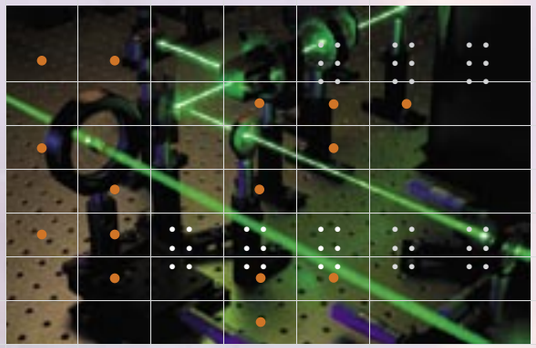
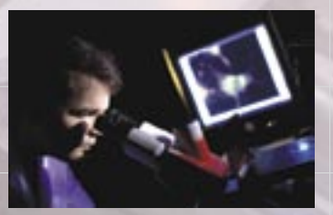


PRECISION PROTEOMICS

PROBLEM

How does molecular diversity at the DNA or protein level regulate biological function and provide early clues about the onset or progression of human disease? As part of the Precision Proteomics Research Theme, scientists will combine next-generation mass spectrometry and fluorescence to correlate precise information on protein molecules with specific biophysical phenomena in living cells and also genetic and proteomic variation in populations of people.

RESEARCH



The Precision Proteomics Research Theme combines the latest in mass spectrometry and fluorescence by using designer probes for molecular recognition of slightly different molecular forms (e.g., two protein forms made from the same gene, but carrying different post-translational modifications). After using mass spectrometry to discover strategically important protein forms, researchers will then employ fluorescence to capture the spatial and temporal dynamics in living cells. These specific technological breakthroughs position the theme to deliver new advances in:

- "Top down" mass spectrometry to detect allele-specific splicing and modification patterns
- New technology for fluorescence-based haplotyping of human DNA
- Reagents that combine molecular recognition and cell-permeability for advanced fluorescence-based imaging of live cells
- Recognition of slightly different protein forms in cancer tissue and the brain
- New methods for construction and readout of protein chips

Researchers in the theme will also leverage leading technology on timely biological drivers in neuroproteomics, and the cell biology underlying skin and breast cancer.

BENEFITS

The long term benefits of this thematic research will include targeted assays that will improve both the diagnosis of human disease and prognosis of patient outcome.

THEME LEADER

Neil L. Kelleher Chemistry

FACULTY

Robert M. Clegg Physics
Taekjip Ha Physics
Paul Hergenrother Chemistry
Chang Liu Electrical and Computer Engineering
Paul R. Selvin Physics
Jonathan V. Sweedler Chemistry

AFFILIATES

Andrew S. Belmont Cell and Structural Biology
Paul W. Bohn Chemistry
Isaac K. O. Cann Animal Sciences
Brian C. Freeman Cell and Structural Biology
Enrico Gratton Physics
Craig A. Mizzen Cell and Structural Biology
Ralph G. Nuzzo Chemistry
Stephen G. Sligar Biochemistry