

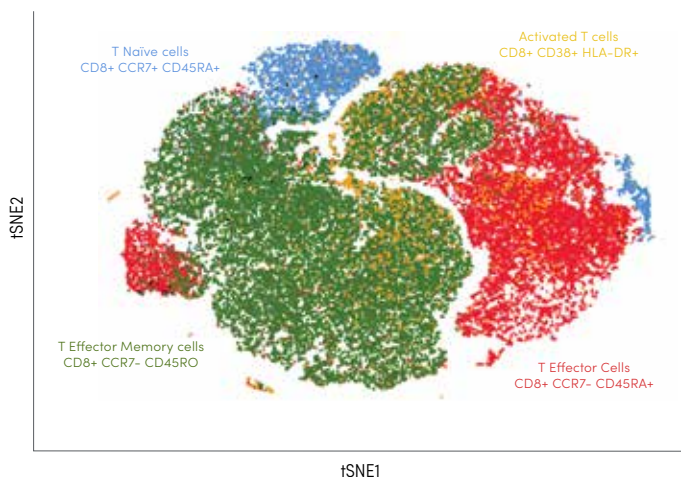
Unravel the Specificity of the Adaptive Immune Response

Feature Barcoding Technology for Cell Surface Protein & Antigen Specificity

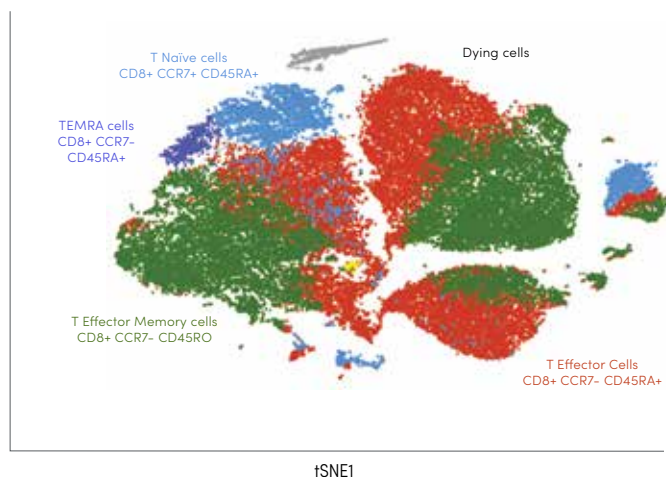
Simultaneously examine the cellular context of the adaptive immune response and immune repertoires of hundreds to tens of thousands of T and B cells in human or mouse with the Chromium Single Cell Immune Profiling Solution (with Next GEM technology). Now, you can also detect cell surface markers and determine antigen specificity by leveraging Feature Barcoding technology. Decipher the mechanisms involved in the antigen-specific immune response by distinguishing antigen specificity of single T cells with DNA-barcoded peptide-MHC (pMHC) multimers. Additionally, you can gain further insight into cellular phenotype via combining gene expression read-outs with cell surface protein expression using antibodies conjugated to barcodes instead of the fluorescent tags used in flow cytometry. The resulting barcode diversity vastly expands the breadth of cell surface markers that can be detected at the same time. Use the Single Cell Immune Profiling Solution with Feature Barcoding technology to unveil a new understanding of the adaptive immune response including T-cell receptor (TCR) specificity, all within the landscape of the responding cell population.

Improved Resolution of CD8+ T Cell Subtypes with the Addition of Cell Surface Protein Detection

A. Gene Expression



B. Antibody



tSNE projections of ~45,000 flow-sorted CD8+ T cells output by Cell Ranger and visualized using Loupe Cell Browser. **A.** T cells are grouped together based on digital gene expression information. **B.** T cells were then grouped by cell surface protein expression profiles. Cell cluster classification was performed by manual curation. The additional antibody information easily resolved many T cell subtypes compared to gene expression data alone.

