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MULTI-PARAMETRIC AND HIGH-THROUGHPUT SINGLE CELL ANALYSIS

Researchers at Stanford, funded in part by the Chan Zuckerberg Biohub, have generated a method for performing multi-parametric and high-throughput single cell genomic and phenotypic analyses.

Single cell -omics, the study of diverse biological processes such as genome, RNA or protein expression profiles and the analysis of specific biomolecules at the single cell level has emerged as an important method for understanding biological phenotypes. For example, assaying tumor cells allows determination of mutations enriched in tumor cell populations. However, current methods of single cell analysis have largely been limited to a single measurement. The capability to screen single cells based on desired phenotypes before downstream -omics sequencing analysis would greatly reduce assay costs while also increasing our understanding of the interplay between phenotype and genetic mechanism. Therefore, there is a need to develop a high-throughput approach for multi-parametric analyses of single cells.

Stage of Research

The inventors have developed an efficient and robust workflow for the multi-parametric analysis of single cells. They use a combination of microfluidic single-cell encapsulation into double emulsion droplets, which are compatible with aqueous high-throughput fluorescent-activated cell sorting (FACS) for downstream molecular profiling. The inventors demonstrate optimized single cell monodisperse double emulsions and robust multiparametric droplet screening. Their method, Dropception, allows the direct linkage of phenotype to genotype in single cells.

Stage of Development

Research – *in vitro*

Applications

- High-throughput and multi-parametric single cell analysis
- Large-scale functional screening and phenotypic multi-omics profiling

Advantages

- Single cell encapsulation into water-soluble double emulsions enables high-throughput FACS analysis
- Sorting individual droplets based on desires molecular characteristics prior to downstream -omics measurements

Publications

- Brower KB, Khariton M, Suzuki PH, Still C, Kim G, Calhoun SGK, Qi LS, Wang B, Fordyce PM. Double emulsion picoreactors for high-throughput single-cell encapsulation and phenotyping via FACS. bioRxiv (2020).

Patents

- Published Application: WO2020009998
- Published Application: 20210261953
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