See the immune system at unmatched resolution with more sensitive immune profiling

GEM-X Single Cell Immune Profiling v3 with Feature Barcode technology

Understanding complex mechanisms driving immune functions requires a complete understanding of the immune cell repertoire. Chromium GEM-X Single Cell Immune Profiling v3 provides a truly comprehensive view of the immune system with increased cell recovery, up to 80% cell capture efficiency, and more effective pairing of full-length T- and B-cell receptor sequences. Maximize immune insights with higher success rates and increased sensitivity to translate biological findings into therapeutic breakthroughs faster.

Highlights

- Explore a more accurate, comprehensive view of innate and adaptive immune cell diversity with detection of rare cell types, biomarkers, and low-RNA content cells like neutrophils

- Maximize insights into B- and T-cell function in health, disease, and drug immune responses with improved V-J matching of full-length receptor sequences

- Characterize immune response to infection and immunotherapies by measuring clonal expansion and immune cell phenotypes

- Confidently analyze precious clinical samples with robust GEM-X technology that provides high success rates
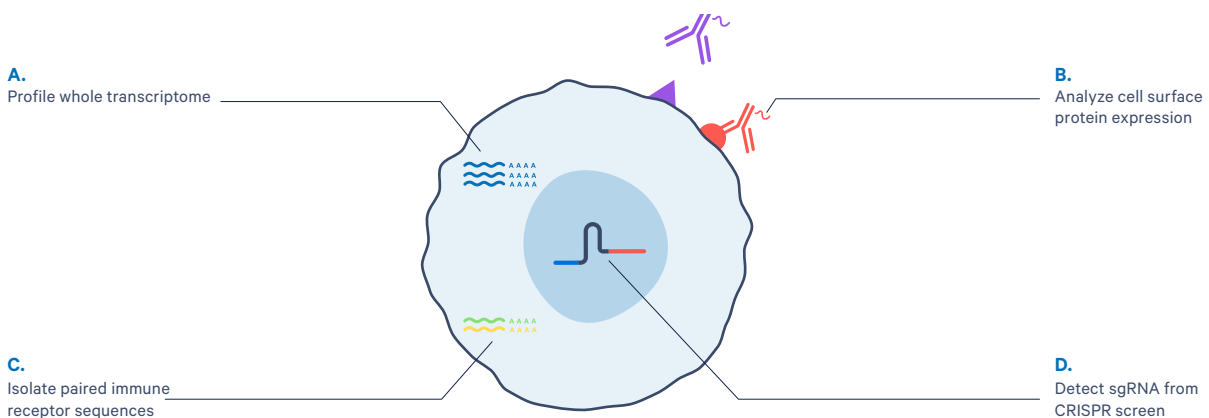

A. Profile whole transcriptome

B. Analyze cell surface protein expression

C. Isolate paired immune receptor sequences

D. Detect sgRNA from CRISPR screen

Figure 1. Fully characterize the adaptive immune response with multiomic profiling, including immune receptor mapping. Detect the whole transcriptome, along with cell surface proteins and paired, full-length receptor sequences of T or B cells. **A.** Chromium GEM-X Single Cell Immune Profiling provides sensitive whole transcriptome analysis at the single cell level, for hundreds to tens-of thousands of cells per reaction. **B.** Measure up to hundreds of cell surface proteins at single cell resolution with Feature Barcode technology. **C.** Identify distinct clonotypes through corresponding paired, full-length immune receptor sequences. **D.** Scale functional genomics screens with tens to thousands of perturbations in a single experiment using Feature Barcode technology, which lets you concurrently detect single guide RNA (sgRNA) and perturbed gene expression profiles in each cell.

