

## **IDEA Program Funding Impact in North Dakota**

The IDEA (Institutional Development Award) program continues to be instrumental in developing the scientific infrastructure necessary to provide statewide medical networks within ND that both serve the citizens of our state and contribute to the nation's global competitiveness. Major components of IDEA in ND are six institutional **COBRE** awards and the statewide **ND INBRE** program. These programs provide resources for collaborative infrastructure positioned to develop and more tightly link statewide multi-institutional networks, with the ultimate goal of becoming self-sustaining. Included in many of these centers are traditionally under-represented groups, primarily communities within ND of American Indian populations, who suffer from health disparities. IDEA programs also build and maintain a pipeline for minority and rural students to enter medical careers.

### **North Dakota COBRE (Centers Of Biomedical Research Excellence):**

#### Center for Diagnostic and Therapeutic Strategies in Pancreatic Cancer

- Conducts fundamental research leading to early detection of pancreatic cancer and its potential treatment by combined chemotherapeutic agents, including projects involving nanoparticles based detection of biomarkers, phytochemicals and antibodies based therapeutic protocol development, as well as the site-specific delivery of therapeutic payloads to the diseased (pancreatic) tissues in an animal model.
- Two Core facilities--Animal Studies and Biostatistics--support the COBRE investigators and other biomedical researchers.
- Implemented an extensive mentoring mechanism to assist researchers, including young biomedical investigators, to become successful in publishing and obtaining research grants (preferably NIH R01) to facilitate transition to independent research.
- Outreach activities involve working with a pancreatic cancer awareness group in the Fargo-Moorhead community.

#### Epigenomics of Development and Disease

- Provides direct research project support for junior investigators working in diverse health-related topics, including pre- and post-natal development, malignant transformation, drug addiction, and infectious disease, with an emphasis on trans-generational inheritance mediated by epigenetic and epigenomic mechanisms.
- Supports an Epigenetics Bioinformatics Core Facility that provides researchers with access to advanced-omics platforms.
- Advances epigenetics research and career development via mentoring programs for junior investigators, pilot grant funding, an annual symposium, research training and workshops, as well as a seminar series that brings nationally and internationally recognized experts to ND.
- Investigators from three different University of North Dakota (UND) colleges support the Center. Other participants include a ND PUI (primarily undergraduate institution) and the USDA Human Nutrition Research Lab.

#### Center for Excellence in Host-Pathogen Interactions

- The Host-Pathogen CoBRE (HPI CoBRE) is working to establish a nationally/internationally recognized Center for Excellence in infectious disease research by bringing together a dynamic group of investigators whose research focuses on host events that are critical to control various pathogens and identifying potential new targets for treatments of devastating diseases relevant to the aging and largely rural population of North Dakota.
- In collaboration with other entities at UND, HPI CoBRE is enhancing research infrastructure by establishing and maintaining state-of-the art facilities (Flow Cytometry, Imaging, Histology, Human tissue, library resources, satellite vivarium) available to support research within and outside of UND.
- Using pilot grant mechanisms, annual symposia, seminars and chalk-talks, the host-pathogen CoBRE is actively cultivating a clinical/translational component that builds on current relationships between academic, clinical, and industry here at UND and the surrounding area by including both clinical and academic researchers in the Center's activities.

#### Pathophysiological Signaling in Neurodegenerative Disorders (final year under a no-cost extension)

- Probes deep into the microscopic and submicroscopic realm to answer questions about neurodegenerative diseases, such as Alzheimer's and Parkinson's disease, neurological complications associated with HIV-1 infection, multiple sclerosis and seizure disorders. The center's team of investigators is drawn from all the medical research disciplines at UND's School of Medicine and Health Sciences. Translating their discoveries into treatments is a crucial part of the work.
- Two core facilities: 1) the Mass Spectrometry Center, where researchers use instruments to measure with great precision and accuracy small molecular weight compounds that might play roles in the pathogenesis of neurodegenerative disorders, and 2) the Edward C. Carlson Imaging and Image Analysis Core Facility, where investigators use a variety of light and electron microscopes to visualize pathological features of the diseases, were initiated under this COBRE.

