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Kinase biosensor for individualized cancer therapy (20150289, Dr. Laurie Parker)

A method to sensitively and specifically detect the activity of multiple kinases, from multiple samples in a traceable manner.

Technology No. 20150289

IP Status: Issued US Patent; **Application #:** 15/207,379

Applications

- Individualized medicine
- Identification of optimal kinase inhibitor in leukemia patients
- Assay development for additional cancers and diseases
- Basic kinase research
- Tandem mass spectrometry analysis of multiple samples

Key Benefits & Differentiators

- **Sensitive:** Mass spectrometry measurements of substrate phosphorylation provides accurate and precise measurements of kinase activity.
- **Specific:** Isotopically distinct, kinase specific substrates link activity measurements back to identified kinases under different conditions.
- **Rapid and economical:** Assay format allows running multiple mass spec samples in tandem.

Time and money wasted on ineffective cancer treatments

Kinase signaling is a major mechanism driving many cancers, particularly leukemias. However, due to variation between cancers, chemotherapeutic kinase inhibitors (such as imatinib/Gleevec) exhibit different levels of efficacy on a patient-by-patient basis. With no feasible way to determine which treatment is best suited to each patient, nearly $100 million

dollars and precious treatment time are lost every year to ineffective therapies. To determine the best kinase inhibitor treatment strategy on an individual basis, researchers at the University of Minnesota have developed a multiplexed mass spectrometry assay that is capable of analyzing and comparing the specific activity of multiple kinases exposed to different therapeutics. Furthermore, the analysis for all these conditions can be run in tandem, saving time and money.

Isotopic barcodes unlock individualized medicine capabilities

The power of the assay to simultaneously measure a variety of kinases exposed to multiple compounds is enabled by isotope-coding of kinase-specific substrates. Cancer cells, various inhibitors and kinase specific peptide substrates are coincubated. The substrates are isotopically distinct for each condition, allowing kinase inhibitor activity to be measured and directly compared after carrying out mass spectrometry on pooled samples.This provides a robust, fast and affordable method to determine if a patient will respond to a variety of different kinase inhibitor therapeutics. Furthermore, since clinics already routinely use mass spectrometry for metabolite analysis, this approach can immediately be implemented using existing workflows and machinery. This technology has the capability to transform kinase inhibitor treatments and serve as a model system for introducing pharmacodynamics into personalized medicine for leukemias and other cancers.

Phase of Development

Proof of concept. Individual synthetic peptides synthesised and used to assess activity at the MS1 level by mass spec analysis.

Researchers

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External Link (cbs.umn.edu)

Desired Partnerships

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