

# 10x Genomics Platform

Susan Kloet

Leiden Genome Technology Center (LGTC)

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# 10x Genomics Chromium Controller

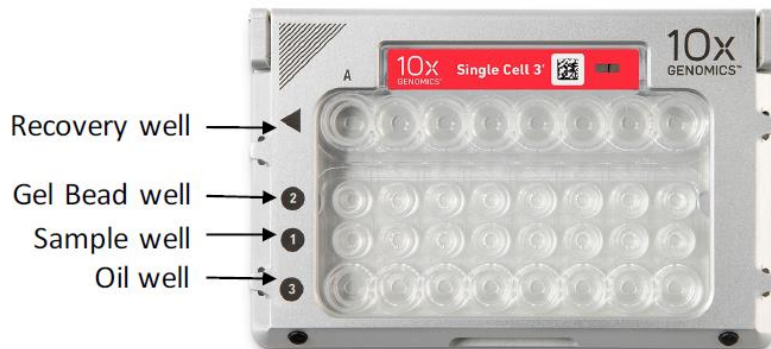
Commercial launch early 2016

Microfluidics system for reaction compartmentalization

High throughput, up to 80k cells/run

High capture rate, ~50%

Single-use microfluidics chip



# 10x Genomics products

## TRANSCRIPTOMICS



### Single Cell Gene Expression

3' gene expression profiling at scale with single cell resolution.

Now with Feature Barcode technology!



### Single Cell Immune Profiling

V(D)J repertoires of T and B cells integrated with 5' Gene Expression.

Now with Feature Barcode technology!



### Spatial Gene Expression

Simultaneous analysis of molecular and imaging data from tissue sections.



### Targeted Gene Expression

Profile a defined set of transcripts from single cells or tissue sections.

## SINGLE CELL EPIGENOMICS



### Single Cell Multiome ATAC + Gene Expression

Simultaneous profiling of 3' gene expression and chromatin accessibility from the same cell.



### Single Cell ATAC

Chromatin accessibility and transcriptional regulation at the single-cell level.

## AUTOMATED SOLUTIONS



### Automated Single-Cell Gene Expression

3' automated gene expression from cells to sequencing-ready libraries.

## SINGLE CELL GENOMICS

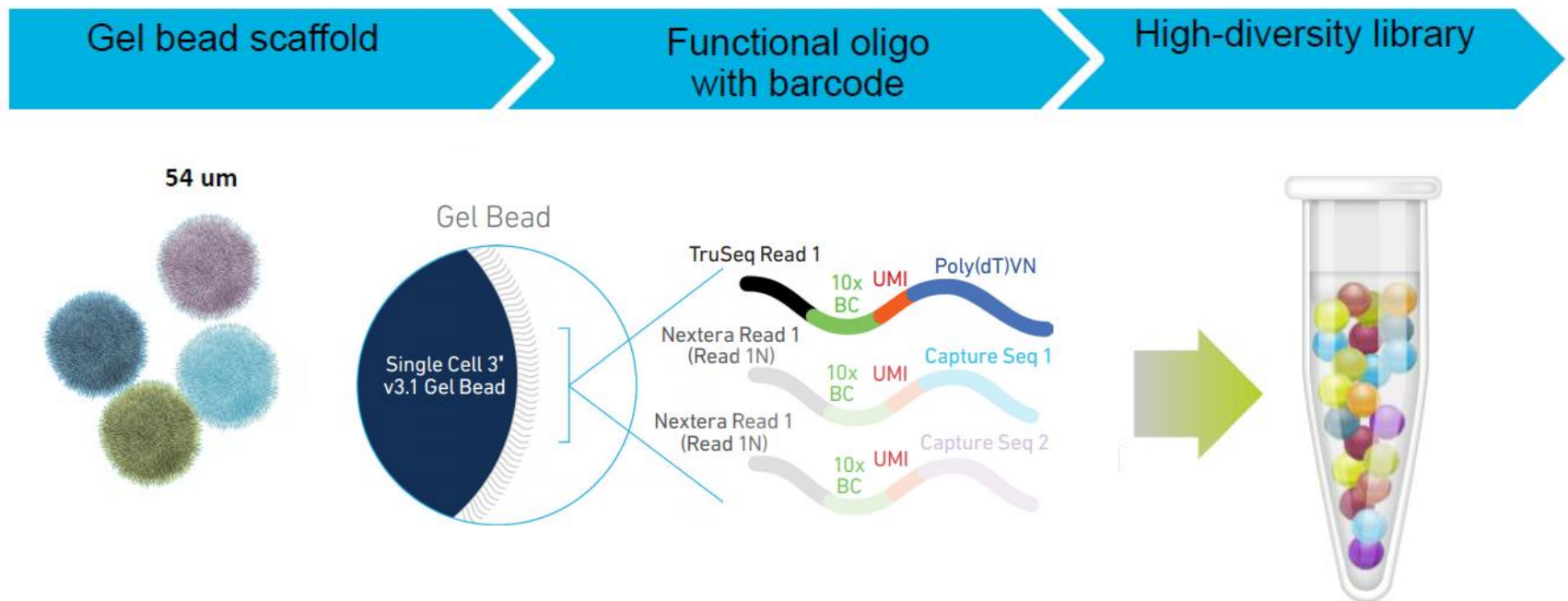


### Single Cell CNV

Copy number variation and genomic heterogeneity at single cell resolution.