Highlights

- Reveal clonality, diversity, antigen specificity, and cellular context
- Pair α and β chain TCR sequences from individual T cells
- Pair heavy and light chain immunoglobulin (Ig) sequences from individual B cells with full isotype resolution
- Simultaneously measure TCR, B cell Ig, cell surface protein expression, and 5' gene expression in the same cells
- Link full-length, paired TCR α and β chain sequences with TCR-pMHC specificity

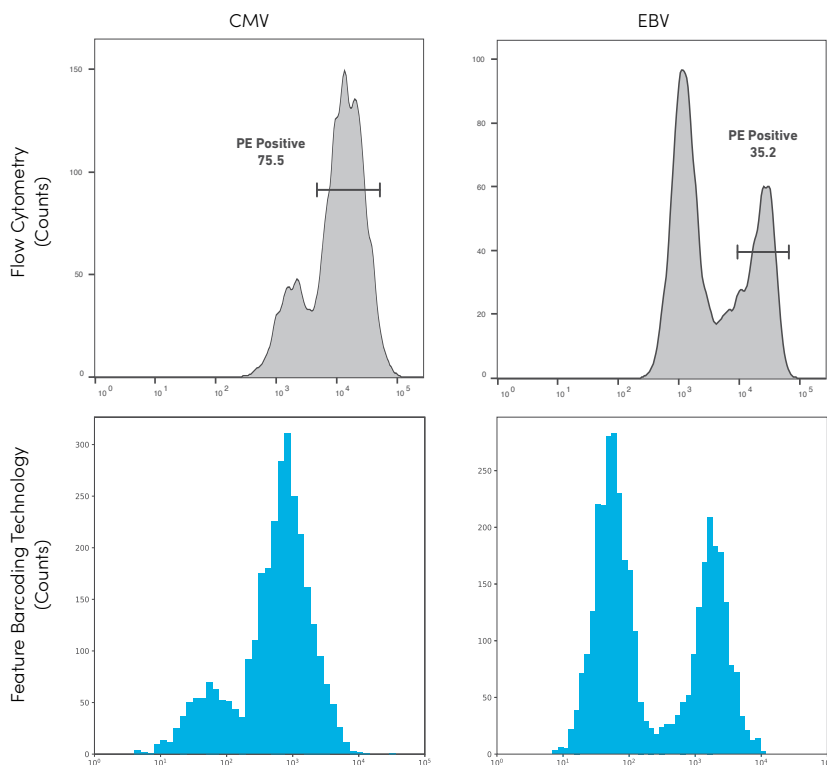
Solution Features

- Ready-to-use, robust protocols including the Feature Barcoding technology
- Compatible partners for oligo conjugated antibodies and MHC multimers
- Documentation for custom conjugations for use with Feature Barcoding technology
- Easy to use software includes Cell Ranger Analysis Pipelines, Loupe Cell Browser and Loupe V(D)J Browser visualization tools
- Based on Next GEM technology

System Features

- Partition 100 – 80,000+ cells efficiently
- 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% in 1000 cells

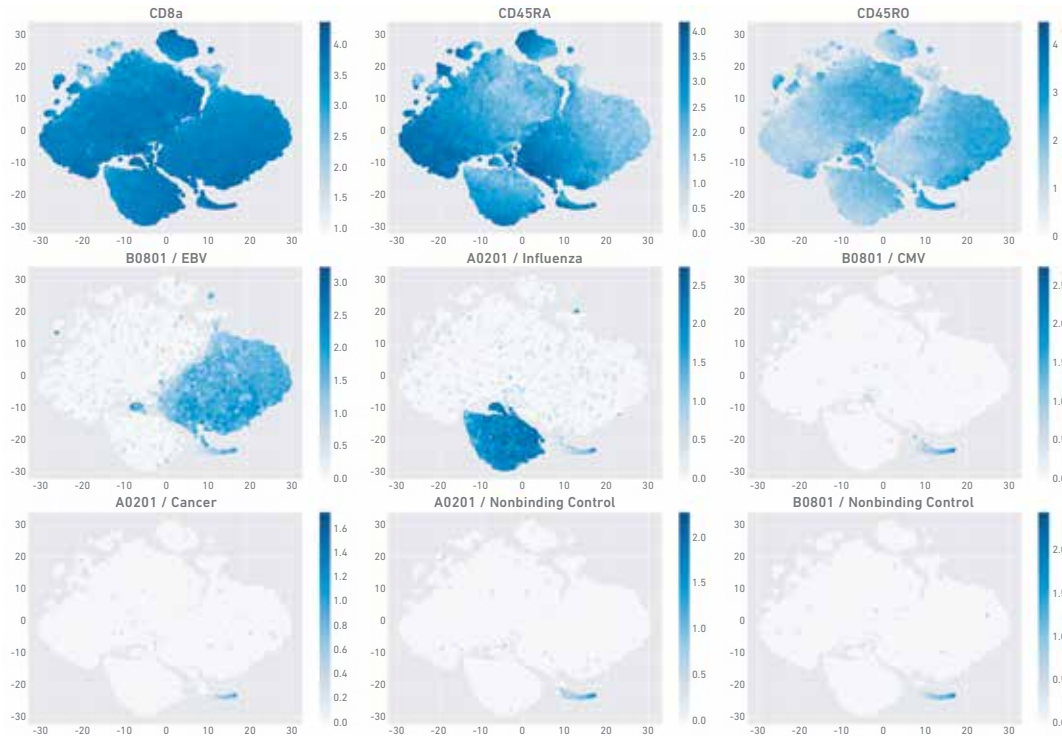
Detection of pMHC Specificity in Antigen-Expanded Cells



