Single Cell Metabolomics Assay

Resolution in Cell Metabolomic Assays

Cell metabolomics – the observation of metabolic phenomena in cells - is one of the simplest and most accurate assays for establishing health status. Within cell metabolomics, the need for single cell resolution from assays is imperative for the understanding of cancer tumor and immune cell types. Despite this, current metabolomic imaging assays lack the functionality for single cell resolution, which can be problematic when trying to assess cancer tumor heterogeneity or immune cell response.

Single Cell Resolution in Cell Metabolomic Assays

The Coskun Lab has developed a way to harness the insights of metabolomics with the resolution of single cell imaging. This method involves a one-time labeling step to increase visibility of specific tumor and immune cell types, followed by a 3-dimensional metabolomic profiling framework that can identify hundreds of lipids and elements at a submicron resolution for anywhere between 200-1000 depth slices. This process culminates in the ability to localize cytoplasmic and nuclear boundaries to reconstruct metabolomic distributions of individual cell types for single-cell imaging. Through providing single cell resolution, this metabolomic analysis allows for the identification of different cell types in cancer tumor biopsies, as well as in complex tissue types such as lymphatic tissue samples.

Summary Bullets

- The technology makes it possible to identify single cell resolution of lipids and other small molecules in complex tissue types, as well as metabolism mapping specific to different cell types.
- The measurements found through this can be used to study metabolomic response to drug exposure.
- The technology can achieve submicron resolution of lipids and other small molecules at anywhere from 200-1000 depth slices, using spatially resolved metabolic profiling.

Solution Advantages

- **Targeted:** Makes it possible to identify single cell resolution of lipids and other small molecules in complex tissue types, as well as metabolism mapping specific to different cell types.
- **Effective:** Measurements can be used to study metabolomic response to drug exposure.

- **Fine Resolution:** Spatially resolved metabolic profiling allows the technology to achieve submicron resolution of lipids and other small molecules at anywhere from 200-1000 depth slices.

Potential Commercial Applications

- Analysis of tumor cell types
- Analysis of complex tissue cell types
- Drug response analysis

Background and More Information

Grant Support Number: 5 R21 AG081715-02

Inventors

- Ahmet Coskun
  Assistant Professor - Georgia Tech Coulter Department of Biomedical Engineering
- Thomas Hu
  PhD Student - Georgia Tech

IP Status

Patent application has been filed : US63/401294

Publications

Single-cell spatial metabolomics with cell-type specific protein profiling for tissue systems biology, Nature Communications -

Images

Visit the Technology here:
Single Cell Metabolomics Assay