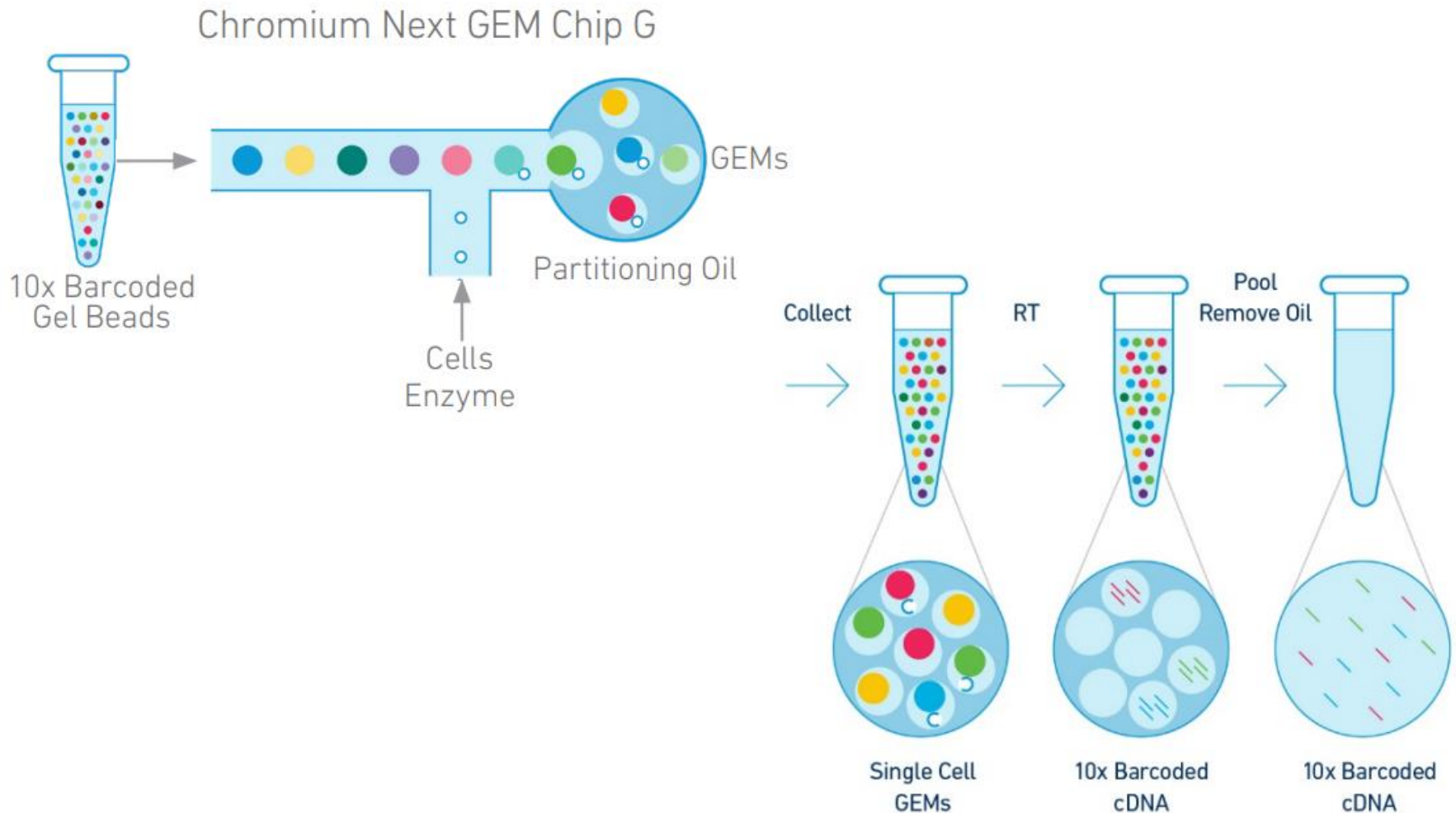
# Gel beads up close

4M Discrete Reagents in One Tube

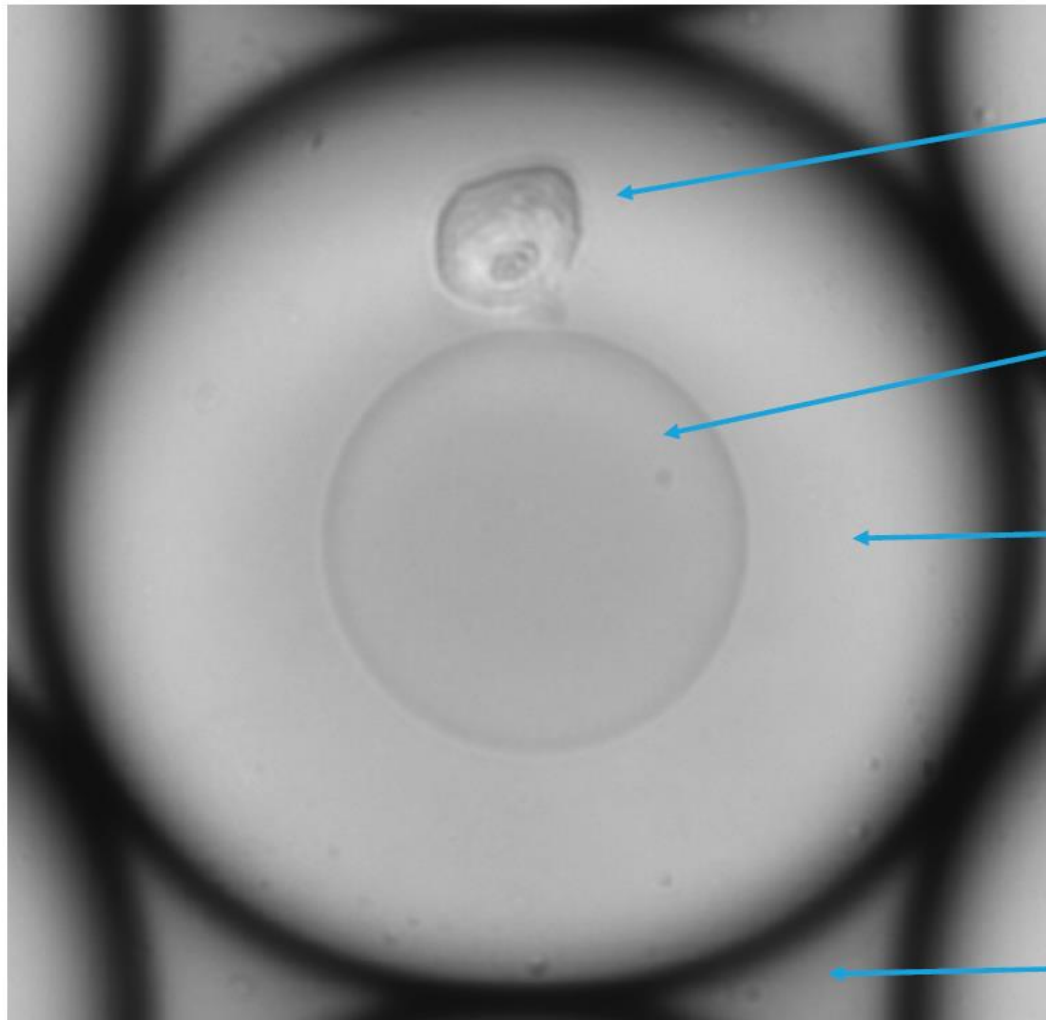


**10x Barcode (16bp): unique for each GemBead**  
**+UMI (12bp): correct for PCR duplicates**

# Gel bead in Emulsion (GEM) technology



# GEMs up close



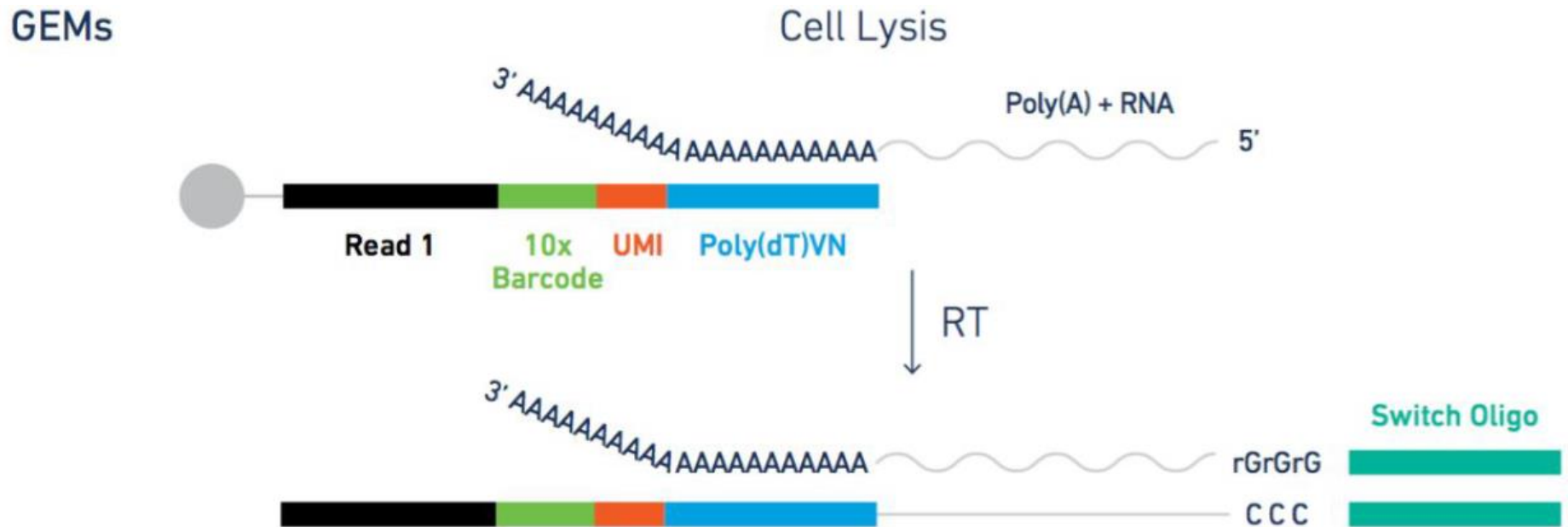
Single T Cell

Functionalized  
Gel Bead

RT Reagents  
in Solution

