Docket #: S23-116

Liquid Biopsies Using Cell-free RNA for Non-invasive Cancer Detection and Characterization

Liquid biopsies have emerged as a groundbreaking approach in cancer diagnostics, enabling the detection of DNA shed by cancer cells through a simple blood test. However, cancer cells also shed RNA into the blood. Analyzing this cell-free RNA could enable much more thorough characterization of cancer than DNA, as RNA reports on gene expression patterns that vary widely between cancer types and can inform cancer progression.

To better enable cancer diagnosis, classification, staging, and early detection, Stanford researchers therefore developed a highly sensitive and specific method for analyzing cell-free cancer RNA. Researchers extensively optimized methods for blood collection, plasma separation, cell-free RNA purification, and library preparation. They designed a custom panel of 5,546 genes to identify and classify cancer with high sensitivity. They showed that this method could diagnose a wide range of cancers from patient blood samples with sensitivities of 66-100%, including non-small cell lung cancer and prostate cancer. It also could distinguish histological subtypes and differentiate cancer from other, non-malignant conditions.

Stage of Development
Preclinical: detection of NSCLC (73.7% sensitivity), SCLC (66.7% sensitivity), PAAD (80% sensitivity), PRAD (77.8% sensitivity), LIHC (100% sensitivity).

Applications

- Cancer diagnosis, classification, and staging
- Early detection of cancer
- Personalized cancer treatment

- Companion diagnostics for cancer treatment
- Monitoring of treatment response and resistance
- Development of new treatments for cancer
- Identification of cancer driver and resistance mutations
- Non-invasive research into cancer transcriptomics
- Classification of noncancerous cells in the tumor microenvironment (tumor-associated macrophages, etc.).

Advantages

- Non-invasive testing
- cfRNA enables more thorough molecular characterization than cfDNA
- Low limit of detection (~0.01%)
- High sensitivity (67%-100%, depending on tumor type)
- High specificity

Innovators

- Maximilian Diehn
- Arash Alizadeh
- Monica Nesselbush
- Bogdan Luca

Licensing Contact

Chu Chang

Licensing Manager, Life Sciences

Email