

DynaSCOPE® Single Cell RNA Dynamic Library Kit

- Adding “Time dimension” into single cell sequencing data

DynaSCOPE® is the one-and-only commercially available kit that measures the dynamic synthesis rate, the levels of freshly synthesized RNA and long-lasting RNA for each individual gene at single cell level.

Current high throughput single cell sequencing methods obtain snapshots of gene expression profiles at a particular time-point. By adding the extra “time” dimension to the common single cell sequencing data, further questions for studies on cellular gene expression events and regulations can be uniquely addressed.

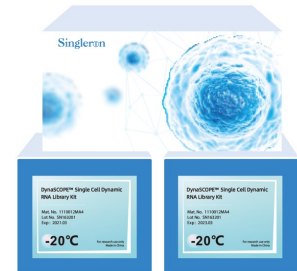
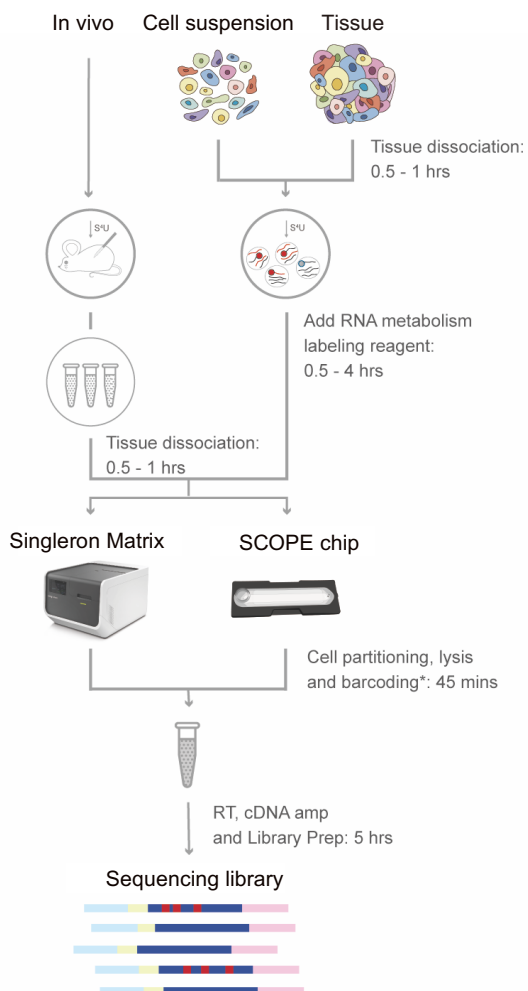


Figure 1. DynaSCOPE Single Cell RNA Dynamic Library Kit



Highlights

- **Time resolution:** Quantitative analysis of dynamic changes in the transcriptome - distinction between “new” and “old” transcripts
- **Easy workflow:** Straightforward process to analyze thousands of cells in parallel
- **Accurate representation:** Cellular transcriptome is unaffected by labeling
- **Comprehensive information:** Information on RNA dynamics at global, cellular, and gene level
- **Flexible application:** Available for both cell and animal models

Figure 2. For the DynaSCOPE workflow, a labeling reagent (nucleotide analogue) is either injected abdominally into an experimental animal (in vivo version) or added directly into the cell culture (culture version). This compound is incorporated into nascent transcripts during transcription. Labeled cells are then loaded onto the SCOPE-chip®, partitioned into microwells, lysed, their mRNA is barcoded and captured. After library construction and sequencing, bioinformatic analysis is performed to distinguish and quantify nascent and long-lasting transcripts.

DynaSCOPE technology and principle:

During the DynaSCOPE workflow, a nucleotide analogue (uracil-analogue) is incorporated into freshly synthesized transcripts during transcription, but not into static transcripts (Figure 3). The incorporated uracil-analogue is converted into cytosine analogue and later recognized as cytosine (C), while the unlabeled uracil in stable transcripts is converted into thymine (T). Nascent and long-lasting transcripts can then be differentiated by bioinformatic analysis provided by the CeleScope® software.

