Gene Signature-Based Chemical Screening

Tech ID: 20615 / UC Case 2010-196-0

BACKGROUND

Current cell-based drug discovery assays have many drawbacks, which make the process inefficient, costly, or unapproachable when specific molecular targets are undefined. Specific drawbacks of current drug discovery assays include: 1) the requirement of engineering a separate reporter cell line, 2) most screens depend on a single or a limited number of surrogate readouts but fail to capture broad and potentially non-specific effects of candidate hits, 3) toxic components are not filtered out at the early stages of screening, and 4) many diseases lack good "drug" targets for developing an effective screening strategy.

TECHNOLOGY DESCRIPTION

Scientists at UC San Diego have addressed these shortcomings and developed a high-content, high-throughput chemical screening method that is based on a signature of gene expression. This signature-based drug screening strategy overcomes key drawbacks associated with current cell-based assays. The present technology may be used to identify gene expression signatures that reflect different functional states of the cell. This new approach leverages these molecular signatures to localize small molecules capable of switching the cell processes from one functional state to another.

This gene signature-based approach capitalizes on the observation that each cell type generates a profile or signature of gene expression that provides a unique "finger print" of the functional state of the cell. Since, unique sets of genes have been widely used to characterize the cellular state associated with specific developmental stages or diseases, in many cases, a small panel of signature genes is often sufficient to define a specific cellular state(s) for disease diagnosis and prognosis.

Key improvements of the new gene signature screening method include:

- Directly using primary cells for screening, thus avoiding the need for additional cellular engineering.
- Results are based on multiple functional readouts, rather than by single screens.
- Simultaneously evaluates the specificity and potential for cellular toxicity by harnessing a sizable panel of built-in controls (such as housekeeping genes and toxicity related genes).
- Robust approach is equally applicable to drug and non-drug targets or diseases with undefined targets.

Even with complex diseases that may result from combinatorial molecular defects, it may still be possible to identify small molecules that have partial, but specific effects, and such hits can be subsequently tested in various combinations. This technology will permit drug screening on previous non-drug targets. It also shortens significantly the screening process by having a series of controls to serve as counter screens in the same assay. The concept can serve as the basis for modifications so that the technology can be adapted to a number of applications based on gene signature.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,499,814	11/22/2016	2010-196

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Genome-Wide Gene Expression Profiling, Alternative Splicing Monitoring, and Genotyping with Direct Template Annealing Oligo-Ligation

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OTHER INFORMATION

CATEGORIZED AS

- **Medical**
  - Diagnostics
- **Research Tools**
  - Screening Assays

RELATED CASES

2010-196-0

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