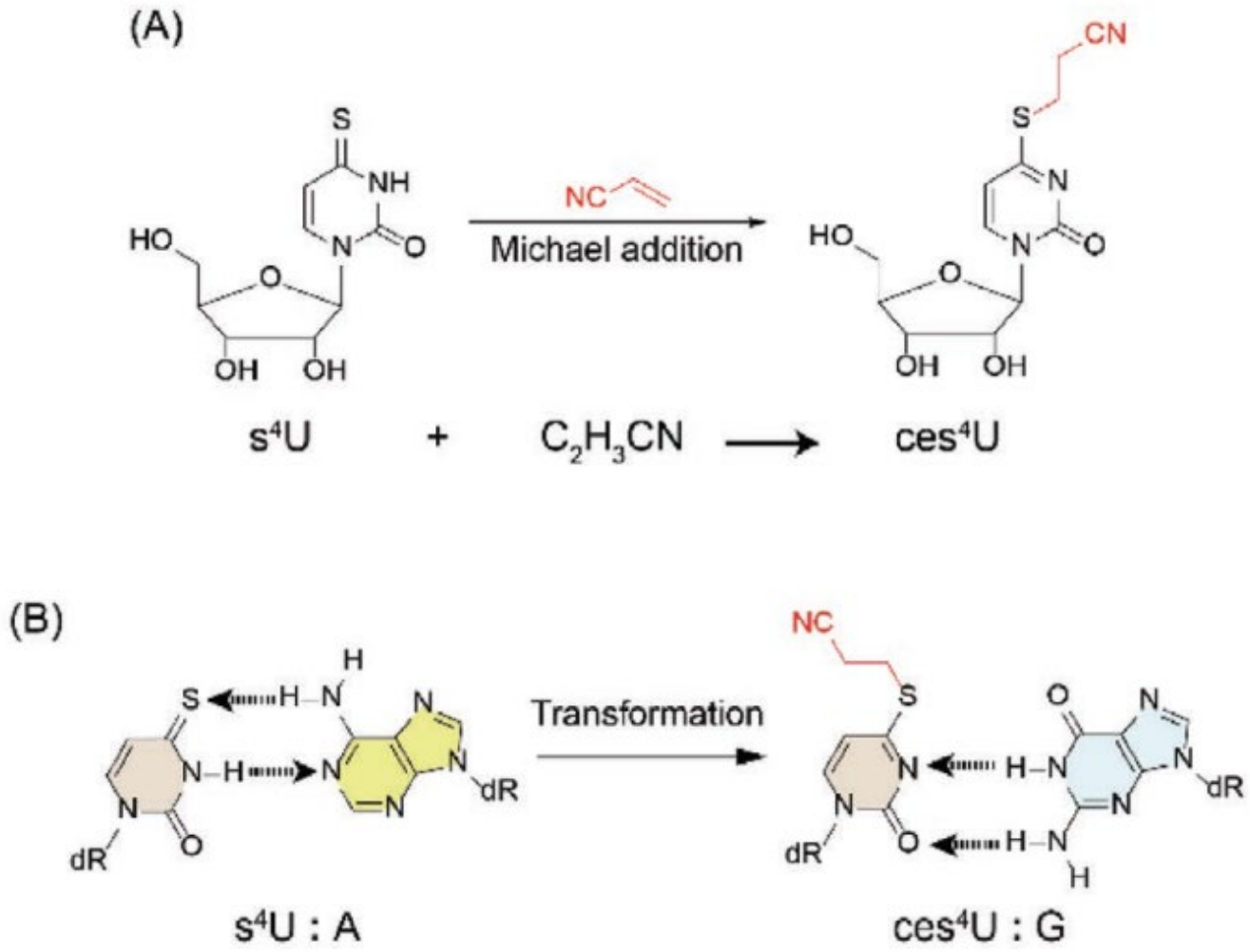






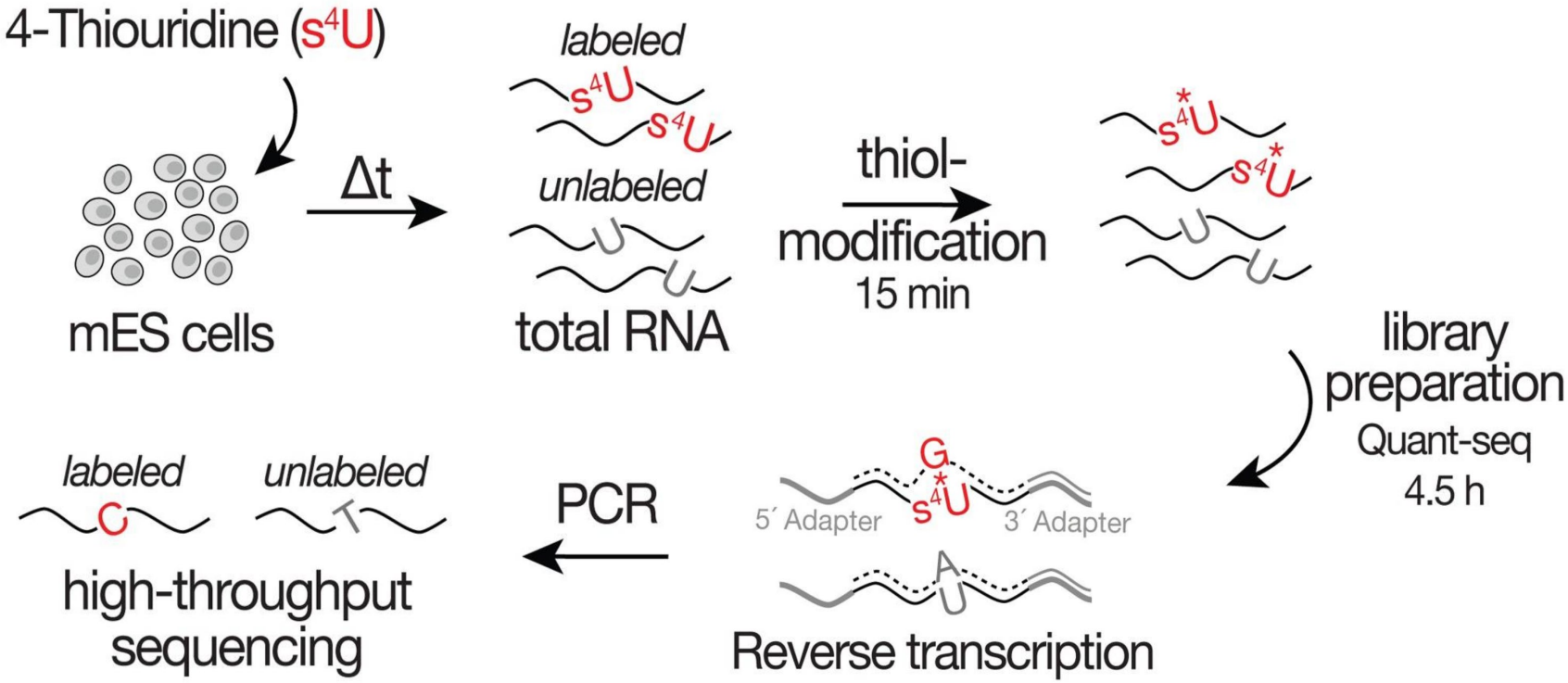


s4U can convert T to C