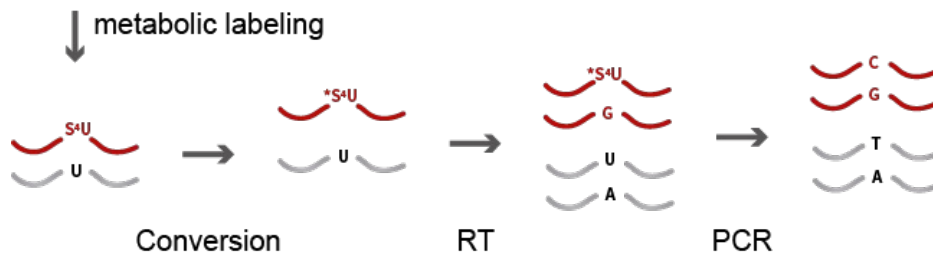


Figure 3. Nucleotide analogue is added and incorporated into newly synthesized RNA. This results in a sequencing library with a thymine to cytosine conversion in cDNA of nascent RNA, and thymine in stable transcripts.

Accurate representation of single cell transcriptomes

During the DynaSCOPE labeling process, no difference in transcriptome (Figure 4A) or cell composition (Figure 4B) have been observed between treated and untreated samples. The transcriptome remains largely unaffected by the labeling reagent, ensuring precise gene expression profiling.

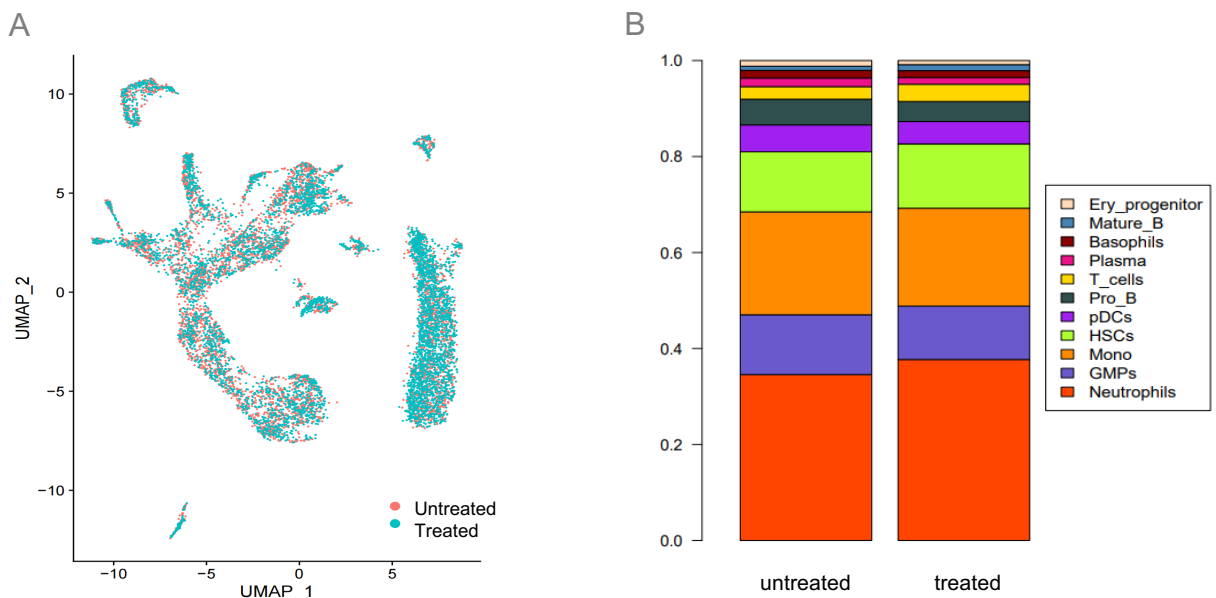


Figure 4. Cellular compositions of murine bone marrow cells that have been treated with metabolic labeling reagent and untreated control with (A) a UMAP and (B) with a bar plot. No differences have been observed.

Analysis of RNA dynamics at global, cellular and genetic level

Through specific metabolic labeling of RNA, long-lasting and nascent transcripts can be analyzed for each single cell. RNA synthesis rates of individual genes can be now analyzed for different cell types to reveal differential gene expression, transcription dynamics, and regulation (Figure 5).