Product features

- Profile thousands of genes at the single cell level by barcoding mRNA at the 5' end, for unbiased characterization of cell types and cell states

- Detect more genes and UMIs per cell and increase complexity to gain a more comprehensive view of the dynamic immune cell repertoire

- Leverage unmatched sensitivity to capture rare transcripts, fragile cells, and cells with low RNA content

- Simultaneously profile immune repertoire (BCR/TCR) and gene expression from the same

cell to enable correlation of clonotype with the corresponding cell subtype

- Obtain paired, full-length receptor sequences from T cells and/or B cells with complete isotype resolution and enhanced V-J pairing rates, providing functional data for antibody/ TCR discovery

- Combine gene expression analysis with detection of hundreds of cell surface proteins at high resolution for ultra-high-parameter multiomic cytometry
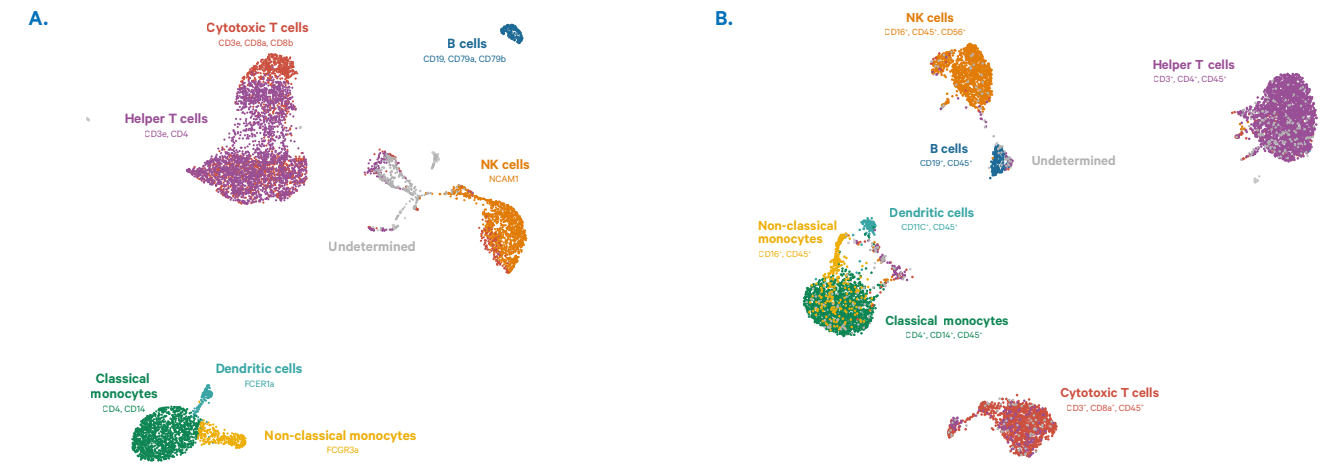

Figure 2. Efficient and streamlined workflow for multiomic profiling of the immune system. Start with a single cell suspension of unlabeled cells, oligo-conjugated antibody-labeled cells, or cells expressing compatible CRISPR guides. After GEM generation, separate libraries can be constructed from a single sample, including gene expression, V(D)J, cell surface protein, or CRISPR guide libraries, generating multiple readouts that can each be linked back to the same single cell. Process data with Cell Ranger and visualize sample heterogeneity and clonal expansion with Loupe Browser or Loupe V(D)J Browser, our fully integrated and intuitive analysis and visualization software tools.

