

ND 2/12/2019

## 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 serve the citizens of our state while contributing to the nation's global competitiveness. Major components of IDEA in ND are five 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: <https://www.ndsu.edu/centers/pancreaticcancer/>

Conducts fundamental research leading to early detection of pancreatic cancer and its potential treatment by combined chemotherapeutic agents, including projects involving nanoparticle-based detection of biomarkers, phytochemicals and antibody-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 are supported by this funding: 1) Animal Studies and 2) Biostatistics. The Center 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: <https://med.und.edu/epigenetics/>

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. Funding is used to 1) Support a Genomics Core Facility that provides researchers with access to advanced "-omics" platforms and 2) Advance epigenetics research and career development via mentoring programs for junior and mid-career 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 on this project are from three different University of North Dakota (UND) colleges and from the USDA Human Nutrition Research Lab.



Center for Excellence in Host-Pathogen Interactions: <https://med.und.edu/host-pathogen/>

This highly interactive and dynamic group of junior investigators focuses their research on understanding the mechanisms that underline the host response to various infectious agents. With expertise in viral, bacterial and parasitic infections, they are working to uncover immune mechanisms regulating the pathogenesis of these diverse infectious diseases and identify novel targets for treatments in the face of increasing antibiotic resistance. The critical research of this Center will be accomplished by utilizing infrastructure supported by core facilities equipped with modern instrumentation and technology (flow cytometry, imaging, histology). A translational component has been added as a key facet (human tissue core), which is consistent with our strategic mission to address the needs of ND's aging, largely rural population, who are prone to infectious diseases such as pulmonary infections, sepsis, neuroinflammation and vector-borne disease. This Center nurtures a focused group of investigators. Successful completion of the team's specific aims will result in the establishment of a sustainable Center capable of attracting talented faculty, students and fellows to conduct research in the burgeoning field of infectious disease. UND is fully committed to ensuring the growth and sustainability of this group after the COBRE grant ends through independent extramural funding, which will establish and maintain UND as the emerging infectious disease center in the US.

### Pathophysiological Signaling in Neurodegenerative Disorders

Completed this year (11/30/18), the Center probed 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. Translating their discoveries into treatments was a crucial part of the work. The Center was comprised of two core facilities: 1) the Mass Spectrometry Center, where researchers used instruments with great precision and accuracy to measure 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 used a variety of light and electron microscopes to visualize pathological features of the diseases.

### Center for Protease Research: <https://www.centerforproteaseresearch.org/>

Completed this year (6/30/19), the Center investigated novel therapeutics that have the potential to treat diseases such as cancer, arthritis, autoimmune diseases, diabetes, and asthma. The research programs provided fundamental information on how proteases impact these diseases through the study of the biological role played by matrix metalloproteinases and histone deacetylases. 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 and instruments utilized for research, teaching, and outreach.

### Center for Visual and Cognitive Neuroscience (CVCN): <https://www.ndsu.edu/centers/cvcn/>

The Center continues to provide access to many advanced visual and cognitive neuroscience resources through three core facilities: 1) Driving Simulator Core, which permits the collection of human performance measures in a driving environment with high ecological validity; 2) High-Density Electroencephalography/Neurostimulation Core, which 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, which provides advanced computer programming support for real-time applications, electronics design and fabrication, custom EEG recording and analysis software. The Center also provides 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): <http://ndinbre.org/>

ND INBRE supports undergraduate research at two primarily undergraduate institutions (Dickinson State University and Mayville State University), 1 master's college/university (Minot State University), 2 tribal colleges (Cankdeska Cikana Community College and Turtle Mountain Community College), 2 research intensive universities (UND and NDSU) and 1 private university (University of Mary) in ND. Since 2009, over 1,000 undergraduates have received 400+ hours of research experience, resulting in over 500 poster presentations. The ND INBRE also provides the registration fees for K12 students to participate in the ND Science and Engineering Fair. In addition, since 2013, ND INBRE has supported the participation of 2,697 students in the Regional Competition, 679 students in the State Competition, and 80 students in the INTEL International Science and Engineering Fairs. Eleven students have won awards at the National Competition. A new program recently launched by ND INBRE is designed to aid middle and high school teachers in presenting laboratory-based exercises that meet requirements for advanced placement and dual credit courses. The laboratory exercises have been pilot tested by over 35 teachers and by over 100 students throughout ND.

Finally, ND INBRE provides infrastructure to support the research of ND INBRE partners. Since 2018, ND INBRE has provided funding for equipment:

- \$1+ million for equipment to support cores at UND, open to all researchers in ND for Flow Cytometry and Cell Sorting, Animal Behavioral Research, Microscopy, Metal Analysis, and Medical Informatics;
- \$500,000+ for equipment infrastructure at the PUIs and MCU; and
- \$1+ million, in cooperation with the Native American Research Centers for Health (NARCH), to the TCs and the UND Summer Undergraduate Research Program.

Current Active North Dakota IDEa Awards				
Program	Award	Amount	Type of Award	# of Awards
NIH	IDEa	\$16.8 million	INBRE	1 award
NIH	IDEa	\$40.5 million	COBRE	6 awards

For more information about North Dakota EPSCoR:  
Visit our website: [www.ndepscor.ndus.edu](http://www.ndepscor.ndus.edu) or  
Call 701.231.8400 (North Dakota EPSCoR State Office)