

Single Cell Gene Expression with Cell Surface Protein

FEATURE BARCODING TECHNOLOGY FOR CELL SURFACE PROTEIN

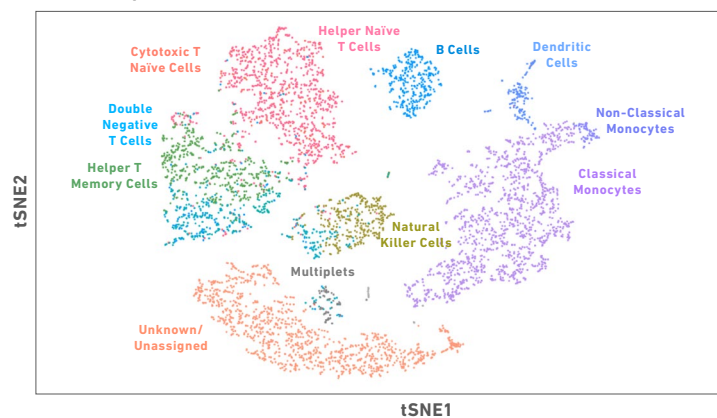
The Chromium Single Cell Gene Expression Solution with Feature Barcoding technology (with Next GEM technology) combines cell surface protein detection with an unbiased readout of each single cell transcriptome. Cell surface proteins serve as biomarkers to help distinguish individual cells. As an alternative to the fluorescent tags used in flow cytometry, Feature Barcoding technology leverages antibodies conjugated to DNA barcodes for single cell sequencing. Barcode diversity vastly expands the number of markers you can analyze per assay and improves cell type resolution.

This robust solution allows you to gather highly multiplexed surface marker information in hundreds to tens of thousands of cells. Layer cell surface protein expression data over digital gene expression data, on a cell-by-cell basis, to measure cell surface protein markers and protein isoforms that are difficult to differentiate at the transcript level. These capabilities expand your ability to identify cell types and states, as well as detect rare cell types, all in a single assay at single cell resolution.

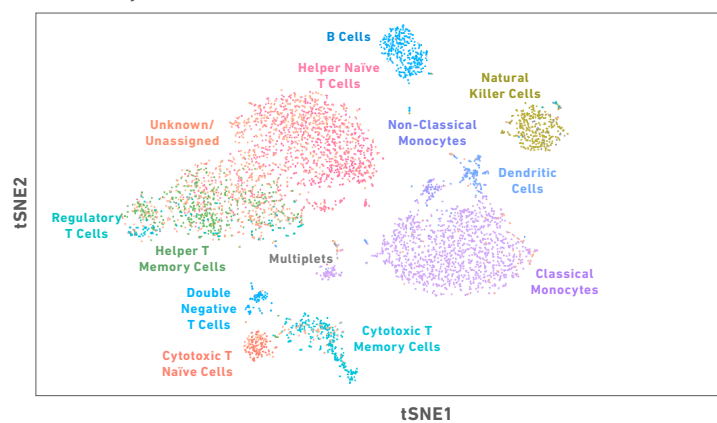
Improved Resolution of Cell Types with the Addition of Cell Surface Protein Detection

tSNE projections of ~5,500 peripheral blood mononuclear cells (PBMCs) output by Cell Ranger. **A.** PBMCs are grouped together based on digital gene expression information. **B.** PBMCs were then grouped by cell surface protein expression profiles. The additional information from antibody UMI counts better resolved many canonical cell types compared to gene expression data alone—naive and experienced T cells, CD4+ and CD8+ T cells (populations denoted with asterisk*), for example.