Commercially available CD8+ T cells expanded against CMV and EBV antigens (CMV: HLA-A*0201 NLVPMVATV, EBV: HLA-A*0201 GLCTLVAML, Astarte Biologics). Flow cytometry and Feature Barcoding technology identify similar Dextramer®-binding cell populations when profiled with dCODE™ Dextramer® reagents displaying the same pMHC specificities.

Profile Flow-sorted CD8+ T with TotalSeq™-C Antibodies and dCODE™ Dextramers®

A.



B.

	V	D	J	C
α	TRAV13-2	-	TRAJ45	TRAC
β	TRBV5-6	TRBD2	TRBJ1-1	TRBC1

TCRα: TRAV13-2 : TRAJ45 : TRAC

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GATTCTGATTAATAGGTTATGGCAGAAGTAGAGCCTTTTCTATTGGCTGAGTAGACAATGTGAGAAACCACTATGATGTTAGAG
GAAAGAAAGGAATACCCGATGATGGAAGTAGCTCTTATGGCTGGAGATGCGAGGTTTATGACTGATCCTATTGGGAAGAACAATGATGGCAGG
CATTCGAGCTTTATTTATGACTTGTGGCTCGAGCTGGACTGGGTGAGCAGAGGAGAGAGTGTGGGGTGCATCTTCTACCTGAGTGTCCAG
GAGGGTGACAACCTCTATTATCACTGTGCTTATCAACAGCCCTCAGACTTTCATTTGGTACAGCAAGAATCTGGAAGAGTCCCAAT
TCATTATAGACATTCGTTCAAATATGGACAAAAGGCCAAGGCCAAGAGTCACCGTTTATTGATAAGACAGTGAAACATCTCTCTGCAAA
TTGCAGCTACTCAACCTGGAGACTCAGCTGTCTACTTTGTGCAGACTCCGGAGGAGGTTGCTGACGACTACCTTTGGCAAAGGACTCATCTA
ATCATCCAGCCCTATATCCAGAACCCTGACCTGCGGTGTACCAGCTGAGAGACTCTAATCCAGTGACAAGTGTGTCTGCTTATCCAGGATTTTG
TCRβ: TRBV5-6 : TRBD2 : TRBJ1-1 : TRBC1
GGACTCACAGGCTCCTACCTCCGCTGATGGGCAAGTGTGTGAGCTCCAGCATGGAGCACCACAGCACTAGTGGGGAAGAACGGTGATAGG
GTGATGGGGCAGCCTGTGAGCTGGGGCAGTGTAGGCAGAGGAGGAAGTGTATCACCACAGAAACTTCTCGCTCACACATCCCTCCAGCTAG
GCAGGACAGGTAGAGAGTCCAGTGTCTGGAGCACTAGACTAAGGAAGGCTGCATGGGAGGACAAAGGACAGTGACATCACAGGA
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CCTCTGTGCTATGGGCCCGGGCTCCTGTCTGGGCACTGCTTTGTCTCTGGGAGCAGGCTTAGTGGACGCTGGAGTCCACCAAAGT
CCACACCTGTATCAAAACGAGAGGACAGCAAGTGAAGTCTGAGATGCTCTCTAAGTCTGGGATGACACTGTCTCGGTACCAACAG
GCCCTGGGTGAGGGCCCGGCTTTATCTTTTATGATATGAGGAGGAGAGAGAGAGGAACTTCCCTGATGCTTCTGAGTCCAGTCC
CAGTTCCTAAGTATAGCTGAGCTGAATGTGAACCCCTTGTGCTGGGGACTCGGCCCTCTATCTCTGTCGACGAGCCTAAGGAGC
GCTCTGAAGCTTTCTTTGGACAAGGACCAAGACTCACAGTGTGAGGAGCTGAACAAGGTTCCACCCGAGGTCGCTGTGTTTGGC
CATCAGAAGCAGAGATCTCCACACCCAAAAGGCCACTGTGTATGCTGGCCACAGGCTTCTACCCGACACAGTGGAGCTGAGCTGGT
GGTGAATGGGAAGGAGGTGCACAGTGGGGTCAAGCAGAGCCCGCAGCCCTCAAGGAGCAGCCCGCCCTCAATGACTCCAGACTGCTCTGA
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Flow-sorted CD8+ T cells from an EBV-positive donor. A. Stained with a panel of TotalSeq™-C antibodies and a panel of dCODE™ Dextramer® reagents displaying EBV (HLA-B*0801 EBV BZLF1), flu (HLA-A*0201 Flu M1), CMV (HLA-B*0801 CMV IE-1), cancer (HLA-A*0201 Cancer NY-ESO-1) and nonbinding control antigens. CD8+ T cell subtypes are clustered based on cell surface protein expression: CCR7+, CD45RA+, CD45RO+ and HLA-DR+. CD8+ T cells bind specifically to Dextramers displaying an EBV and influenza epitopes. The donor sample does not contain CMV and cancer specific T cells so the CMV and cancer epitope staining are similar to the nonbinding Dextramer controls. B. The table outlines the gene calls for the most prevalent TCR clonotype alpha (α) and beta (β) chains. The paired α and β chain V(D)J sequences are shown and corresponding V(D)J nucleotides are color-coded (5'UTR: gray, V: red, D: yellow, J: green, C: blue).