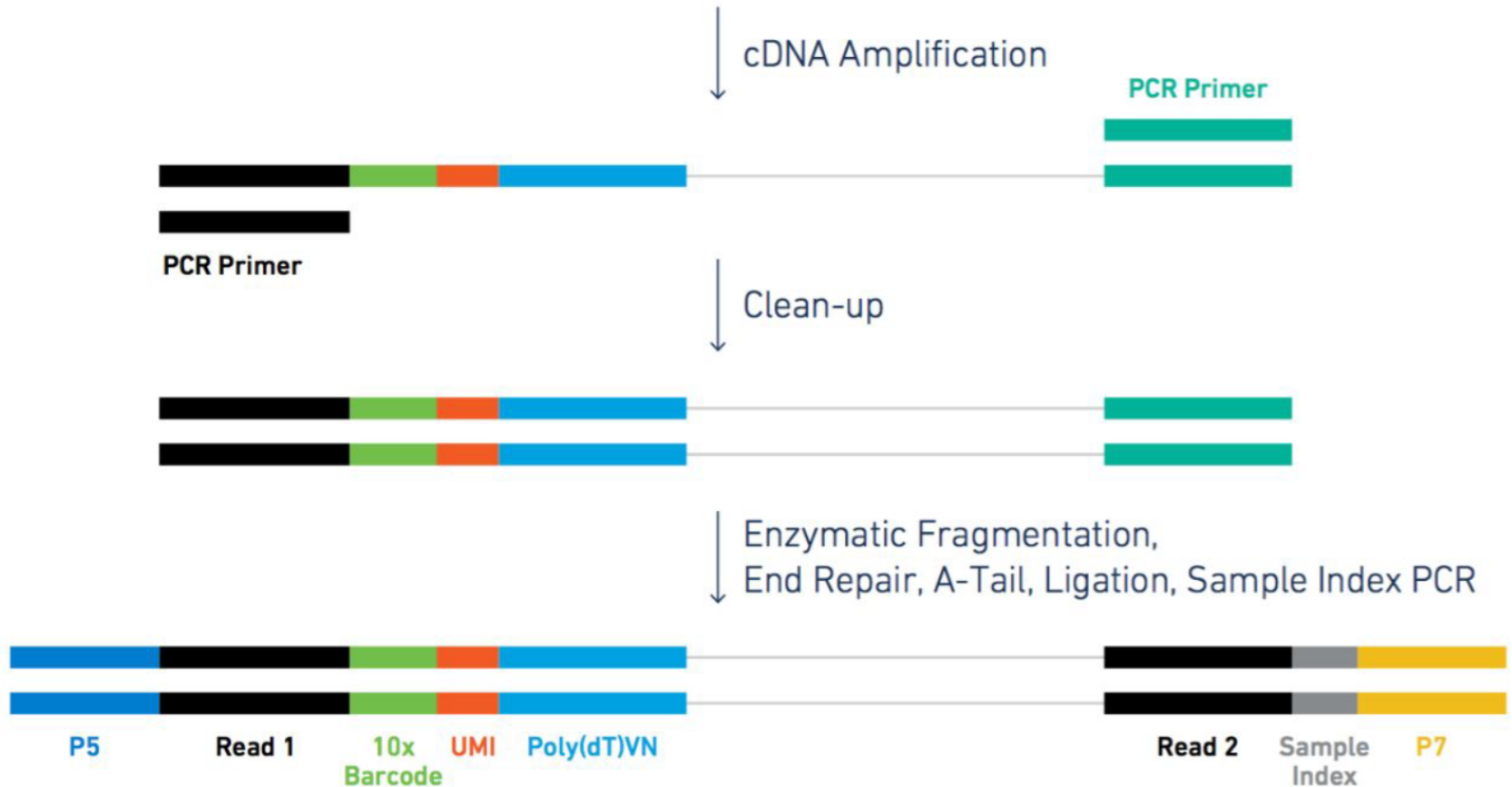
Partitioning Oil

# Assay scheme for 3' mRNA sequencing



# Assay scheme for 3' mRNA sequencing

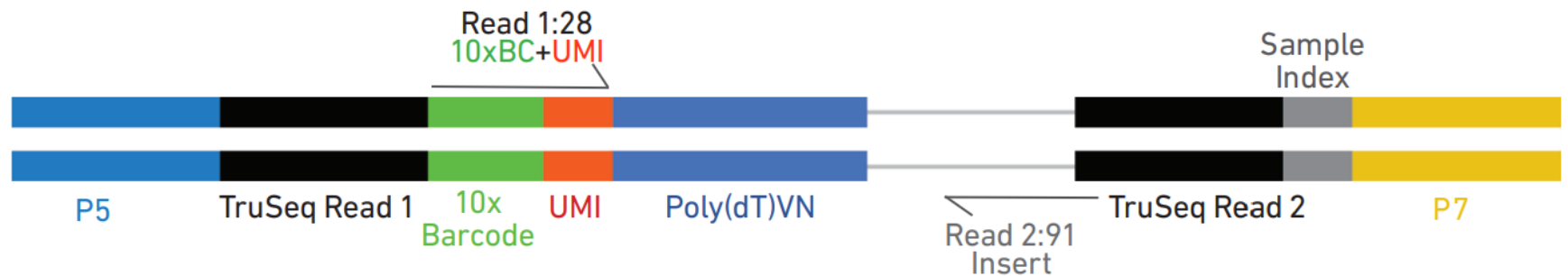
Bulk



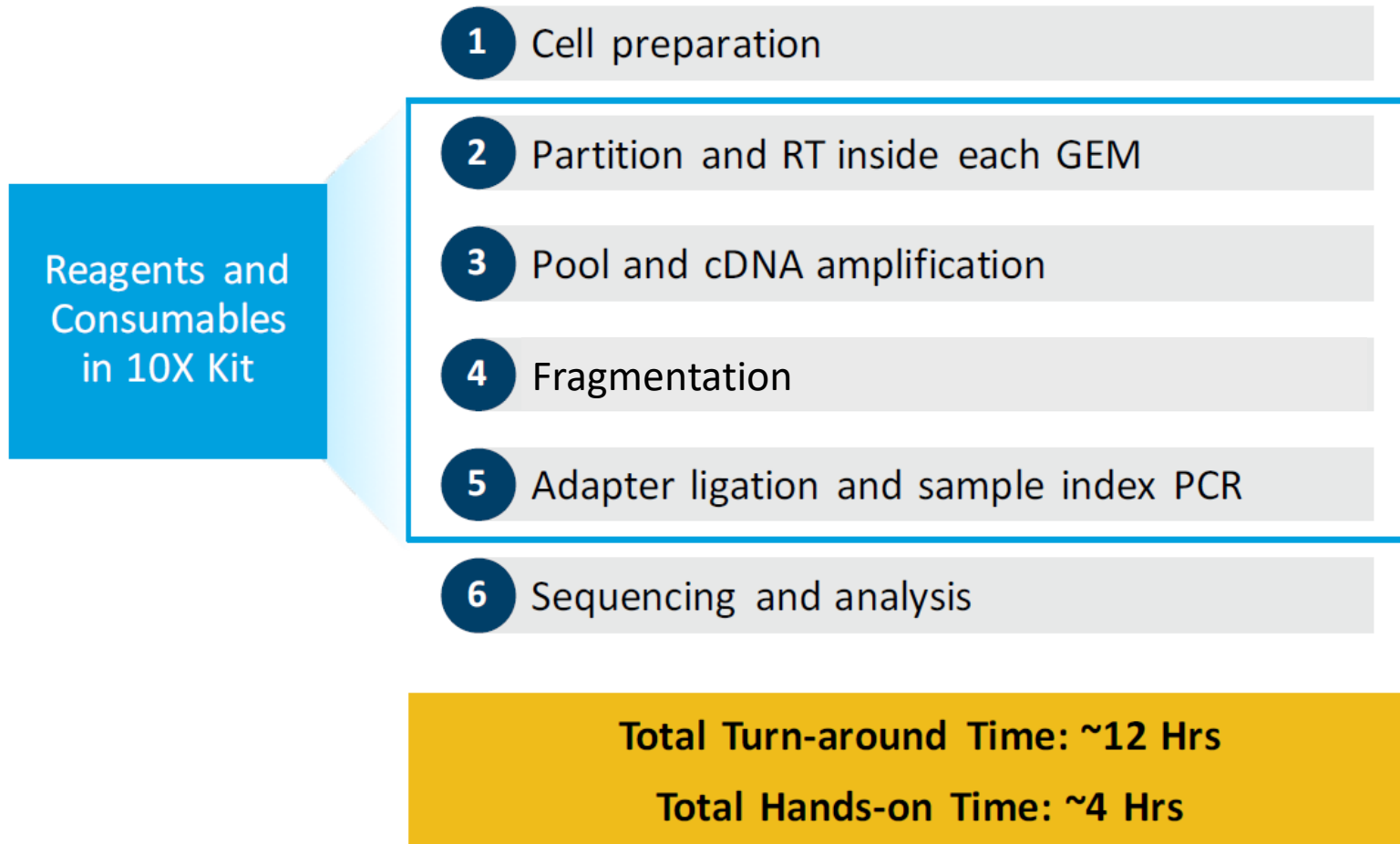


# Final library structure

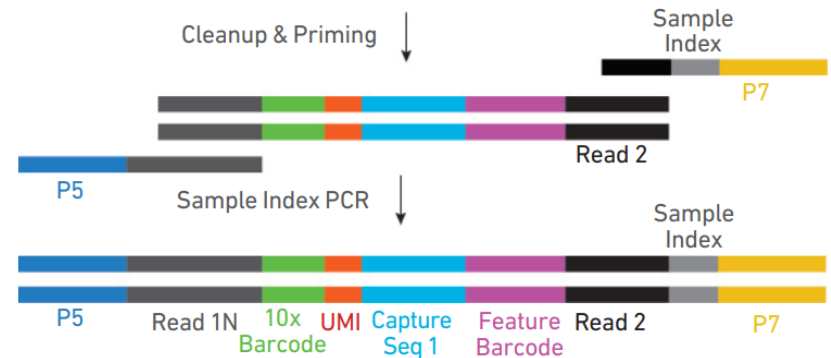
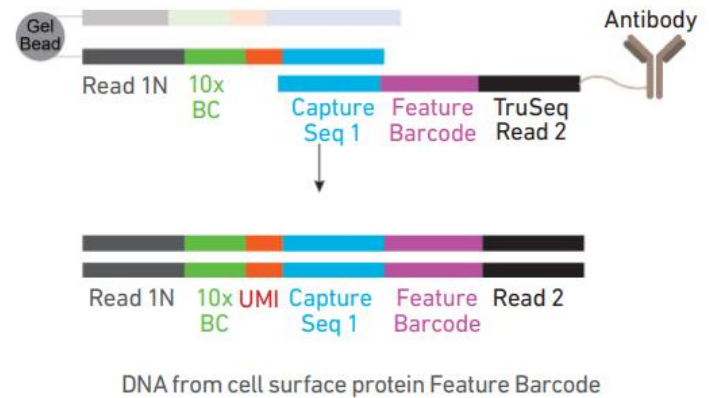
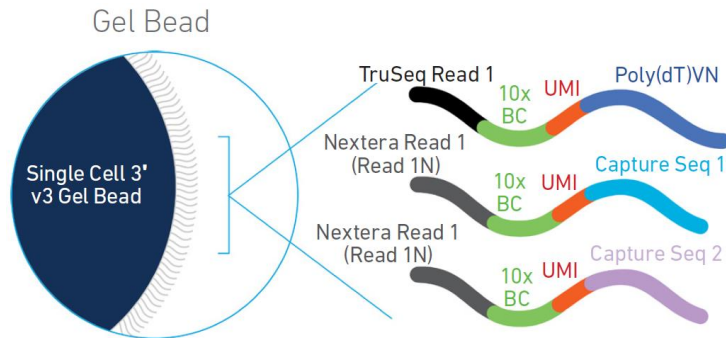
## Chromium Single Cell 3' Gene Expression Library