Figure 3. Multiomic data generated with GEM-X Immune Profiling v3 provided complementary insights into immune cell subtypes in human primary cells. A. UMAP projection of 7,999 PBMCs. Each cell is represented by a single dot. Broad categories of immune cell populations were identified through canonical gene expression signatures. **B.** UMAP projection of the same sample clustered based on cell surface protein expression using a panel of nine markers.
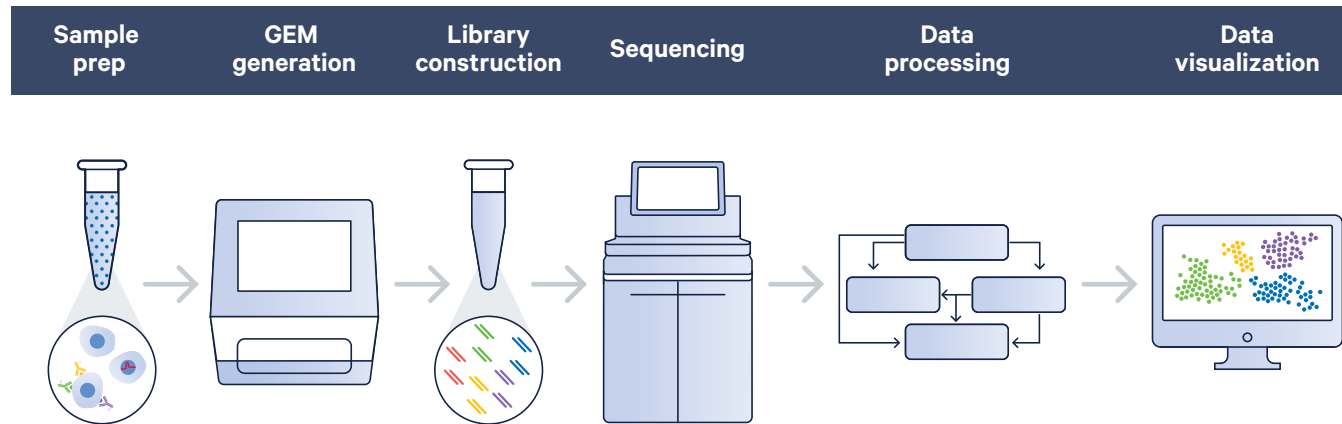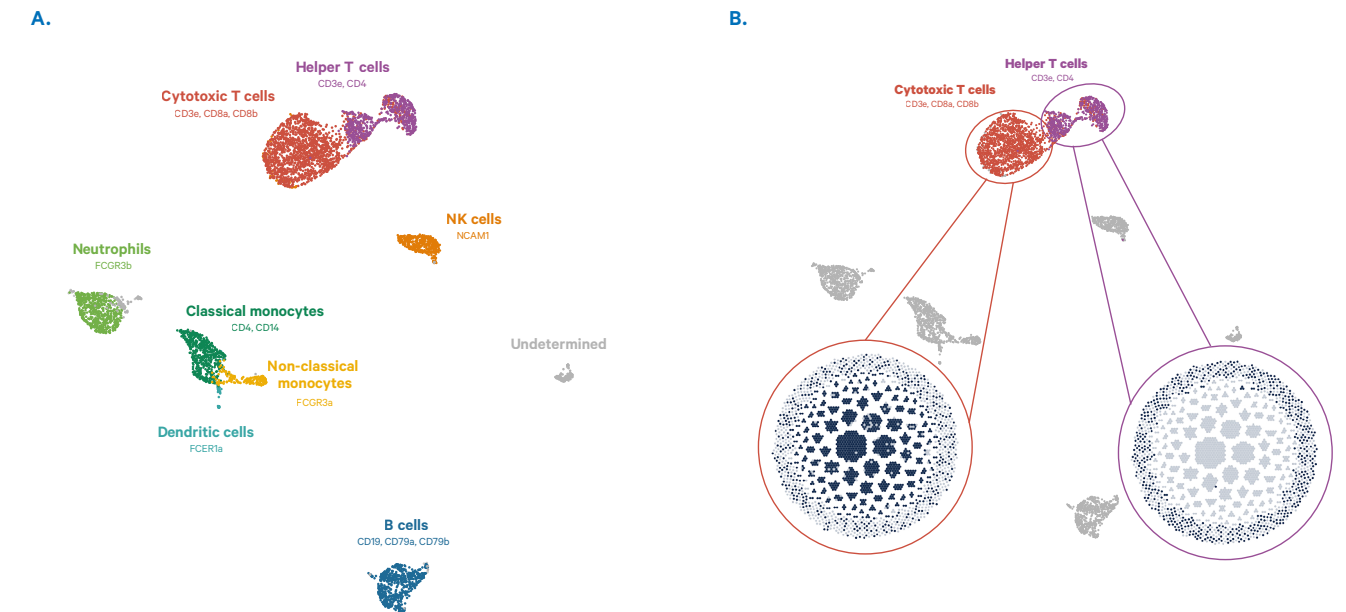