#### Center for Protease Research (final year under a no-cost extension)

- Investigates novel therapeutics that have the potential to treat diseases such as cancer, arthritis, autoimmune diseases, diabetes, and asthma.
- Broad-based research programs provide fundamental information on how proteases impact these diseases through the study of the biological role played by matrix metalloproteinases and histone deacetylases.
- Supports meritorious biomedical and interdisciplinary research through a pilot project mechanism. Several faculty who have received support from the Center have been successful in obtaining R01 and other grants.
- Core facilities in biology and synthesis have been established, including Biomolecular Mass Spectrometric services.
- Outreach activities include workshops for faculty and students and a summer research program for undergraduates. The core facility instruments have been utilized for research, teaching and outreach.

#### Center for Visual and Cognitive Neuroscience (CVCN)

- Provides access to many advanced visual and cognitive neuroscience resources through three core facilities: 1) Driving Simulator Core permits the collection of human performance measures in a driving environment with high ecological validity; 2) High-Density Electroencephalography/Neurostimulation Core applies geophysics techniques to make accurate inferences concerning the intracranial location of the generators of the voltages recorded at the scalp, and allows for causal conclusions about brain-behavior relationships to be drawn with non-invasive brain stimulation; 3) Technical Services Core, including the Electro-Optical Instrumentation, Eye Tracking, and High-Dynamic Range Imaging subcomponents, provides advanced computer programming support for real-time applications, electronics design and fabrication, custom EEG recording and analysis software, as well as web development and maintenance support not only for the faculty and students of the CVCN and North Dakota State University (NDSU), but also for visual and cognitive neuroscience researchers in the region, along with COBRE investigators in other IDeA states associated with the Scientific Exchange Network.

#### **North Dakota INBRE (IDeA Network for Biomedical Research Excellence):**

The goal of North Dakota INBRE is to build biomedical research capacity by serving research universities, primarily undergraduate institutions (PUIs), and tribal colleges (TCs) within the state. The specific aims are to:

- Initiate competitive, sustainable research programs at four predominantly undergraduate institutions (PUIs) and increase the number of students from PUIs who choose to pursue advanced training in the biomedical sciences.
  - 16 faculty researchers at 4 PUIs and their students are working on: 1) Etiology of Exuberant Granulation Tissue in Equine; 2) Role of c-Met in Acidic Extracellular pH-induced Cell Motility and Invasion; 3) Determining the Potential Impact of Road Traffic and Dust on Environmental Health; 4) Examination of the Secondary Effects of Magnesium on ALDH2 Substrates, Inhibitors; 5) Epigenomic and Transcription Control in Bean; 6) Trophic Level Bioaccumulation of Cadmium in the Red River Valley of North Dakota; 7) Ghrelin Interaction with Genetic Risk Factors of Methamphetamine Addiction; 8) Metagenomics of North American Tick Species; 9) Non-Auxin Hormonal Control of Leaf Expansion in Arabidopsis; 10) Environmental and Geographical Constraints on Plant Evolution; 11) Effect of Epigenetic Manipulation on Differentiation Therapy in AML; 12) Novel Formamide Ligands, Their Antifungal Activity and Methods of Their Synthesis; 13) Role of Allosteric Disulfide Bonds in Cellular Infection and Metal Insertion; 14) Shirley Cole-Harding: Caffeine: A Model Drug for Studying Environmental Factors in Addiction; 15) Environmental Health: Coal Fly Ash Phytoremediation and Plants Biofortification; and 16) Molecular Insights into the Mechanisms of Atmospheric Nucleation.
  - 6 faculty researchers at 5 TCs and their students are working on: 1) Environmental Analysis of Heavy Metals; 2) Metal Accumulation in Fish; 3) Ecological Interactions at the Micro-scale: Applying Concepts of Parasitology and Zoonoses to Habitat Processes; 4) Genetics and Pre-eclampsia Study; and 5) Integrating Fundamentals Using Student Experiences.
  - Funding of Research Experiences for Undergraduates [REFUNDU (REU for ND University students) and NSF REU (for students from rural and TCs)]
- Enhance the state's access to computational and electronic resources supporting biomedical research.
- Enhance existing six core facilities located at the University of North Dakota.

#### **Current Active North Dakota IDeA Awards**

<b>Program</b>	<b>Award</b>	<b>Amount</b>	<b>Type of Award</b>	
NIH	IDeA	\$16.8 million	INBRE	(1 award)
NIH	IDeA	\$45.9 million	COBRE	(6 awards)

**For more information about North Dakota EPSCoR:  
Visit our website: [www.ndepscor.ndus.edu](http://www.ndepscor.ndus.edu) or  
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