# Single cell 3' end-to-end workflow



# Single cell 3' feature barcoding



# Structure of T and B cell receptors

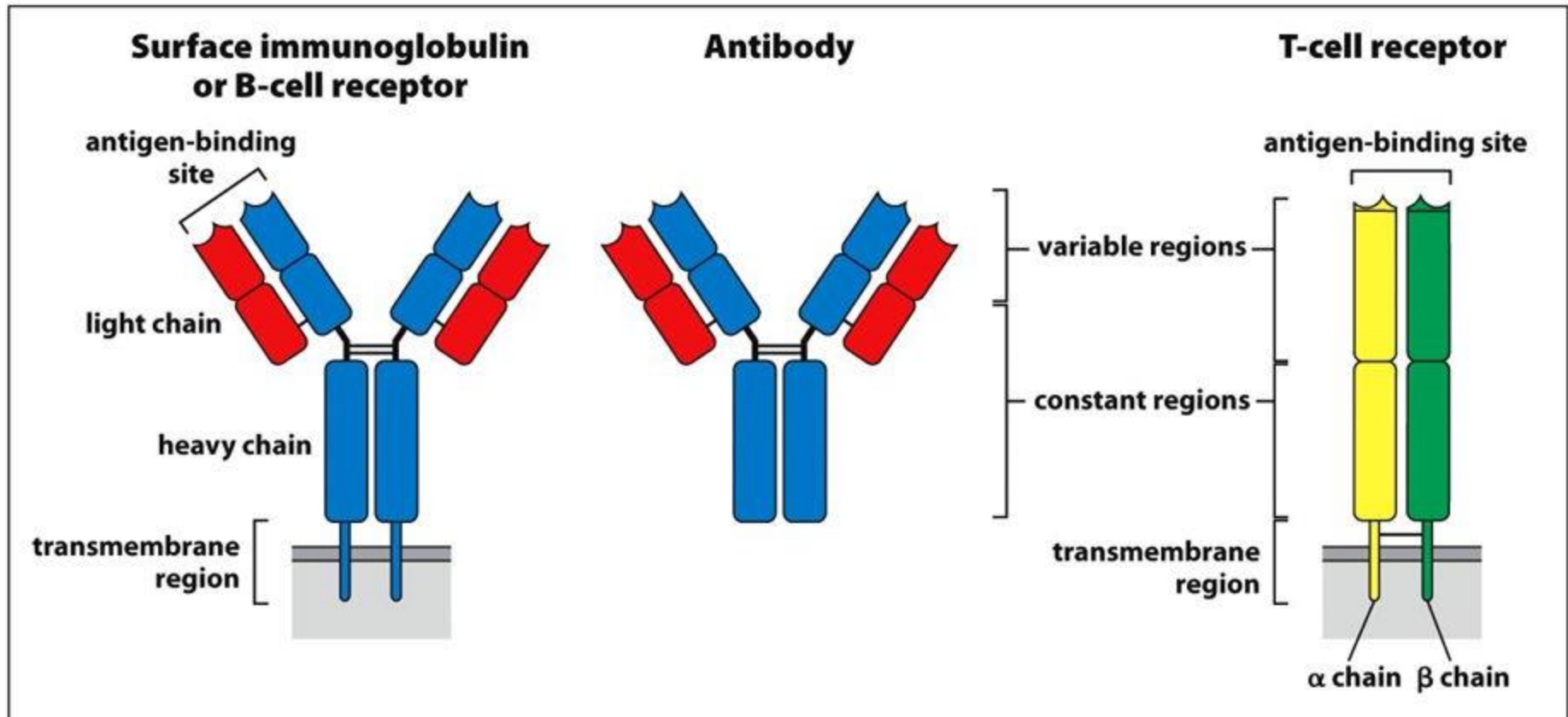
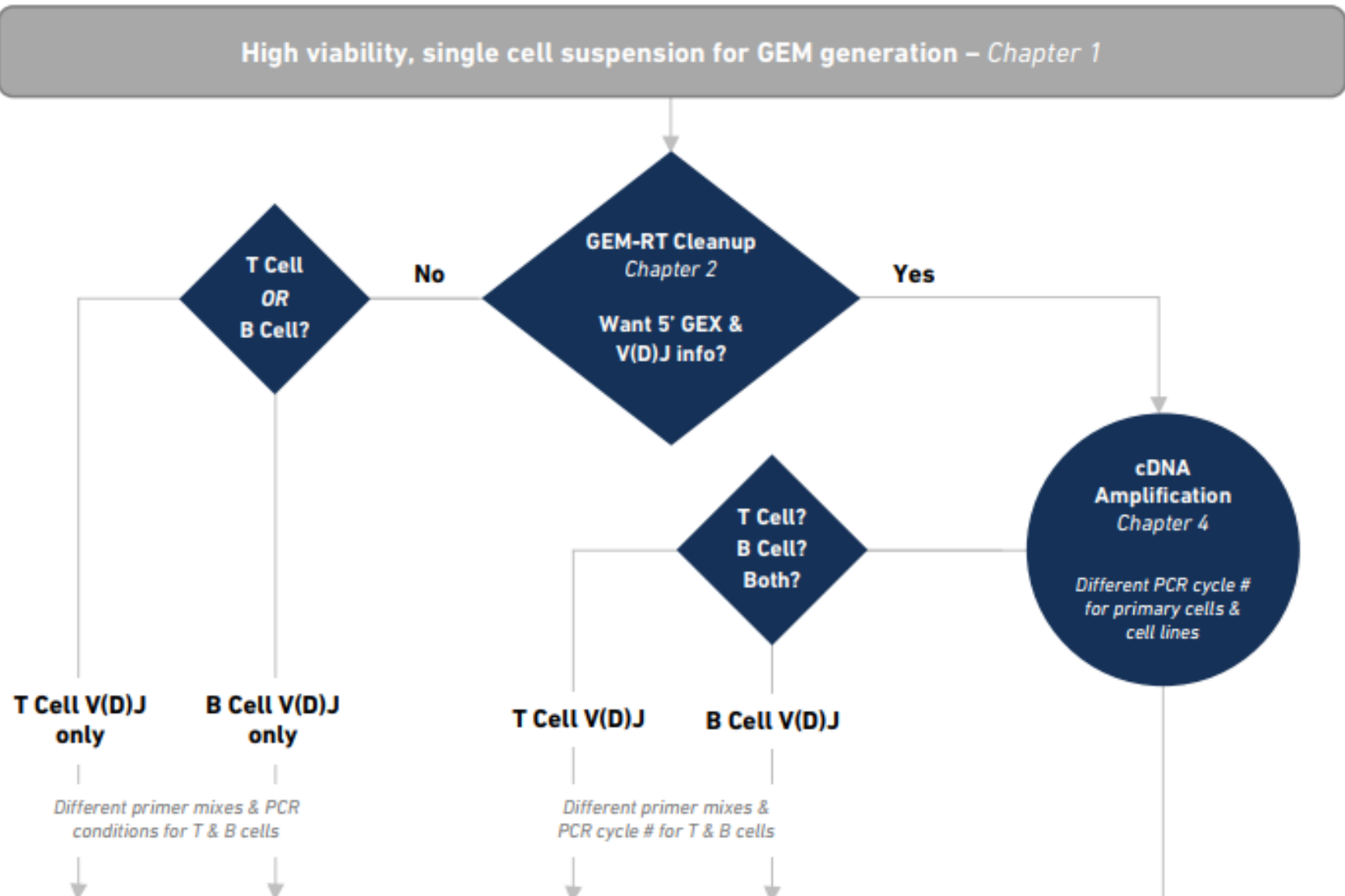


Figure 3.1 The Immune System, 3ed. (© Garland Science 2009)