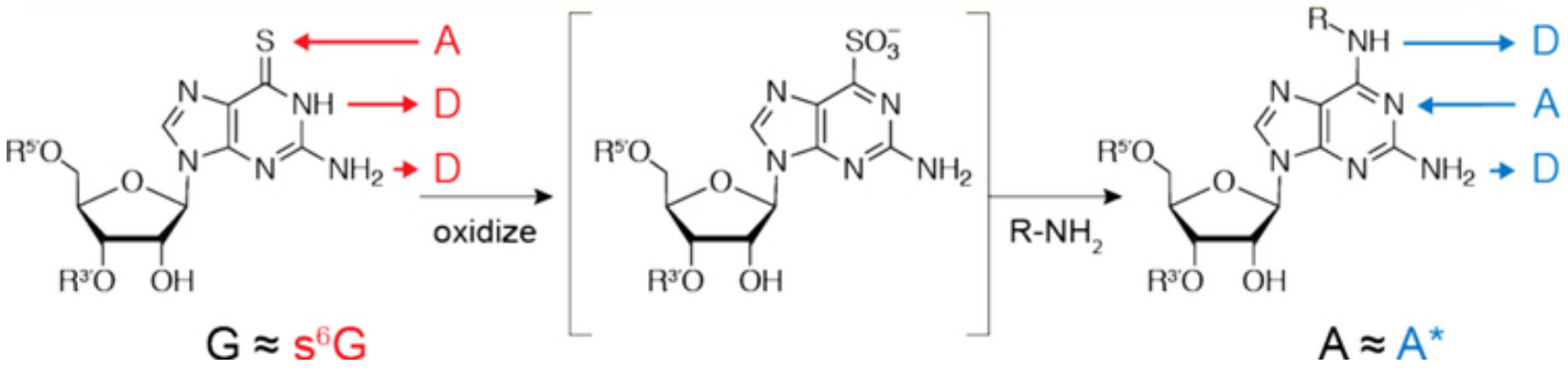
Erhard, F., et al. Nature. 2019

s4U can label nascent RNA in sequencing data by converting T to C

