

Abstract

Nano-Pro Platform for Nano-Scale Cellular Proteomics Analysis

PI: Hamid Band, M.D, PhD, Professor, Eppley Institute; Director, Center for Breast Cancer Research; Associate Director of Translational Research, UNMC-Eppley Cancer Center

Co-PI: Charles Kuszynski, PhD, Director, Cell Analysis Core Facility, UNMC

Abstract:

Revolutionary recent advances in genomics have allowed scientists to decipher the entire genetic blueprint of humans as well as economically-important animals and plants. Genetic information is translated into biological function by proteins encoded by our genes. Thus, understanding mechanisms of normal organism function, aberrations of these functions in as a basis of disease pathology, diagnosis of diseases, and treatment of such diseases ultimately require in-depth analyses of proteins. This proposal is to acquire an innovative new technology, the Nano-Proteomics (or Nano-Pro) Platform, as an enabler of proteomics research at UNMC. This technology, which currently exists only at a select group of premiere institutions, would place UNMC researchers in a highly competitive position by enabling them to carry out nano-scale proteomics analyses that are currently impossible at our institution.

Because of the low sensitivity of available techniques, studies thus far have mainly focused on the subset of proteins that are more broadly expressed and abundant. Thus, the vast majority of proteins that contribute to biological functions as well as pathological states remain relatively unexplored. Many key biological functions and diseases are also attributable to very small numbers of cells and analysis of protein function in biological materials representing these cells is currently difficult or unfeasible. Nano-Pro platform will enhance the limit of detection and expand the range of attributes of proteins, especially their modifications that can be assessed in limited biological samples and hence provides an opportunity to promote basic science, translational discoveries and eventually clinical care across a broad spectrum of disciplines at UNMC.

As is evident from the broad expertise of the sample of investigators that have expressed strong support for this technology as its potential users, and the strong previous, current and anticipated funding support of these investigators, the requested Nano-Pro Platform will help enhance research as well as research funding at UNMC. It will also increase our prominence as a desirable place to pursue academic research and help us recruit the best faculty, fellows, students and staff. By enhancing research at UNMC, the innovative Nano-Pro Platform will provide a strong economic boost to our state by contributing to jobs directly as well as indirectly through increased need for research services.