# General workflow 5' + V(D)J single cell sequencing



# Gel bead oligos

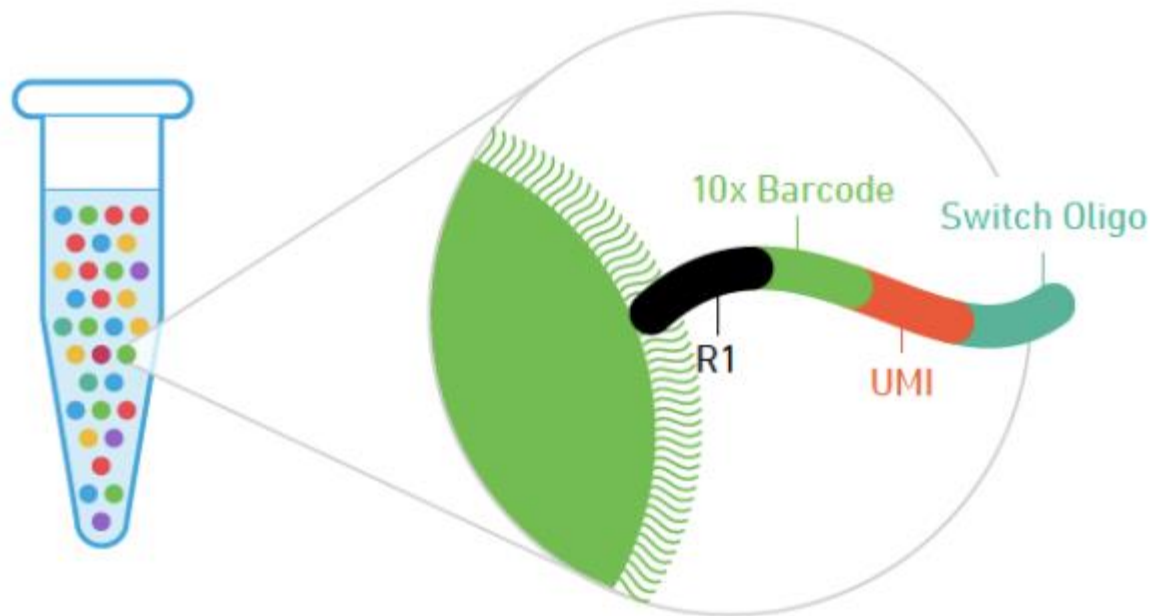
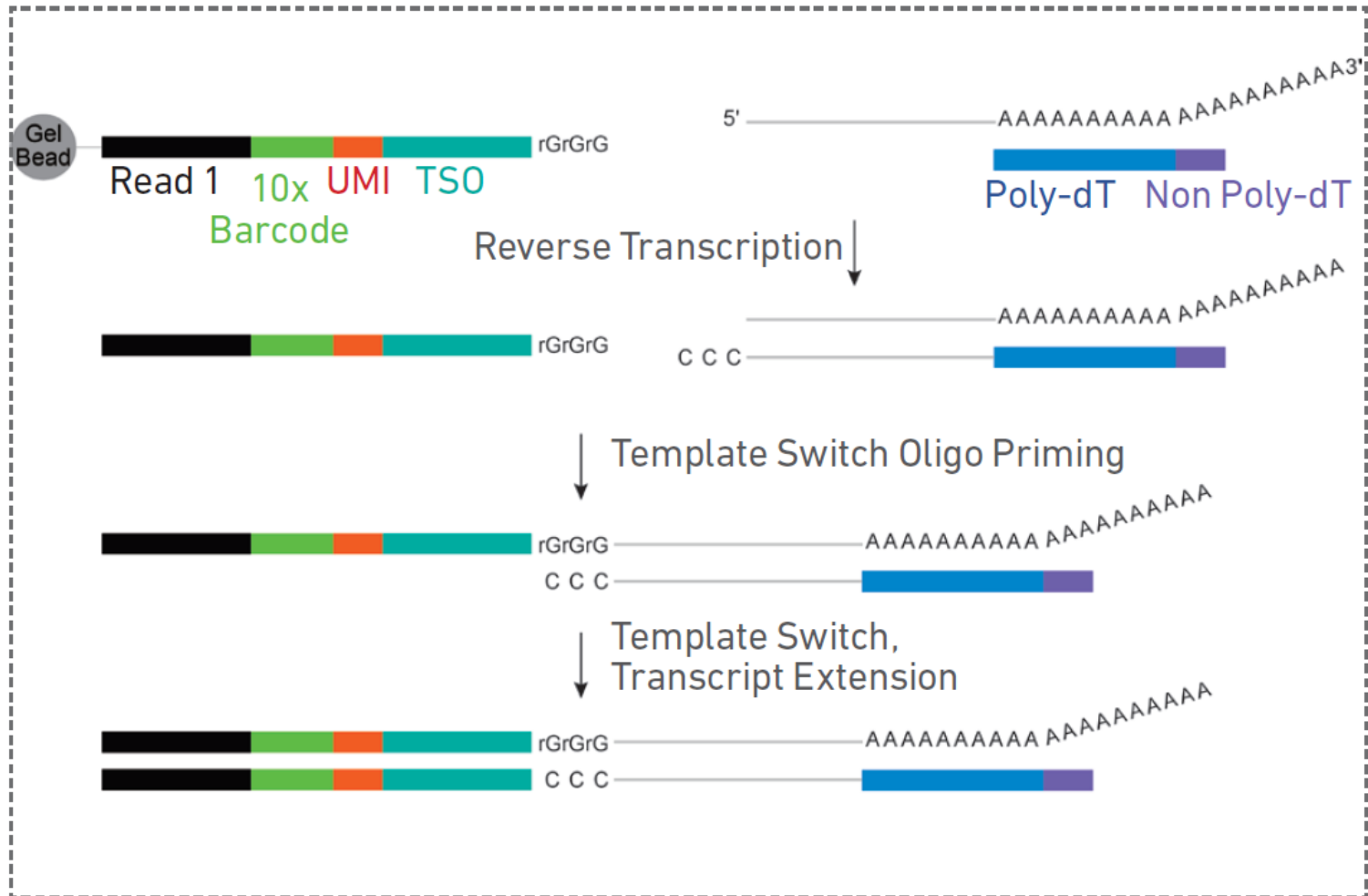


Figure 1. Schematic of a Single Cell 5' Gel Bead oligo primer.

- i. Partial Illumina Read 1 Sequence (22 nucleotides (nt))
- ii. 16 nt 10x™ Barcode
- iii. 10 nt Unique Molecular Identifier (UMI)
- iv. 13 nt Switch Oligo