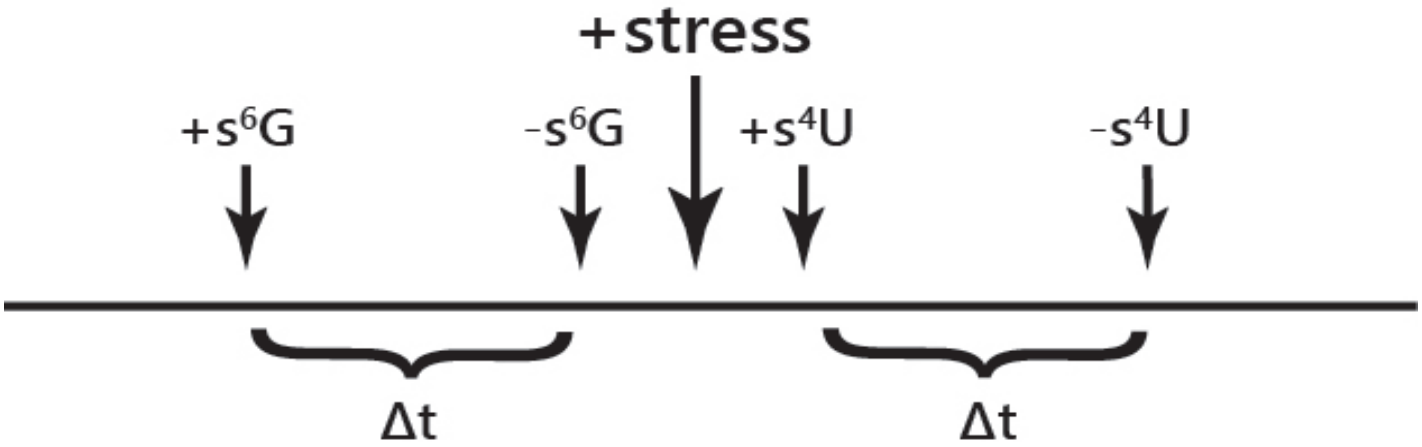


Erhard, F., et al. Nature. 2019

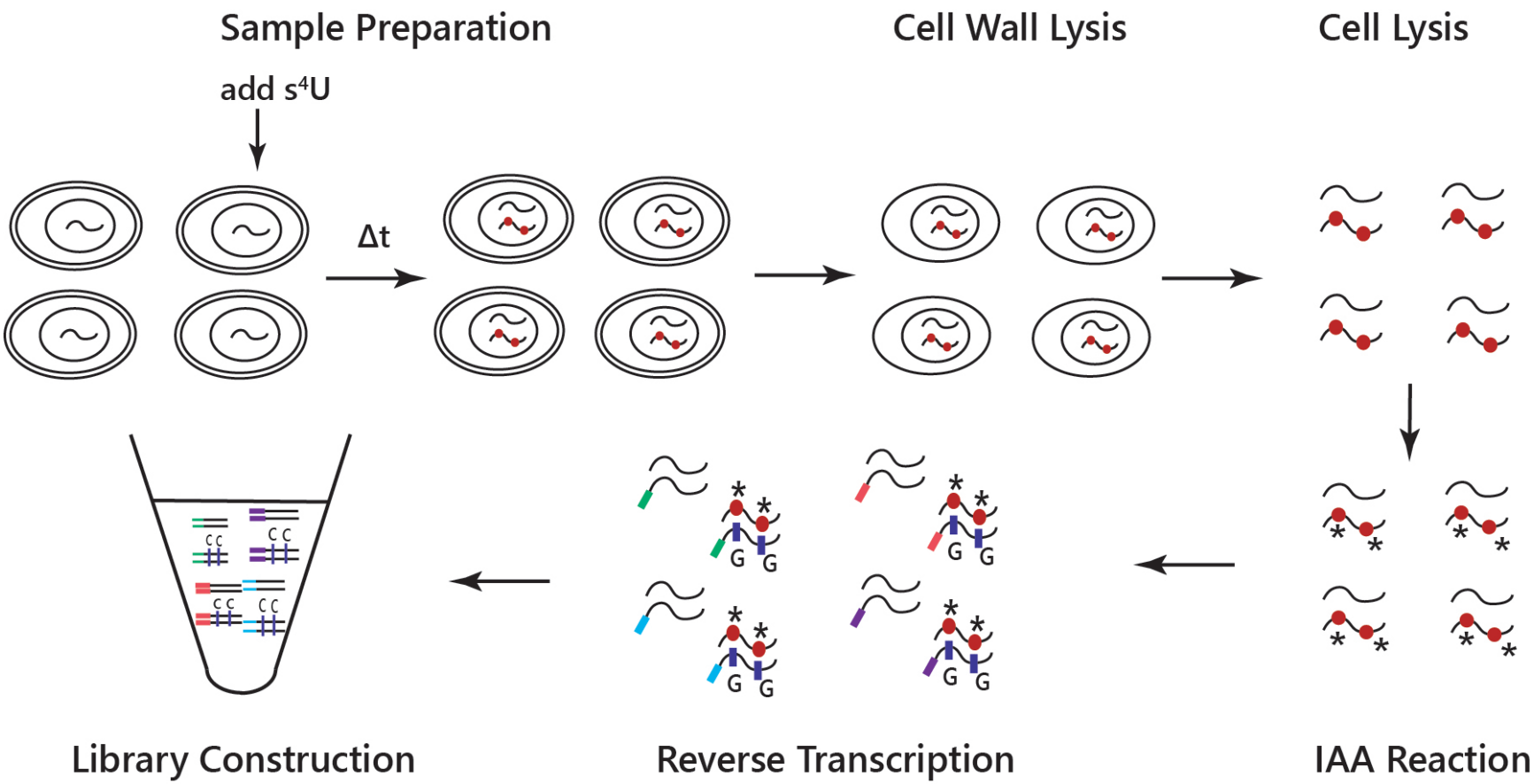
Labeling two time points is feasible because s6G can convert G to A



Kiefer L , Schofield J A , Simon M D . Journal of the American Chemical Society, 2018.