A. Gene Expression



B. Antibody



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HIGHLIGHTS

- Perform cellular phenotyping to identify novel targets, biomarkers, and cell types and states without the need for pre-selected gene expression targets
- Simultaneously examine gene expression and protein abundance in the same cell
- Detect under-represented transcripts of key protein markers
- Detect protein isoforms
- Evaluate differences between mRNA and cell surface protein expression profiles
- Obtain similar protein expression performance as gold-standard flow cytometry
- Better implement published methods like CITE-Seq/REAP-Seq using our new and improved workflow

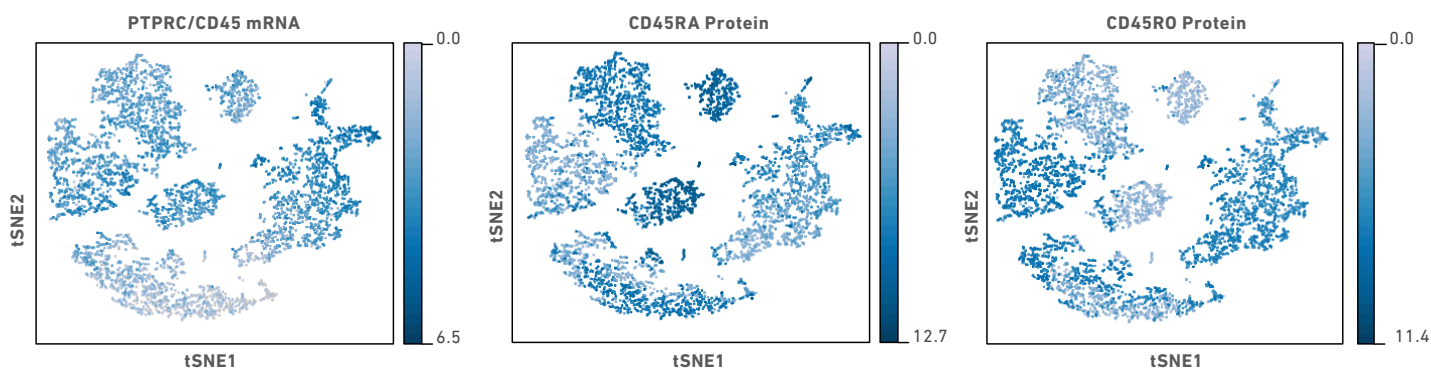
SOLUTION FEATURES

- Ready-to-use, robust protocols including applications using Feature Barcoding technology
- Compatible partners for oligo conjugated antibodies
- Documentation for custom conjugations for use with Feature Barcoding technology
- Easy to use and convenient software with Cell Ranger Analysis Pipelines and Loupe Cell Browser visualization tool
- Based on Next GEM technology

SYSTEM FEATURES

- Partition 100 – 80,000+ cells efficiently
- Scalable; run up to 8 samples in parallel
- Superior sensitivity
- Simple workflow
- Cell size flexibility, no lower limits
- High cell capture rates of up to 65%
- Low doublet rates of under 0.9% per 1000 cells

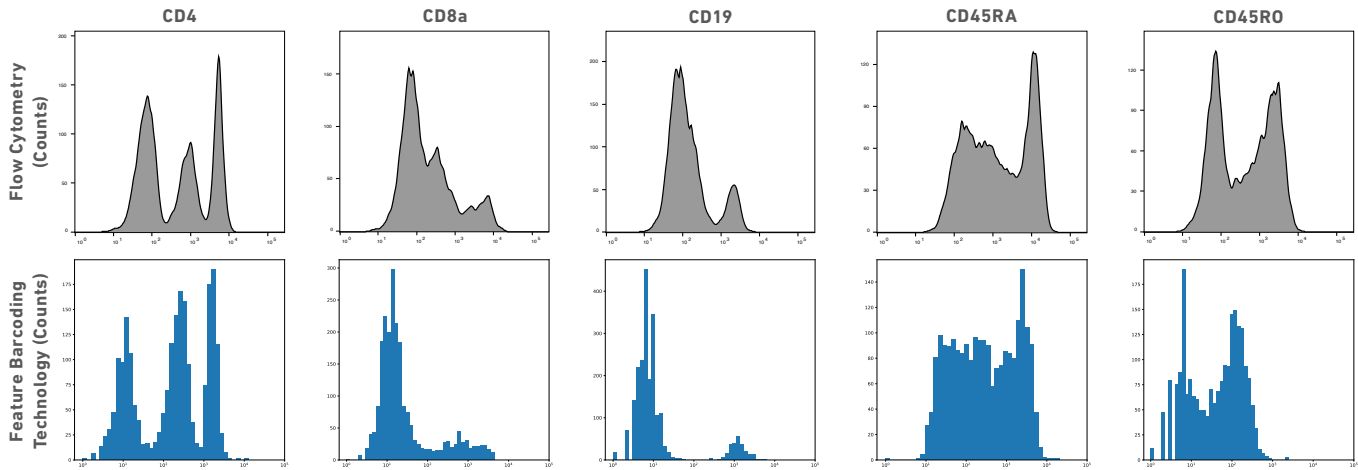
Differentiation of PTPRC Expressing PBMCs via Detection of CD45RA and CD45RO Isoforms