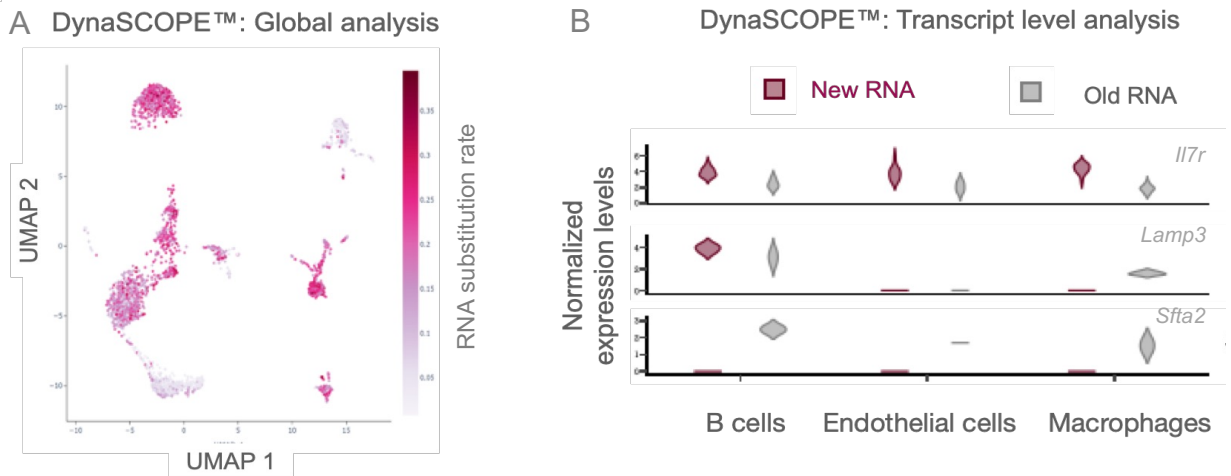


Figure 5. (A) UMAP plot of DynaSCOPE sequencing results from murine lung tissue, the intensity of the color represents the global level of nascent RNA per cell. (B) Violin plot to demonstrate transcription dynamics of different selected genes of the gene expression matrix within each cluster.

Addressing unique applications in clinical research or drug development

DynaSCOPE Single Cell RNA Dynamic Library Kit unlocks new dimensions to study cellular gene expression events and regulations. This new information will bring advances to different research areas.

Infection

- Mechanisms of infection by bacteria or virus
- Response of different host cell types to an antigen or to treatment



Drug development

- Primary and secondary effects of treatment on transcription regulation
- Identification of potential new druggable target genes or new drugs



Developmental biology

- Classification of cell types and their dynamic gene expression and regulation processes



Oncology

- Discovery of aberrant transcriptional regulation mechanisms in cancer
- Insights for novel therapeutic strategies



Flexible applications, both in vitro and in vivo

DynaSCOPE Single Cell RNA Dynamic Library Kit is offered for two different experimental settings: *in vitro* version and *in vivo* versions (Figure 6).

With an *in vitro* setup the labelling reagent is added to the cell culture, allowing precise control over treatment time and dosage. With *in vivo* application, the labelling reagent is injected subcutaneous into an animal, allowing more accurate reflection of the transcriptional complexity of a living organism.

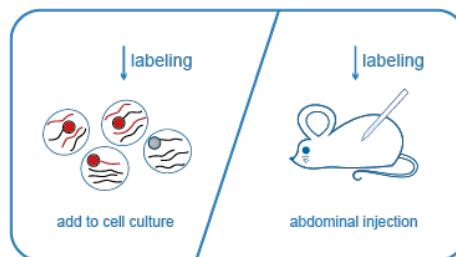


Figure 6. In vitro and in vivo labeling

Ordering information:

Product	Reactions	Catalog Number
DynaSCOPE® Single Cell Dynamic RNA Library Kit Cell	2RXNs / 16RXNs	4189111 / 4189112
DynaSCOPE® Single Cell Dynamic RNA Library Kit Cell Matrix	2RXNs / 16RXNs	4189121 / 4189122
DynaSCOPE® Single Cell Dynamic RNA Library Kit Tissue	2RXNs / 16RXNs	5189111 / 5189112
DynaSCOPE® Single Cell Dynamic RNA Library Kit Tissue Matrix	2RXNs / 16RXNs	5189121 / 5189122
DynaSCOPE® Single Cell Dynamic RNA Library Kit (in vivo)	2RXNs / 16RXNs	1189161 / 1189162

Related products:

Product	Application
GEXSCOPE® Single Cell RNA Library Kit	Single cell mRNA library construction from fresh tissue or cell samples
GEXSCOPE® Single Nucleus RNA Library Kit	Single nucleus extraction and mRNA library construction from frozen tissue or special sample types (e.g., large cells or cells with inhibitory impurities)
GEXSCOPE® Single Cell VDJ Library Kits	Simultaneous analysis of TCR/BCR sequences and mRNA expression profiles in single cells
FocuSCOPE® Single Cell Target Seq Library Kit	Simultaneous analysis of mRNA expression and genetic variants (mutation/ gene fusion) or intracellular viral sequences in single cells