

PROTEOMICS CENTER OF EXCELLENCE AT NORTHWESTERN UNIVERSITY

The Proteomics Center of Excellence provides cutting-edge proteomics research capabilities to faculty, staff, and students at Northwestern University. Northwestern University has made a strategic investment and has demonstrated a commitment to bringing next-generation proteomics research to the Chicagoland area. The Proteomics Center of Excellence also collaborates with other local scientists and engages the community through publications, symposia, and workshops.

Dr. Neil Kelleher is a world-class leader in proteomics. He is actively positioning Northwestern to be the leading hub for next-generation technology to enable the early detection of disease based on precise measurement of intact proteins. Neil, with his staff of senior scientists, is pushing the boundaries of science and technology to provide new insights into some of the most complex diseases affecting the human population.

Revolutionary Biomarkers

Biomarkers are sets of molecules that indicate a biological state, such as disease. Current academic and commercial biomarker efforts in proteomics rely upon the enzymatic digestion of intact proteins before analysis. However, Northwestern University scientists believe that intact proteins are more tightly coupled to disease phenotypes than digested peptides. This concept of “whole proteoforms” will revolutionize the field of biomarker research to discover new remedies to complex diseases.

Epiproteomics

The term “epiproteomics” is a portmanteau of the words “epigenetics” and “proteomics.” While epigenetics studies the inheritance of gene function that occurs “outside” of the human genome, epiproteomics studies heritable modifications of histones, DNA-binding proteins that become disordered in many blood cancers, such as multiple myeloma and chronic lymphocytic leukemia.



“Top Down Proteomics is about precise detection of proteins in wellness and disease—so we can tell the difference in a reliable and timely manner.”

Neil Kelleher, PhD, Director of the Proteomics Center of Excellence, Walter and Mary E. Glass Professor of Molecular Biosciences, Judd A. and Marjorie Weinberg College of Arts and Sciences, and Professor of Medicine at Northwestern University Feinberg School of Medicine



Center for Clinical Metabolomics

Metabolites are the panoply of small molecules that are produced by the human body in response to everyday life. Small changes in the production of these molecules may be undetectable to physicians in the clinic, but serve as the ‘canary in the coal mine,’ alerting doctors to potential subclinical disease. Clinical labs are well-established for the detection of common molecules such as glucose (diabetes) and creatinine (renal function). Mass spectrometry offers highly sensitive and specific measurement of hundreds of individual metabolites simultaneously.

Human Proteome Project

Although the Human Genome Project did not begin in earnest until 1991, it had been proposed as early as

1980, when automated DNA sequencing became a reality. After an overall investment of approximately \$3 billion from the US government, the Human Genome Project is estimated to have generated over \$500 billion in economic activity. The Cell-Based Human Proteome Project is more complex. While every somatic cell contains the same DNA sequence, its protein content is unique. The Cell-Based Human Proteome Project seeks to immunoprecipitate specific cell types and use top-down proteomics to determine its proteome. As we begin to understand the ‘normal cellular proteome’ on a cell-by-cell basis, we will be able to better understand the proteomes of cancer and other human disease.

Philanthropic Opportunities

Proteomics Center of Excellence	\$ 10 million
Center for Clinical Metabolomics	\$ 10 million
Instrument for Intact Proteins	\$ 1.5 million
Endowed Postdoctoral Fellowship	\$ 1.5 million
Data Repository for Top Down Proteomics	\$ 1 million
Epiproteomics–Histone Modifications in Cancer	\$ 1 million
Innovation Research Fund	\$ 500,000
Consortium for Top Down Proteomics	\$ 500,000
Revolutionary Biomarkers Research Projects	\$ 500,000
Endowed Lectureship	\$ 100,000

For more information about philanthropic opportunities within the Proteomics Center of Excellence, please contact:

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