Microfluidic and Solid-State Beta Camera In-Vitro Kinase Radioassay

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SUMMARY

UCLA investigators have developed a miniaturized kinase assay that holds several advantages over conventional kinase radioassays. By utilizing a microfluidic platform with a solid state beta camera, this invention lowers the cell and radioactive input requirements and allows for improvements in cost, efficiency, speed, and labor.

BACKGROUND

There is a broad interest in targeting kinases for drug discovery and patient diagnosis. For example, kinases are important biomarkers in cancer diagnostics and treatment, or their activity can be monitored to determine the state of a cell (e.g. via PET imaging). This interest led to the development of numerous kinase assay technologies.

Generally, radiometric assays are adopted as the primary technology used by companies that provide kinase profiling services. However, they suffer from several limitations. The input amounts required for these assays make it difficult to study kinase activity on a small level. Also, these assays are labor-intensive, expensive, and are potentially hazardous to those handling the radioactive materials. Further, regulations that control the levels of a specific radioisotope that can be used may limit the desired work pace.

INNOVATION

The invention uses a polydimethylsiloxane microfluidic platform with a solid state beta camera to measure kinase activity on a limited amount of patient samples. Miniaturizing the radiometric kinase assay brings several advantages over current radiometric assays. The amount of cell input required is reduced by 1,000 times over conventional assays. This allows for direct experimentation on clinical samples that are expensive or perishable. Also, the amount of radioactivity is reduced by at least one magnitude, alleviating radiation safety concerns. Further, the chips are inexpensive to custom design and produce. Finally, since most of the steps in the assay are under digital control, the performances of these assays are more efficient, faster, and less labor-intensive.

APPLICATIONS

- Monitor kinase activity in precious samples such as biopsies or aspirate in experimental pre-clinical and clinical trials.
- Complementary diagnosis kit for cancer and other diseases.
- Assay platform works for both protein kinases and small molecule kinases.
- Studying signaling pathways in stem cells and/or patient samples in cancer and other disease biologies via protein kinase activity.
- Studying metabolic pathways in stem cells and/or patient samples in cancer and other disease biologies via small molecule kinase activity.

ADVANTAGES

- Amount of required cell input is reduced by 1,000 times, allowing for experimentation on expensive of perishable samples.
- Amount of radioactivity is reduced due to lower amounts of radioactive elements used.
- Chips are cheaper to design and produce.
- Digital control makes assays more efficient, faster, and less labor-intensive.

STATE OF DEVELOPMENT

A working prototype has been developed.

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OTHER INFORMATION

KEYWORDS

Diagnostic, kinase, protein kinase, small molecule kinase, sugar kinase, nucleotide kinase, profile, assay, microfluid, solid state beta camera, in vitro, radioassay, radioactive, drug, discovery, cancer, radiometric Diagnostic, kinase, protein kinase, sm

CATEGORIZED AS

- **Medical**
  - Diagnostics
  - Disease: Cancer
  - Research Tools
- **Research Tools**
  - Screening Assays

RELATED CASES

2011-129-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,448,178	09/20/2016	2011-129

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Identification Of Pan-Cancer Small Cell Neuroendocrine Phenotypes And Vulnerabilities
- Treatment Of Melanoma With Ferroptosis Inducing Agents
- Statistical Comparison of Rank Lists and Molecular Profiles

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