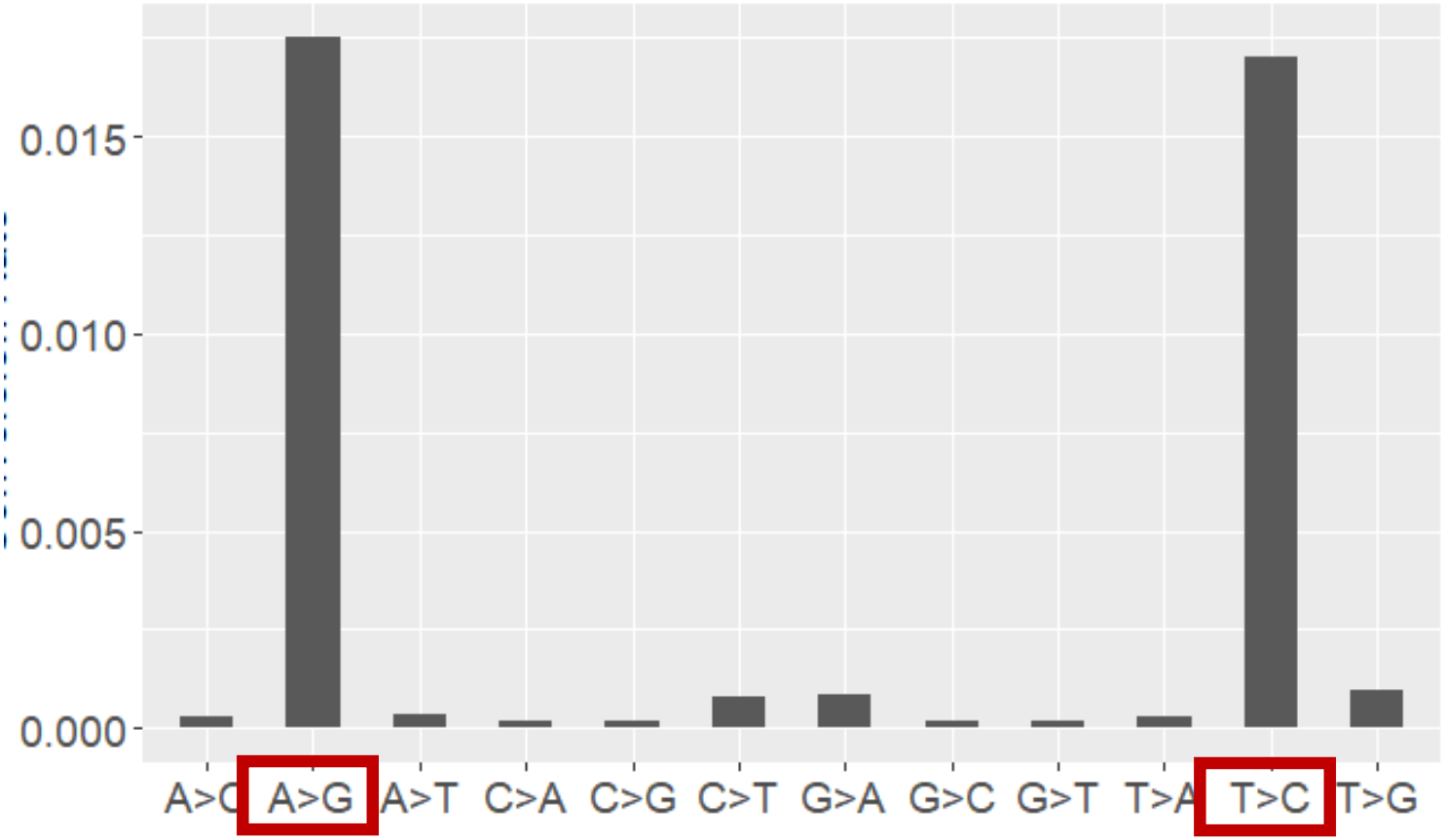


Overview of yeast nascent single-cell RNA sequencing (YNSC-seq)

