Docket #: S21-125

PROFILING CELL TYPES IN CIRCULATING NUCLEIC ACID LIQUID BIOPSY

Technology Reference
CZ Biohub ref. no. CZB-208S
Stanford ref. no. S21-125

Researchers at Stanford have developed a method to identify cell types of origin for cell-free RNA from liquid biopsies for a variety of diseases.

Cell-free RNA (cfRNA) in blood plasma samples enables dynamic and longitudinal phenotyping for physiological conditions spanning oncology, bone marrow transplants, obstetrics, neurodegeneration and liver disease. Liquid biopsies that measure cfRNA afford broad clinical utility as these transcripts can reflect the health status of multiple tissue types. Most current assays focus on tissue-level contributions when trying to identify the cell types of origin of these cfRNA transcripts, however cell-level identity would be even more powerful for identifying the cellular pathophysiology contributing to the formation of the disease. In addition, this level of analysis would more closely match the resolution provided by invasive biopsy procedures.

Stage of Development
Research –

in vitro

Stage of Research
The inventors have developed a method to identify cell types of origin for cfRNA from liquid biopsies. This method uses the Tabula Sapiens transcriptomic cell atlas as well as individual tissue transcriptomic cell atlases in combination with the Human Protein Atlas RNA consensus data set. The method identifies cell type

signature scores, which allow for the inference of cell types that contribute to cfRNA for a variety of diseases.

Applications

- Integration of tissue-of-origin and single cell transcriptomics to identify cell-types-of-origin of cfRNA.
- Non-invasive resolution of cellular pathophysiology with cfRNA.

Advantages

- More closely matching the resolution of tissue biopsies than tissue-level cfRNA identification.
- A non-invasive procedure to study cellular pathophysiology and its contribution to disease.
- Applications to a variety of physiological conditions spanning cancer, obstetrics, neurodegeneration and liver disease.

Publications

- Vorperian, S.K., Moufarrej, M.N., Tabula Sapiens Consortium and Quake, S. R., " Cell types of origin of the cell-free transcriptome." Nature Biotechnology, (40)855-861, 2022.

Patents

- Published Application: WO2022221283
- Published Application: 20240191300

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