Lipid-Modified Oligonucleotides For Sample Barcoding in Droplet Microfluidics-Based Single-Cell RNA Sequencing

Tech ID: 29668 / UC Case 2018-119-0

INVENTION NOVELTY

A new strategy for barcoding single living cells using lipid-modified oligonucleotides that can vastly enhance sample multiplexing in droplet microfluidics-based RNA sequencing

VALUE PROPOSITION

Single-cell RNA sequencing has recently emerged as a powerful tool for mapping transcriptional changes in heterogeneous cell populations. Recently, large-scale genomic screens combined with single-cell RNA sequencing have been utilized to understand complex biological phenomena. Novel insights could also be gained from coupling single-cell RNA sequencing to chemical library or drug screens, but methods for stably labeling living cells with oligonucleotide barcodes are lacking. Lipid-modified oligonucleotides represent an inexpensive, scalable, and technically simple method for labeling cell membranes in a fashion that interfaces with existing single-cell RNA sequencing workflows using droplet microfluidics.

This new cell barcoding method provides the following advantages:

- Significantly **increase the current sample and cell multiplexing capacity** of scRNA sequencing workflows.
- Dramatically **decrease labor and material costs and increase efficiency** of creating a sequencing library by performing the multiplexing early in the workflow
- **Avoid or remove technical artifacts** due to fixation, doublets, or activation of cell surface receptor-mediated transcriptional responses
- Uses a **universal cell-labeling platform** that can be applied in any biological context, without requiring *a priori* knowledge of cell surface markers
- Barcodes are **inexpensive to synthesize and stable at room temperature**.

TECHNOLOGY DESCRIPTION

Researchers at University of California, San Francisco have developed a new cell barcoding method that uses lipid-conjugated oligonucleotides to efficiently label single live cells derived from distinct patients or test conditions. Oligonucleotide barcodes (engineered with a PCR handle, unique identifier and PolyA sequence) can be subsequently introduced to the cells and subsets of the cells processed for droplet microfluidics-based RNA sequencing library preparation. This method can be commercially applied

CONTACT

Abdalla A. Saad

abdalla.saad@ucsf.edu

tel: .

INVENTORS

- Chow, Eric D.
- Gartner, Zev J.
- McGinnis, Christopher S.
- Patterson, David M.
- Weber, Robert J.

OTHER INFORMATION

KEYWORDS

Single Cell RNA Sequencing, Barcoding, Droplet microfluidics, Library preparation, Clinical & preclinical samples

CATEGORIZED AS

- **Biotechnology**
  - Bioinformatics
  - Genomics
- **Medical**
  - Screening
- **Research Tools**

in the form of 96-, 384-, 1536- or 3456-well plates containing lipid-modified oligonucleotides prehybridized to sample barcodes. Cells derived from distinct perturbations or clinical samples could be barcoded via dispensing into unique wells upstream of labeling and single-cell RNA sequencing.

LOOKING FOR PARTNERS

To develop and commercialize this technology, potentially as a cell barcoding kit for droplet microfluidics-based RNA sequencing.

APPLICATION

Single cell RNA sequencing library preparation

STAGE OF DEVELOPMENT

Proof of Concept

DATA AVAILABILITY

Under NDA/CDA

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12077826	09/03/2024	2018-119
Japan	Issued Patent	7456637	03/18/2024	2018-119
European Patent Office	Published Application	3818151	05/12/2021	2018-119
China	Published Application	CN112654699A	04/13/2021	2018-119

Additional Patents Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- XYZeq – Spatially-Resolved Single Cell Sequencing

- Nucleic Acids/DNA/RNA
- Screening Assays

RELATED CASES

2018-119-0

ADDRESS

UCSF

Innovation Ventures

600 16th St, Genentech Hall, S-272,

San Francisco,CA 94158

CONTACT

Tel:

innovation@ucsf.edu

https://innovation.ucsf.edu

Fax:

CONNECT

Follow Connect