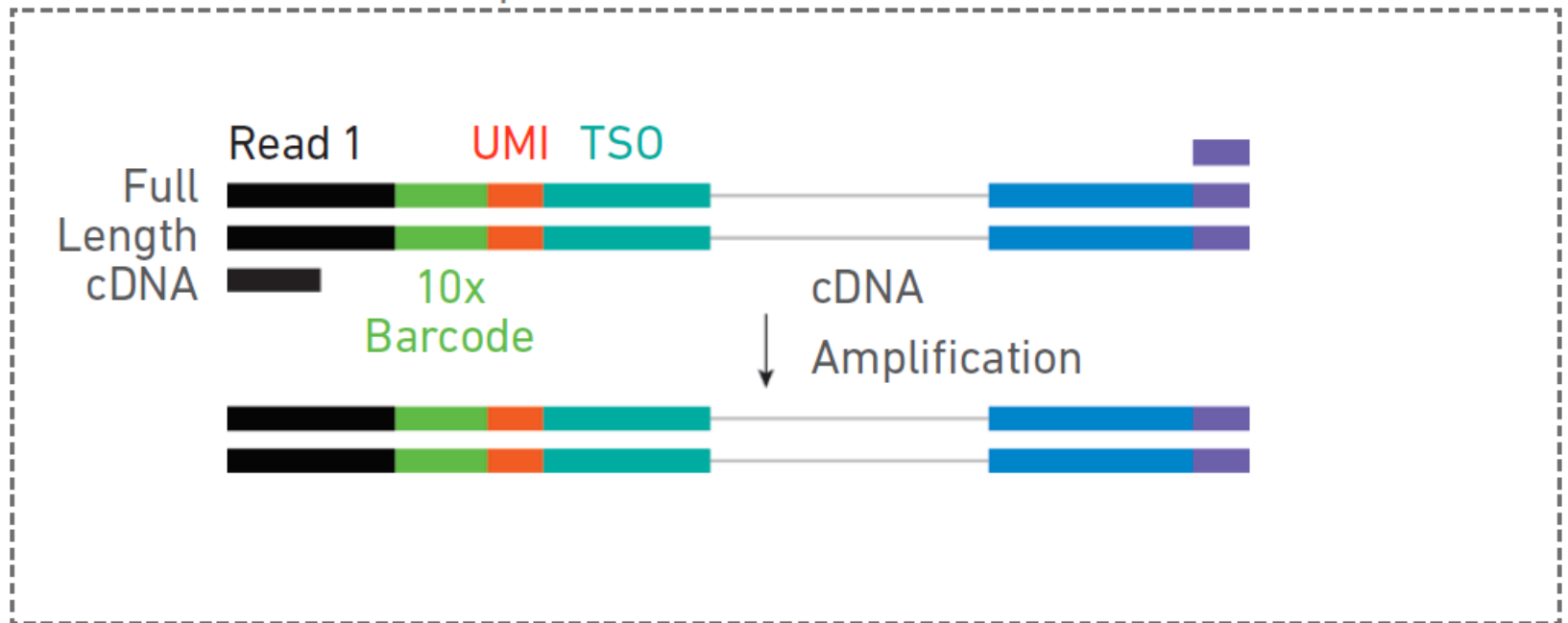
# Assay scheme for 5' scRNA-seq

Inside individual GEMs



# Assay scheme for 5' scRNA-seq

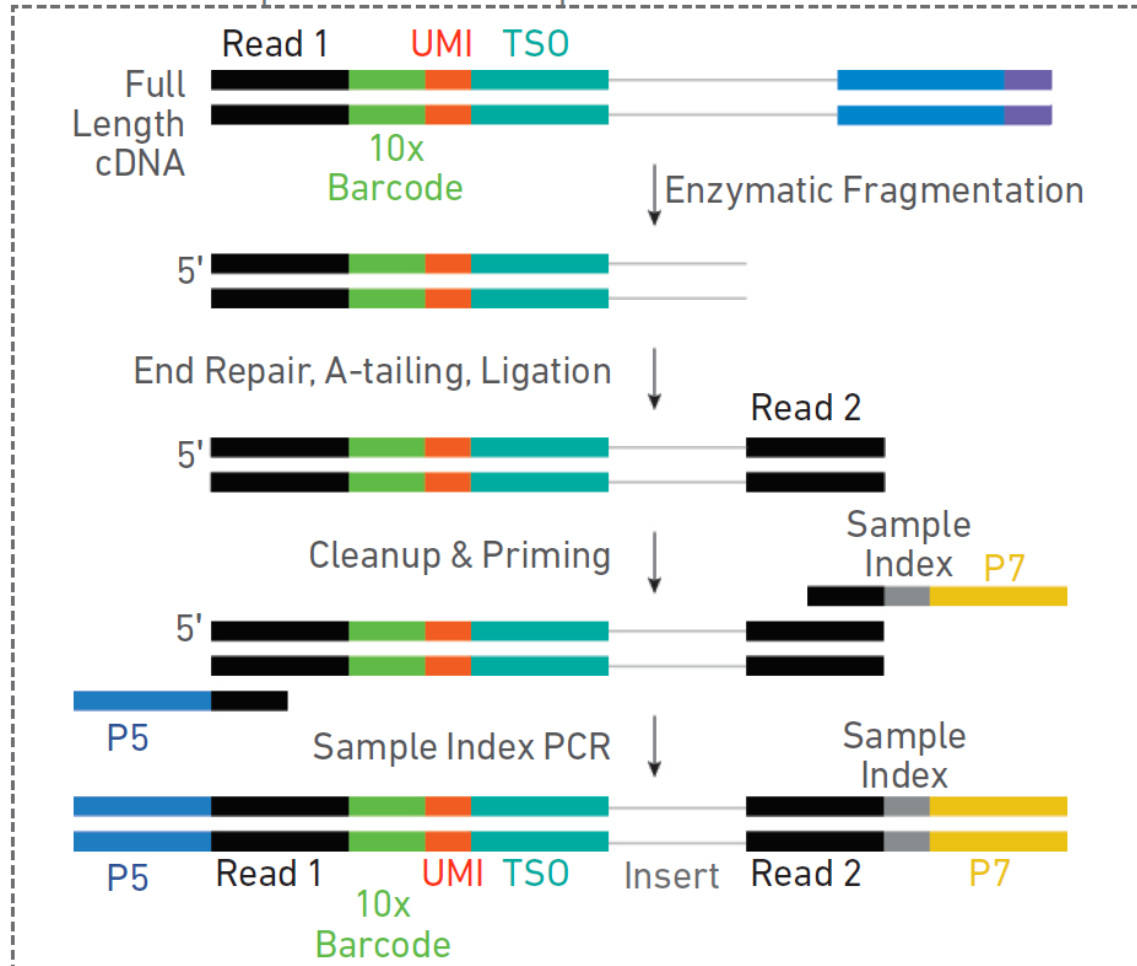
Pooled cDNA amplification





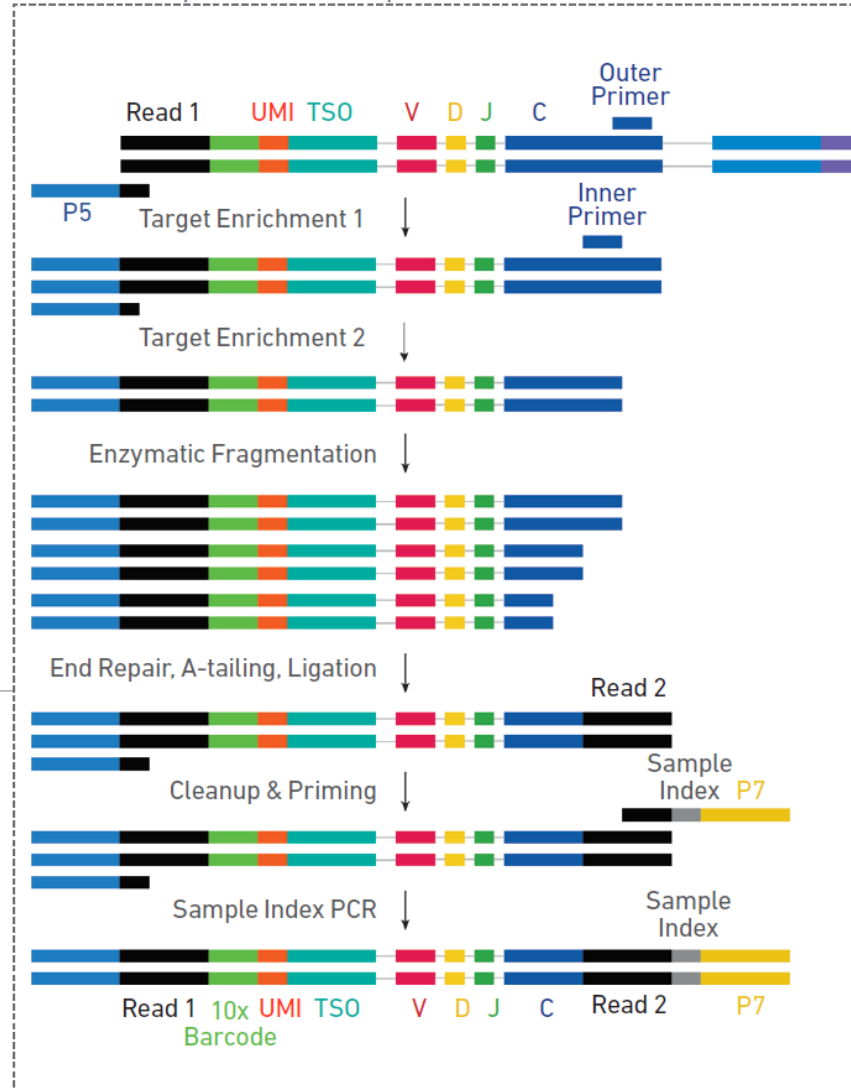
# Assay scheme for 5' scRNA-seq

Pooled amplified cDNA processed in bulk



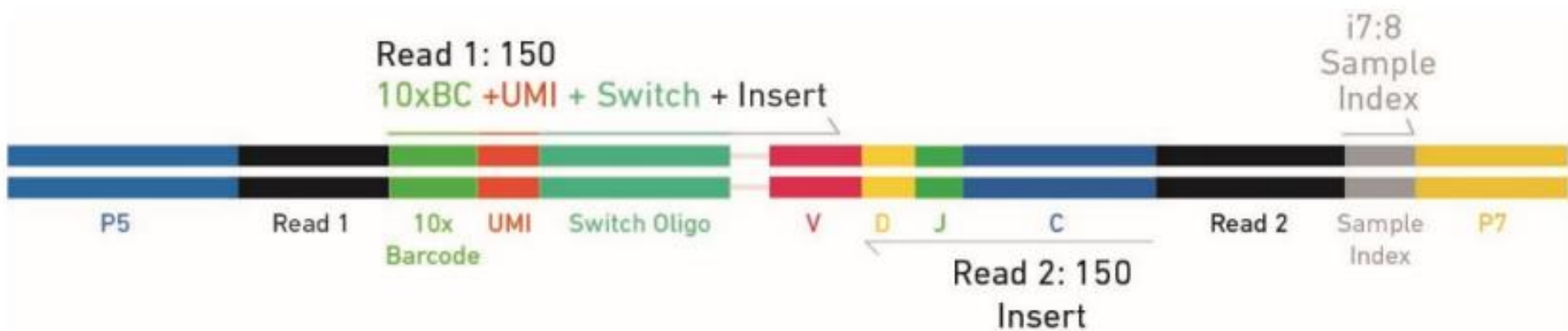