Figure 4. The GEM-X Immune Profiling v3 assay provided critical multiomic insights into immune cell subtypes in a complex cancer sample. A. UMAP projection of 4,818 PBMCs. Each cell is represented by a single dot. Broad categories of immune cell populations were identified through gene expression signatures. **B.** Cytotoxic and helper-T-cell receptor clonotypes are highlighted in their respective honeycomb plots, showing all cells grouped by clonotypes. Each hexagon represents an individual T cell with a TCR-specific sequence.
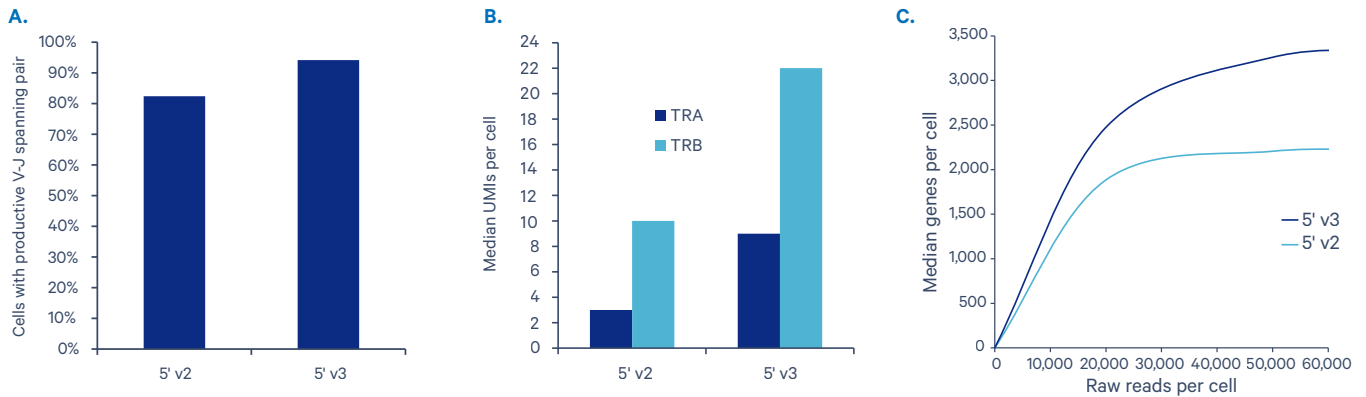
A.

B.

C.

Figure 5. Substantial increase in pairing rates and library complexity with GEM-X Immune Profiling v3. A. Average pairing rate for GEM-X (5' v3) was 94% compared to 84% with Next GEM (5' v2). **B.** A 200% and 120% increase was observed in TRA and TRB median UMIs with GEM-X (5' v3). **C.** A 37% increase in detected genes was observed with GEM-X (5' v3) versus Next GEM (5' v2). All samples were run in duplicate.

Gene expression and/or immune profiling products	Product code
Chromium GEM-X Single Cell 5' Kit v3, 4 rxns	1000695
Chromium GEM-X Single Cell 5' Kit v3, 16 rxns	1000699
Chromium GEM-X Single Cell 5' Chip Kit v3, 4 chips	1000698
Dual Index Kit TT Set A, 96-rxns	1000215
Library Construction Kit C, 16 rxns	1000694

Feature Barcode technology products	Product code
Chromium GEM-X Single Cell 5' Feature Barcode Kit v3, 16 rxns	1000703
Dual Index Kit TN Set A, 96 rxn	1000250

V(D)J amplification kits		Product code
Human T cell	Chromium Single Cell Human TCR Amplification Kit, 16 rxns	1000252
Human B cell	Chromium Single Cell Human BCR Amplification Kit, 16 rxns	1000253
Mouse T cell	Chromium Single Cell Mouse TCR Amplification Kit, 16 rxns	1000254
Mouse B cell	Chromium Single Cell Mouse BCR Amplification Kit, 16 rxns	1000255

Instrument compatibility	Product code
Chromium iX & Accessory Kit, 12 Mo. Warranty	1000328
Chromium iX & Accessory Kit, 24 Mo. Warranty	1000329
Chromium X & Accessory Kit, 12 Mo. Warranty	1000331
Chromium X & Accessory Kit, 24 Mo. Warranty	1000332
Chromium X Upgrade Package	1000330

Software compatibility	
Cell Ranger	Download Cloud Analysis
Loupe Browser	Download
Loupe V(D)J Browser	Download

Compatible partner products	
Biolegend TotalSeq™-C biolegend.com/totalseq	Learn more

Product specifications

- Efficiently partition 500–20,000 cells per channel, for up to 160,000 cells per run

- Scalable; run up to 8 samples in parallel

- Cell size flexibility with no lower limits

- High cell capture rates of up to 80%

- Low doublet rates of 0.4% per 1,000 cells

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