Docket #: S22-019

Single Molecule Sequencing and Methylation Profiling of Cell-Free DNA

Stanford inventors have developed a novel cancer detection assay that relies on sequencing single DNA molecules.

Existing methods of detecting cancer involve measuring the circulating tumor DNA (ctDNA) in patient blood. ctDNA measurement requires the addition of enzymes and other chemicals which cause oxidative damage to DNA and reduce the fidelity of sequences in the PCR amplification process. Stanford scientists have overcome these challenges by developing a DNA assay to detect and quantify ctDNA directly using single molecule sequencing. While next generation sequencing methods target methylated compounds, single molecule sequencing allows for direct detection and quantification of DNA originating from malignant cancer tumors. This assay offers a new framework of detection of cancer and other diseases without obtrusive pre-treatment of ctDNA.

Stage of Development
Proof of concept – in vitro data

Applications

- Cancer diagnostics
- Other disease diagnostics

Advantages

- **Simpler** than conventional methods
- **Higher sensitivity** to low-abundance reads

- **Eliminates** need for enzyme and other chemical additions
- **Eliminates** amplification bias that is common in conventional methods

Patents

- Published Application: WO2023235379
- Published Application: 20250313898

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