# Assay scheme for 5' VDJ libraries

Pooled amplified cDNA processed in bulk

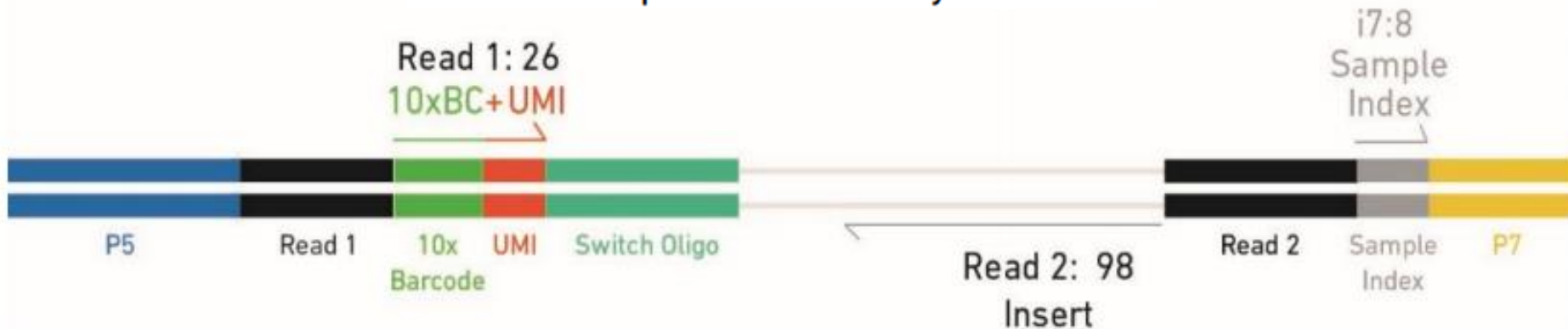


# Final library structure

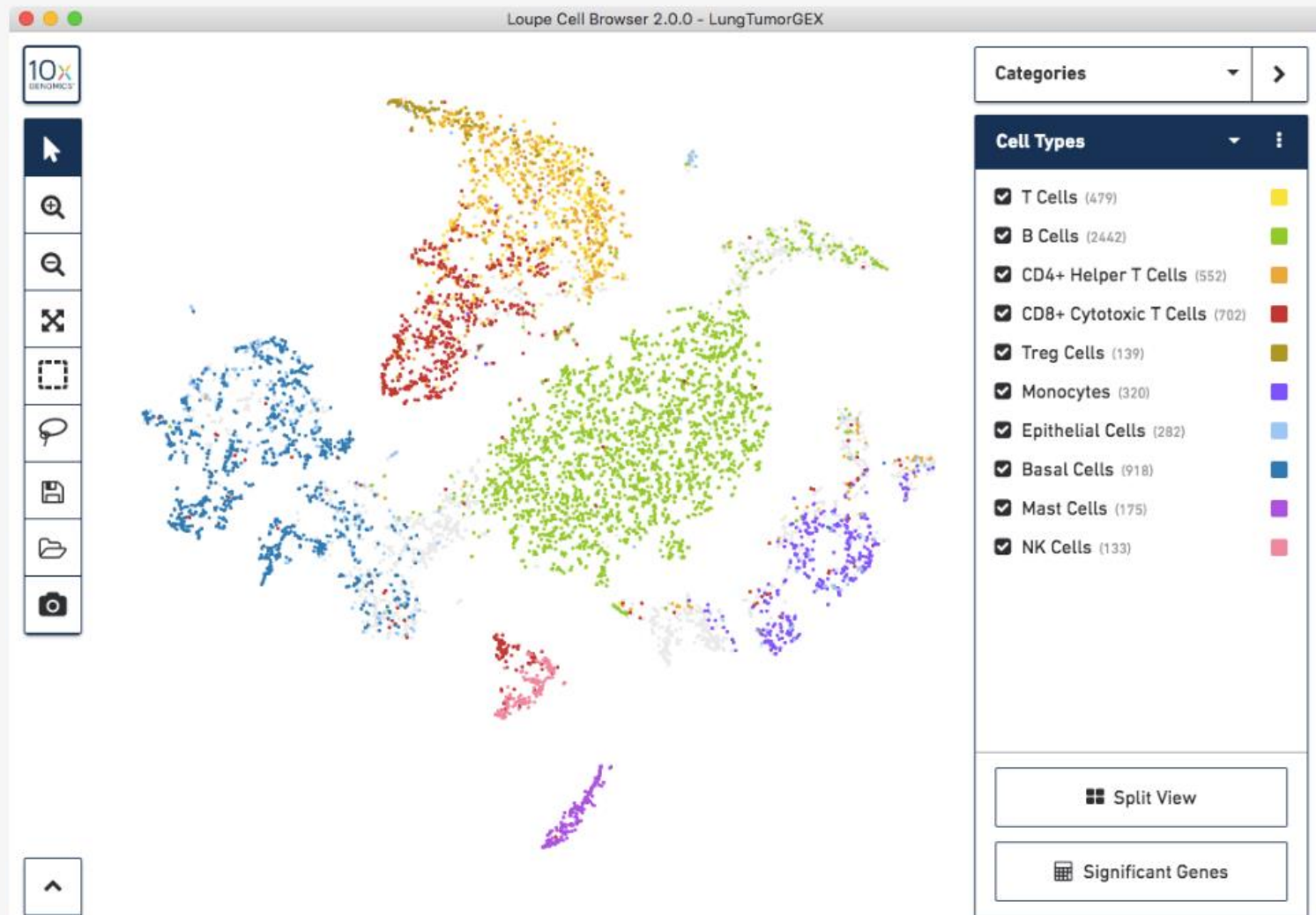
## V(D)J Enriched Library Structure:



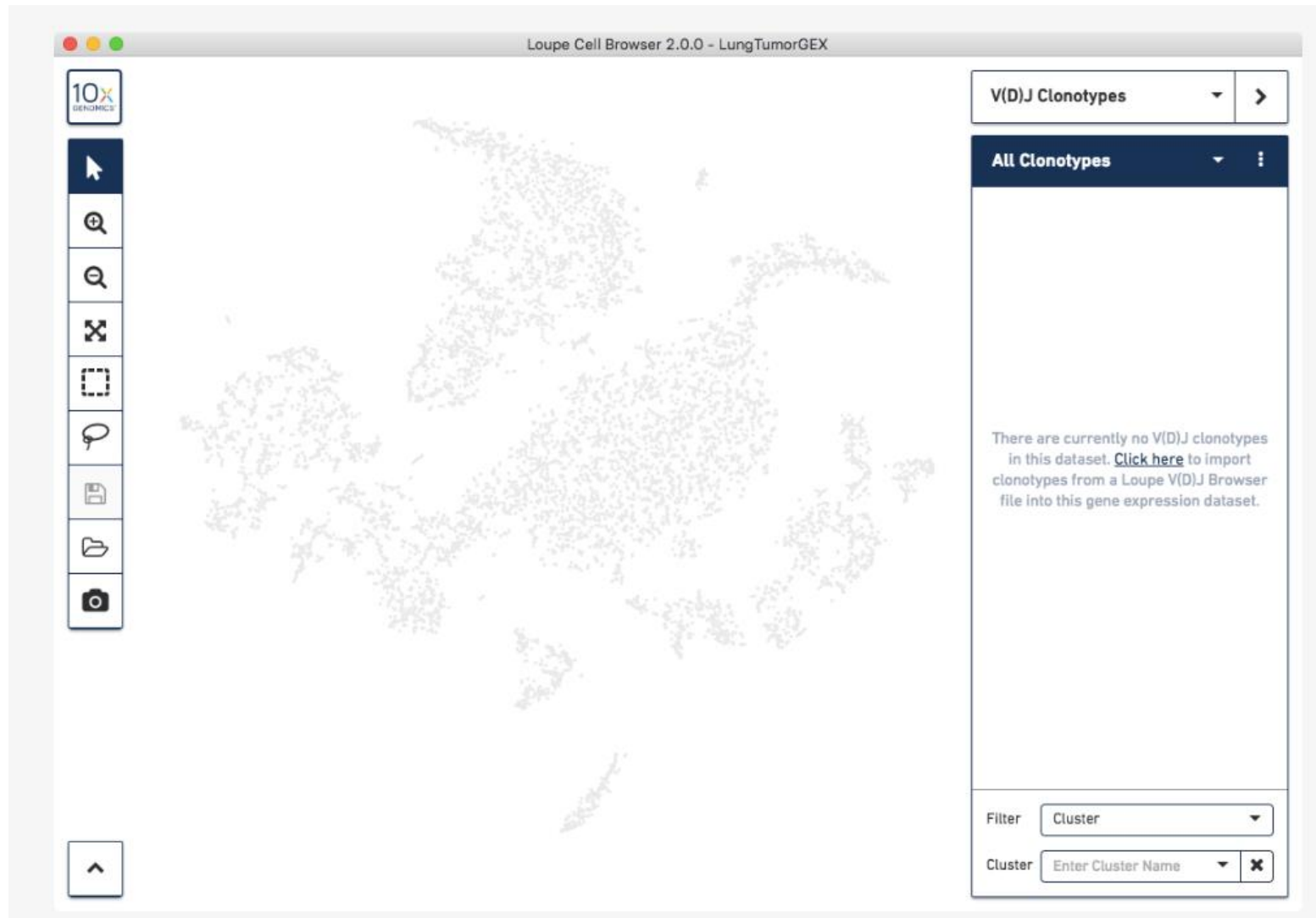
## 5' Gene Expression Library Structure:



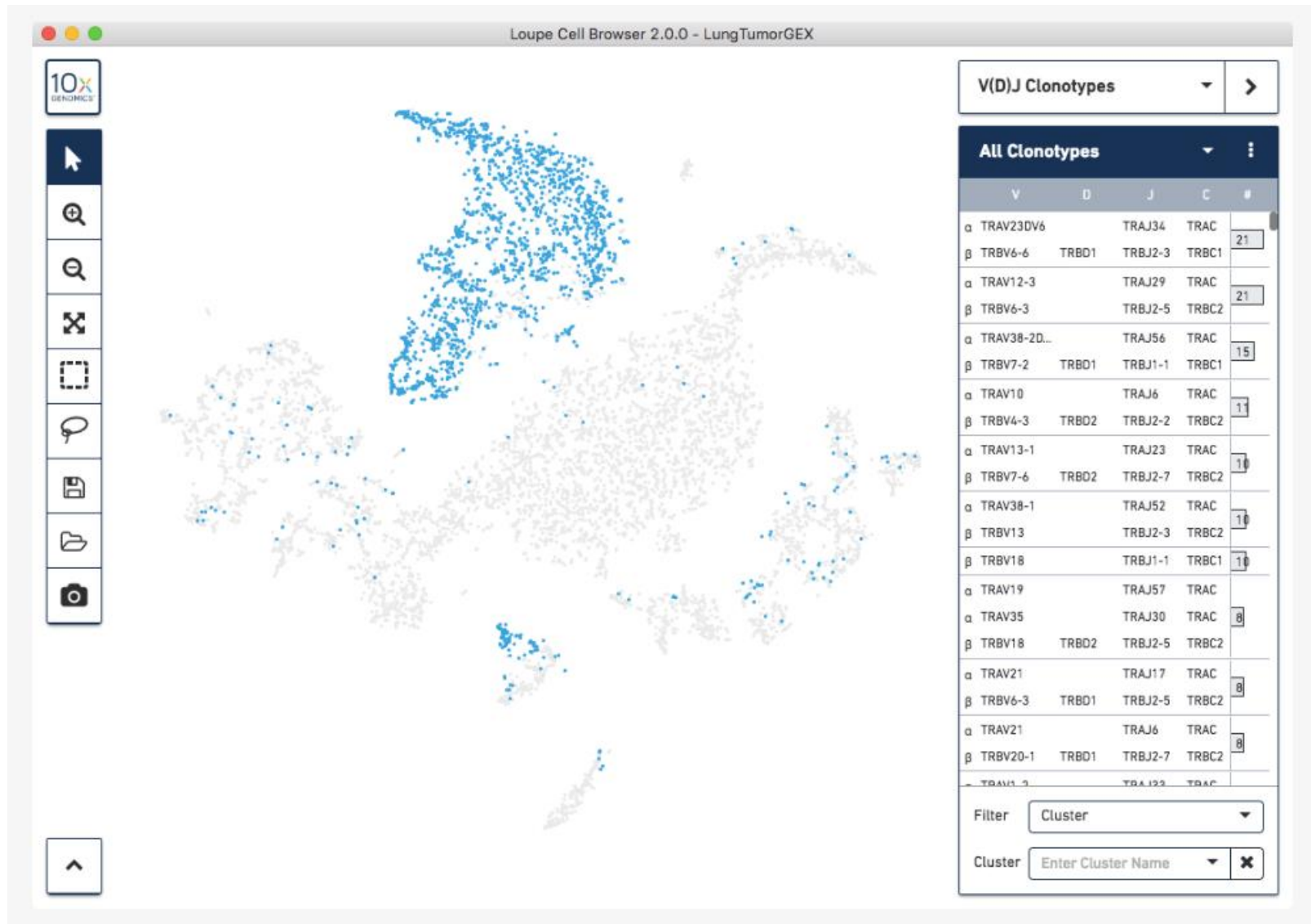
# Exploring data using Cell Ranger tools