tSNE feature plots depicting PTPRC mRNA (coding for CD45 protein), and CD45RA and CD45RO protein expression. Oligo-conjugated antibodies against CD45RA (HI100) and CD45RO (UCHL1) were used to identify CD45 isoforms which are difficult to differentiate at the transcript level. Color gradient represents UMI counts where dark blue associates with higher UMI counts (higher gene or protein expression levels). While PTPRC is expressed across most cells in the sample and is detected at the mRNA level, the additional information from the isoform-specific antibodies allows differentiation of naive and memory populations.

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Similar Cell Populations are Revealed Comparing Flow Cytometry and Feature Barcoding Technology Data



In PBMCs, flow cytometry and Feature Barcoding technology reveal similar cell populations when fluorescence intensity is compared with UMI counts per cell.

APPLICATIONS

- Biomarker Discovery
- Immunophenotyping
- Cell Atlasing and Cataloguing
- Disease Pathway Investigation
- Discovery of Rare Cell Types
- Enhanced Phenotyping of Tissues and Organs
- Pathway & Cell Signaling Analysis

RESEARCH AREAS

- Cell Biology
- Cancer Research
- Basic & Translational Immunology
- Developmental Biology
- Stem Cell Biology
- Immuno-Oncology & Immunotherapy

ADDITIONAL RESOURCES

DATASETS	go.10xgenomics.com/scRNA-3/datasets
SEMINARS	go.10xgenomics.com/scRNA-3/seminars
APPLICATION NOTES	go.10xgenomics.com/scRNA-3/app-notes
TECHNICAL SUPPORT	go.10xgenomics.com/scRNA-3/support
PUBLICATIONS	go.10xgenomics.com/scRNA-3/pubs

Reference

¹ Next GEM reagents are specific to Next GEM products and should not be used interchangeably with non-Next GEM reagents.

PRODUCTS	PRODUCT CODE
Chromium Next GEM Single Cell 3' GEM, Library & Gel Bead Kit v3.1 ¹ , 4 rxns	1000128
Chromium Next GEM Single Cell 3' GEM, Library & Gel Bead Kit v3.1 ¹ , 16 rxns	1000121
Chromium Next GEM Chip G Single Cell Kit ¹ , 48 rxns	1000120
Chromium Next GEM Chip G Single Cell Kit ¹ , 16 rxns	1000127
Chromium Next GEM Single Cell 3' Library Construction Kit v3.1 ¹ , 16 rxns	1000157
Chromium i7 Multiplex Kit, 96 rxns	120262
Chromium Single Cell 3' Feature Barcode Library Kit, 16 rxns	1000079
Chromium Controller & Next GEM Accessory Kit ¹ , 12 Mo. Warranty	1000202
Chromium Controller & Next GEM Accessory Kit ¹ , 24 Mo. Warranty	1000204
Cell Ranger	go.10xgenomics.com/scRNA-3/cell-ranger
Loupe Cell Browser	go.10xgenomics.com/scRNA-3/loupe-cell
Compatible Partner Product: Biolegend TotalSeq™-B	go.10xgenomics.com/totalseq-B