FASTEGERMARD medical innovation

Technology promises to provide early detection of treatment-resistant cancer mutations

The development of therapeutic resistance is a major factor in cancer-related death. And while tissue biopsies followed by DNA sequencing can detect known resistance mutations, such biopsies are invasive, expensive, and can cause serious complications. As a result, there is a high demand for non-invasive, rapid, low-cost screening technologies that can detect cancer mutations that render tumor cells resistant to specific types of treatment.

The Solution

A University of Michigan team, led by Alexander Johnson-Buck, Ph.D., Muneesh Tewari, M.D., Ph.D., and Nils Walter, Ph.D., has developed Single-Molecule Recognition through Equilibrium Poisson Sampling (SiMREPS), a novel technology platform for the detection of cancer-related DNA mutations in biofluids using single-molecule kinetic fingerprinting. This groundbreaking technology has the potential to provide more accurate results, faster turnaround time, and decreased cost for mutant-target screening compared to current mutation tests on the market.

The development of resistance to cancer therapies is a common event for many types of cancer. Early detection of such resistance in cancer permits switching to potentially more effective treatments and prevents the waste of time and resources on ineffective treatments. DIAGNOSTIC

GOA

empowering effective treatment before progression of disease

MTRAC

The University of Michigan Translational Research and Commercialization (MTRAC) for Life Sciences Innovation Hub is supported by the U-M Medical School, U-M Tech Transfer Office, and the Michigan Economic Development Corporation and works to "fast forward" projects that have a high potential for commercial success, with the ultimate goal of positively impacting human health. The SiMREPS project is just one of 11 projects in the 2017 cohort funded by MTRAC. In 2014, the program funded 11 teams for early commercialization development, while 11 teams were funded in 2015, and 12 projects were funded in 2016.

Technology offers highly sensitive detection of cancer-related DNA mutations in biofluids

Significant Need

With the number of targeted cancer drugs on the market expected to increase, and with ongoing identification of specific mutations resulting in resistance against these drugs, there is a strong need for a non-invasive, rapid, low-cost screening technology that detects mutations that are resistant to or, conversely, sensitive to particular courses of treatment.

Compelling Science

Dubbed SiMREPS, this new diagnostic technology monitors the repeated binding of short, fluorescently labeled DNA probes to a complementary sequence on a target nucleic acid (DNA or RNA). By evaluating the frequency and duration of these probe binding events to a specific target sequence, it can identify and count each single molecule of target DNA or RNA with the ability to discern single-nucleotide sequence variations, directly in blood serum or urine, without needing conventional PCR amplification.

Competitive Advantage

Compared to blood-based liquid biopsies, urine-based assays offer the possibility of more frequent and easy collection, as well as potentially higher sensitivity due to larger sample volumes than blood. Not needing laborious and potentially biased enzymatic amplification or sequencing reduces time-to-result, makes the assay more reliable and accurate, and is potentially cheaper than conventional technologies.

MTRAC Project Key Milestones

Implement and evaluate two main strategies for Show separate detection of the 5 most common Implement microfluidics; demonstrate increased detection of clinically actionable EGFR EGFR mutations related to TKI sensitivity at multiplexed detection of 5 most common T790M mutation against a wild-type background abundances of <0.01% relative to wild-type EGFR mutations related to drug sensitivity Demonstrate specificity sufficient to Implement and evaluate detect T790M at <0.01% abundance strategies for multiplexing relative to wild-type EGFR **Product Lauch Strategy** Overall Commercialization Instrument and consumables suitable for use in clinical research and diagnostics Intellectual Property **Regulatory Pathway** Multiple patent applications have been filed for the core technology of SiMREPS Diagnostic use in Laboratory Developed Tests (LDTs) is covered under the clinical laboratory improvement amendments (CLIA) by the Centers **Commercialization Strategy** for Medicare and Medicaid Services (CMS) Establish company to license technology for further development

- Alight Sciences LLC was founded in March 2017

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With the help of MTRAC funding, we are developing technology that would provide oncologists and their patients with early, actionable information about the development of treatment resistance through affordable, routine screening after the initiation of a therapeutic regimen.

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