

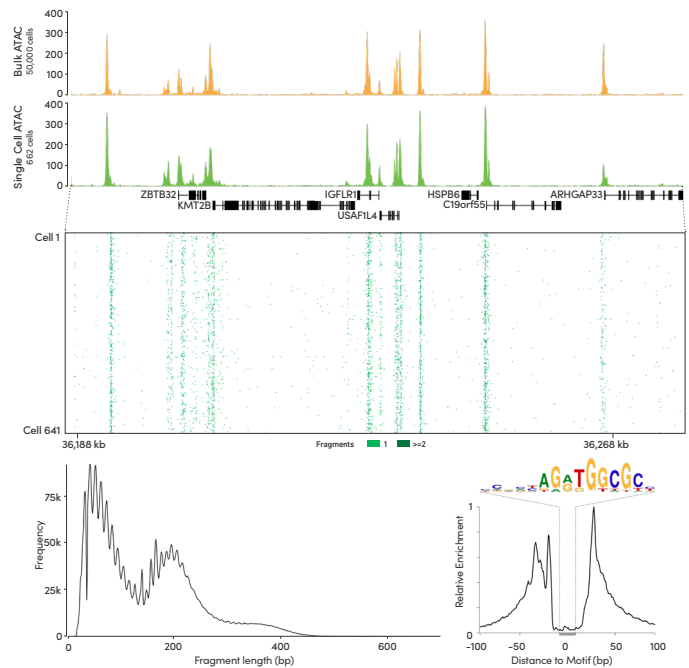
Profiling chromatin accessibility at single cell resolution

Chromium Single Cell ATAC Solution

Chromatin organization compacts meters of DNA into the nucleus, making just a small fraction of DNA accessible for transcription within each cell. The Chromium Single Cell Assay for Transposase Accessible Chromatin (ATAC) Solution provides a robust and scalable approach to map the epigenetic landscape at single cell resolution. Using a transposase enzyme to preferentially tag accessible DNA regions with sequencing adaptors, researchers can now generate sequencing-ready libraries and identify open chromatin regions. Our simple, high-throughput workflow, combined with intuitive software, enables understanding of epigenetic and regulatory variation across tens of thousands of cells.

Highlights

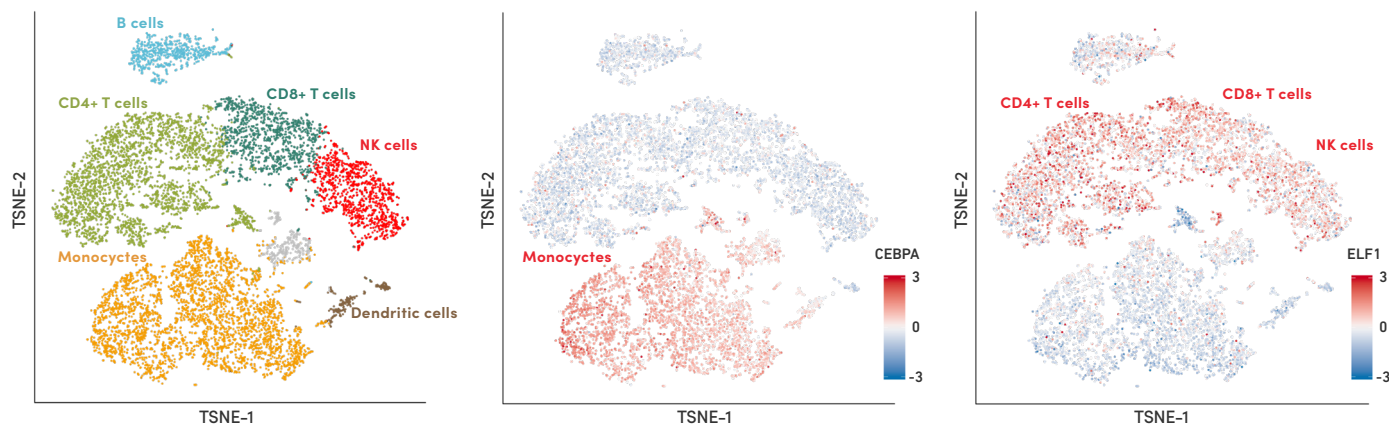
- Detect open chromatin with enriched signals in Transcription Start Sites (TSS) and regulatory regions
- Investigate and compare open chromatin in regions of interest
- Cluster and identify cells based on open chromatin regions and enriched transcription factor (TF) motifs
- Execute simple, streamlined workflow in less than one day
- Profile 500 to 10,000 nuclei per channel for a high-throughput, cost-effective solution
- Recover up to 65% of nuclei loaded on chips
- Demonstrated with cell lines, primary cells, fresh, and cryopreserved samples
- Turnkey bioinformatics analysis software and interactive visualization tools