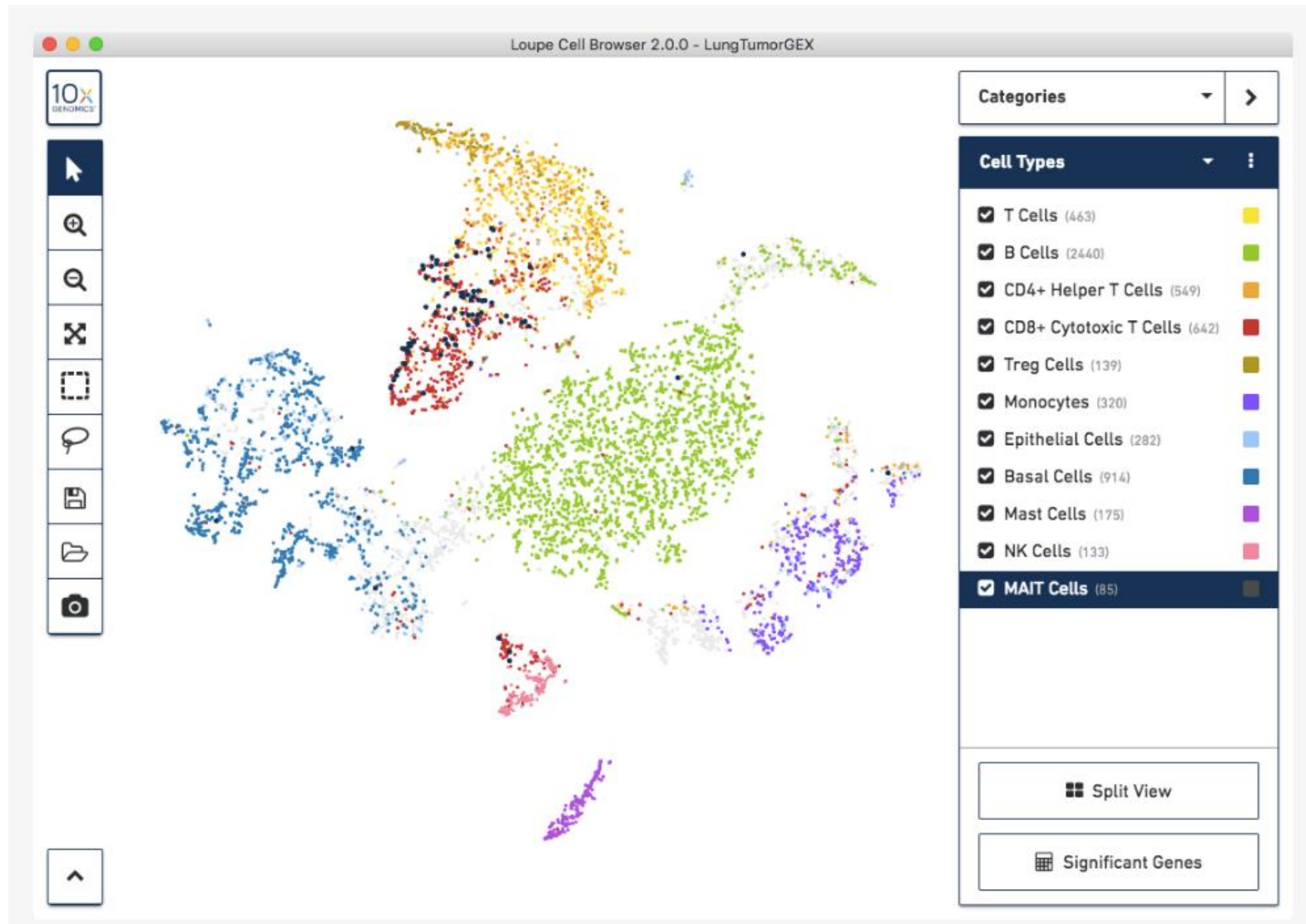
# Exploring data continued...



# Visualize ALL clonotypes



# Combine clonotypes w/gene expression



# Cost estimates

## Library prep

- With 10,000 cells/reaction: 0.25 EUR/cell
- With 1000 cells/reaction: 2.50 EUR/cell

Sequencing 5' expression @ 25,000 reads/cell:  
0.20 EUR/cell

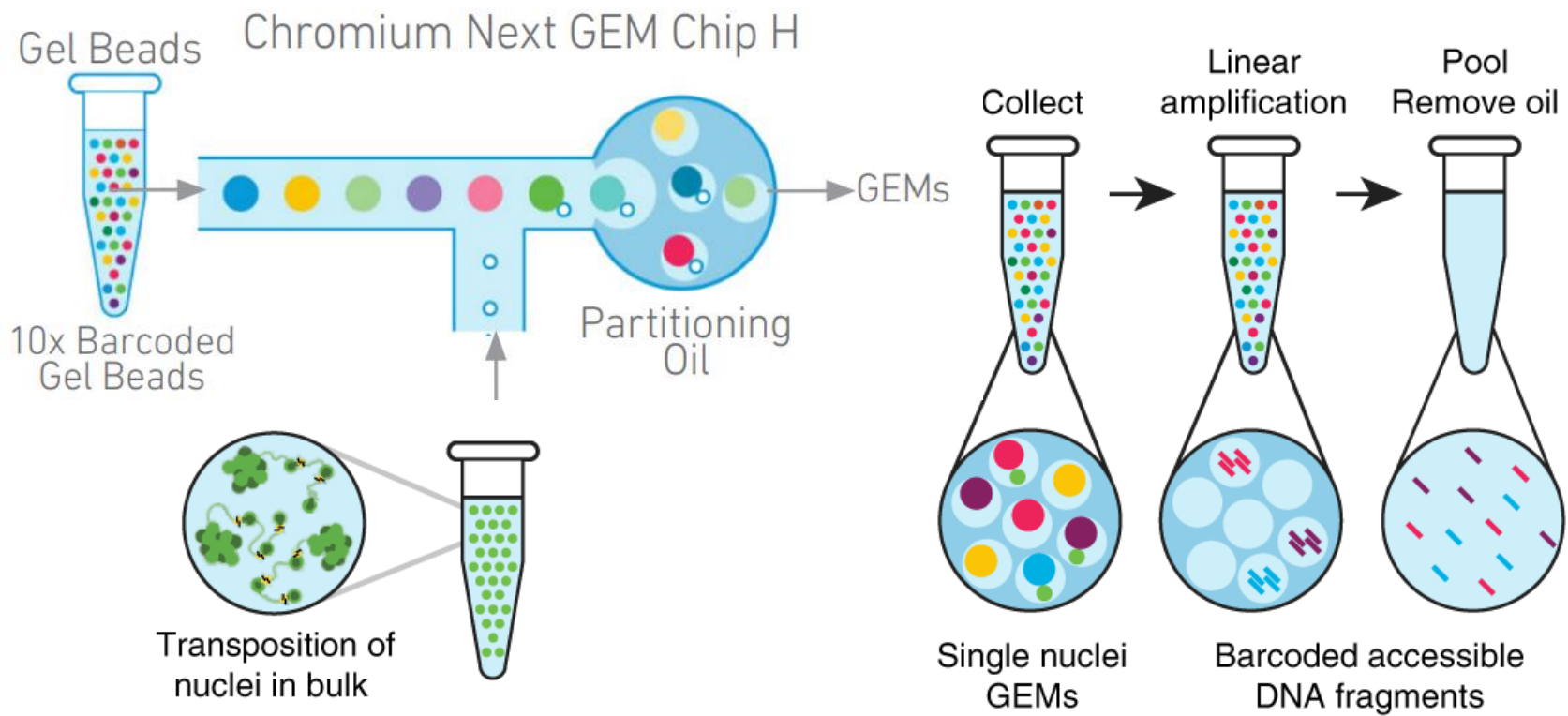
Sequencing BCR @ 2500 reads/cell:  
0.02 EUR/cell

Total cost 5' GEX + BCR sequencing

10,000 cells:	0.47 EUR/cell
1,000 cells:	2.72 EUR/cell



# Single-cell ATAC-seq



# Visium for spatial transcriptomics

A

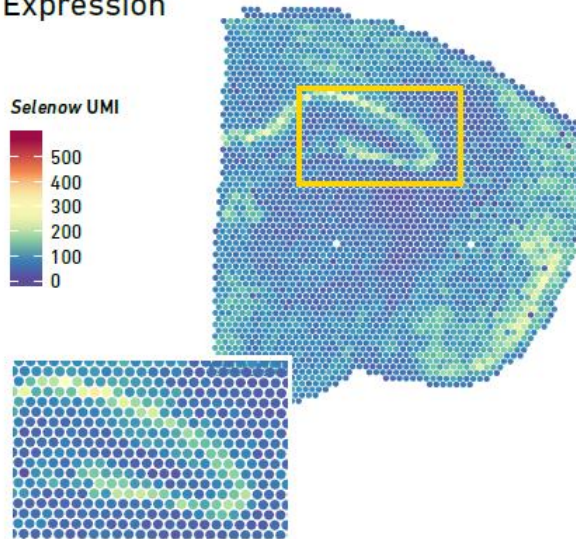
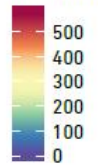
H&E Only



B

*Selenow*  
Expression

*Selenow* UMI



C

*Hpca*  
Expression

*Hpca* UMI

