Docket #: S20-374

Label-free, real-time, whole-cell response monitoring with liquid Raman spectroscopy

Determining a patient's drug susceptibility is currently a lengthy process requiring hundred to millions of cells. Currently, these cells are labelled, frozen or otherwise manipulated in ways that prevent sequential testing against multiple drugs on the same few cells. To address this issue, Stanford researchers have developed a plasmonic liquid Raman spectroscopy platform for rapid drug screening. The liquid chamber works with plasma, serum, whole blood, and sputum allowing for real-time monitoring. Without the need for labeling, researchers monitor cellular behavior of few to single cells for drug susceptibility using surface-enhanced Raman spectroscopy (SERS). Aside from real-time single drug testing, this platform can also accommodate sequential drug testing on samples like cancer cells to evaluate combination therapies. In all, this SERS platform drastically reduces cost, time and volume of sample required, enabling it for more diverse settings and situations.

Stage of Research

- Proof of concept

Applications

- **Drug susceptibility testing: cancer treatment, antibiotics, combination therapies**
- Liquid biopsy: monitoring disease progression to select and optimize treatment from plasma, serum or whole-blood
- Drug development & repurposing
- Research involving cell-cell communication & interactions during and post treatment

Advantages

- **Rapid, real-time interrogation of cells**
- Non-destructive, cells remain live and intact
- Label-free assay
- Few to single cell required
- Multi testing on same cell: various drugs or environmental influences

Publications

- Tadesse, Loza F., et al. "Plasmonic and electrostatic interactions enable uniformly enhanced liquid bacterial surface-enhanced Raman scattering (SERS)." *Nano letters* 20.10 (2020): 7655-7661.

Patents

- Published Application: WO2022051364
- Published Application: 20230324381

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