Applications

- Immune Profiling
- T Cell Antigen Specificity
- Tumor Infiltrating Lymphocyte Characterization
- Immune Derived Cellular Therapy Discovery
- Characterization of the Tumor Microenvironment
- Immune Cell Atlasing

Research Areas

- Basic & Translational Immunology
- Immuno-Oncology & Immunotherapy
- Autoimmune Disorders & Inflammatory Diseases
- Infectious Disease & Vaccine Research
- Transplant & Immune Reconstitution

Additional Resources

Datasets	go.10xgenomics.com/vdj/datasets
Seminars	go.10xgenomics.com/vdj/seminars
Application Notes	go.10xgenomics.com/vdj/app-notes
Technical Support	go.10xgenomics.com/vdj/support
Publications	go.10xgenomics.com/vdj/pubs

Products	Product Code
Chromium Single Cell 5' Library Construction Kit, 16 rxns	1000020
Chromium Next GEM Single Cell 5' Library & Gel Bead Kit v1.1, 16 rxns ¹	1000165
Chromium Next GEM Single Cell 5' Library & Gel Bead Kit v1.1, 4 rxns ¹	1000167
Chromium Single Cell V(D)J Enrichment Kit, Human T Cell, 96 rxns	1000005
Chromium Single Cell V(D)J Enrichment Kit, Human B Cell, 96 rxns	1000016
Chromium Single Cell V(D)J Enrichment Kit, Mouse T Cell, 96 rxns	1000071
Chromium Single Cell V(D)J Enrichment Kit, Mouse B Cell, 96 rxns	1000072
Chromium i7 Multiplex Kit, 96 rxns	120262
Chromium i7 Multiplex Kit N, Set A, 96 rxns	1000084
Chromium Next GEM Single Cell G Chip Kit, 16 rxns ¹	1000127
Chromium Next GEM Single Cell G Chip Kit, 48 rxns ¹	1000120
Chromium Single Cell 5' Feature Barcode Library Kit, 16 rxns	1000080
Chromium Controller & Next GEM Accessory Kit, 12 Mo. Warranty ¹	1000202
Chromium Controller & Next GEM Accessory Kit, 24 Mo. Warranty ¹	1000204
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Loupe Cell Browser go.10xgenomics.com/vdj/loupe-cell	Download
Loupe V(D)J Browser go.10xgenomics.com/vdj/loupe-vdj	Download
Compatible Partner Product: Biolegend TotalSeq™-C go.10xgenomics.com/totalseq-C	Download
Compatible Partner Product: Immudex dCODE™ Dextramers® go.10xgenomics.com/dCODE-Dextramers	Download

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