Characteristic open chromatin profiles at single cell resolution

Top: Representative tracks of open chromatin regions from GM12878 cell line. The upper track (orange) represents data gathered from 50,000 nuclei using bulk ATAC-seq, while the lower track (green) is aggregated from 662 individual nuclei run on the Chromium Single Cell ATAC Solution. Even with data from 100-fold fewer nuclei, the Chromium Single Cell ATAC Solution demonstrates a similar sensitivity to that of bulk ATAC-seq. Middle: Transposition events detected in single cells using the Chromium Single Cell ATAC Solution from the same sample and genomic locus of GM12878 cell line. Open chromatin signals were detected in 97% of the single nuclei. Bottom left: Insert size distribution of Single Cell ATAC fragments from GM12878 cells reveals protection of DNA by individual nucleosomes and nucleosome multimers, along with a nucleosome periodicity of 184 base pairs. Bottom right: Cumulative footprinting signal at predicted transcription factor (CTCF)-binding sites in GM12878 cell line generated by aggregating Chromium Single Cell ATAC data. The dotted lines indicate the location of the known CTCF motif (pictogram above the plot).

The chromium single cell assay for transposase accessible chromatin solution



Single nuclei epigenetic profiling of peripheral blood mononuclear cells (PBMCs) Left: tSNE projection of ~10,000 PBMCs from a healthy donor. Each cell is plotted in tSNE coordinates, colored by their annotated cell types. Major subpopulations were identified based on enrichment scores of well characterized TF motifs. Clustering patterns suggest that there is extensive substructure within each major classification. Middle, Right: Single nuclei epigenetic profiles overlaid on tSNE projections for CEBPA (marker of Monocytes) and ELF1 (marker of T cells and Natural Killer (NK) Cells.). The PBMC population comprises 36% of Monocytes and 56% of T and NK cells consistent with FACS analysis of the cells.

Research areas

- Stem Cell / Developmental Biology
- Oncology
- Immunology
- Neuroscience

Applications

- Cellular Heterogeneity
 - From Epigenetic Variability
- Gene Regulatory Networks
 - Upstream of Gene Expression
- Cell Lineage And Developmental Program Tracing
- Biomarker Discovery

Additional resources

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

Products	Product Code
Chromium Single Cell ATAC Library & Gel Bead Kit, 16 rxn ¹	1000110
Chromium Single Cell ATAC Library & Gel Bead Kit, 4 rxn ¹	1000111
Chromium Single Cell ATAC Chip E Kit, 48 rxn ¹	1000082 (EMEA) 1000155 (US & APAC)
Chromium Single Cell ATAC Chip E Kit, 16 rxn ¹	1000086 (EMEA) 1000156 (US & APAC)
Chromium i7 Multiplex Kit N, Set A, 96 rxn	1000084
Chromium Controller & Accessory Kit, 24 Mo. Warranty	120246
Chromium Controller & Accessory Kit, 12 Mo. Warranty	120223
Cell Ranger ATAC Pipeline go.10xgenomics.com/scATAC/cell-ranger-ATAC	Download
Loupe Browser go.10xgenomics.com/scATAC/loupe-cell	Download

¹ Available for use only with the indicated Chromium Controller (PN-120223;120246) or Chromium Single Cell Controller (PN-120263;120212).

Chromium Chip E Single Cell Kit product code is region specific and should be used based on customer's geographical location.

US: America; APAC: Asia Pacific; EMEA: Europe, Middle East and Africa