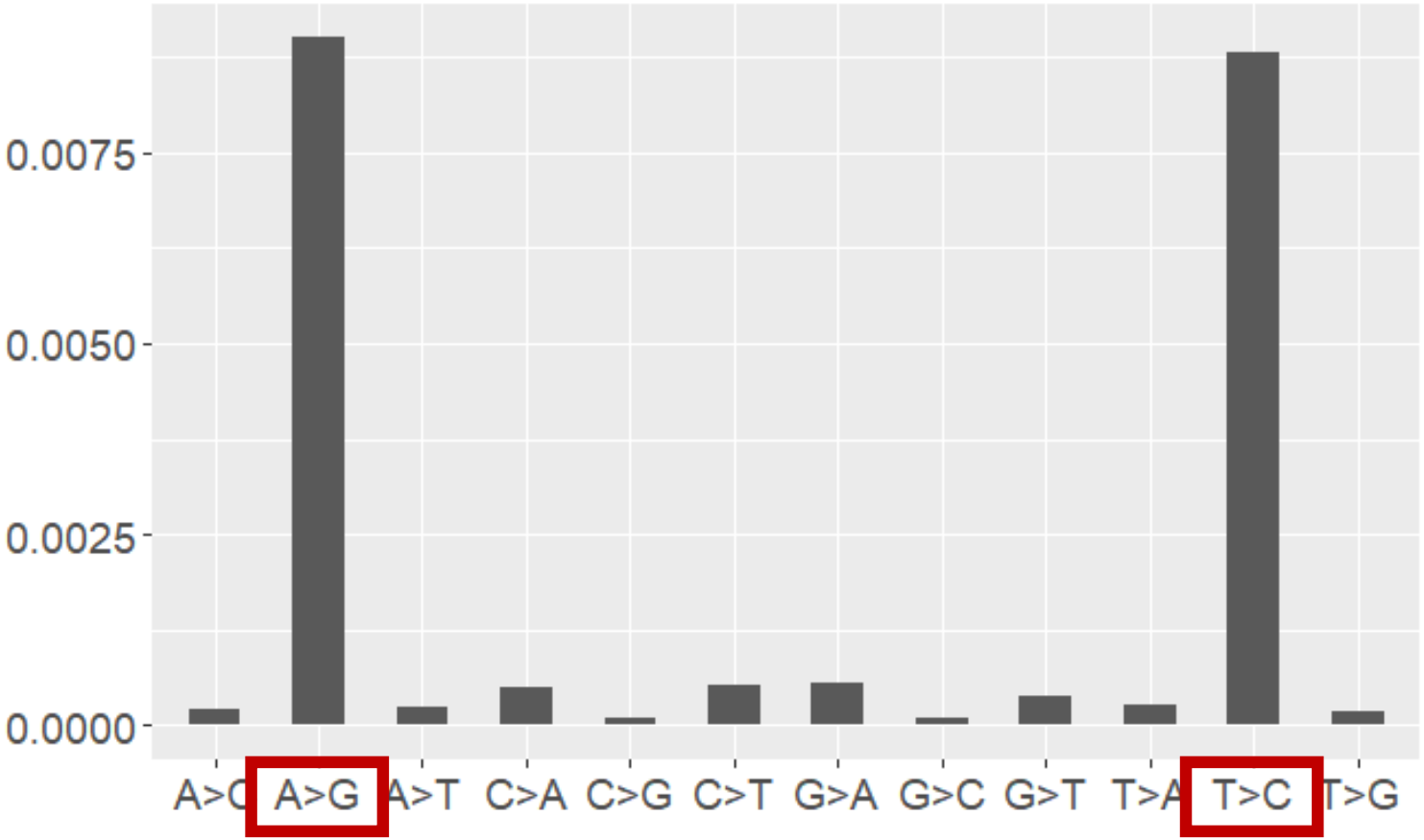


The bulk data showed that s4U treatment convert T to C successfully

The conversion rates in BY4741 cells labelled with s^4U (50μM, 1h)



s4U also worked in single-cell data



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Thank you for listening!

G09 Group