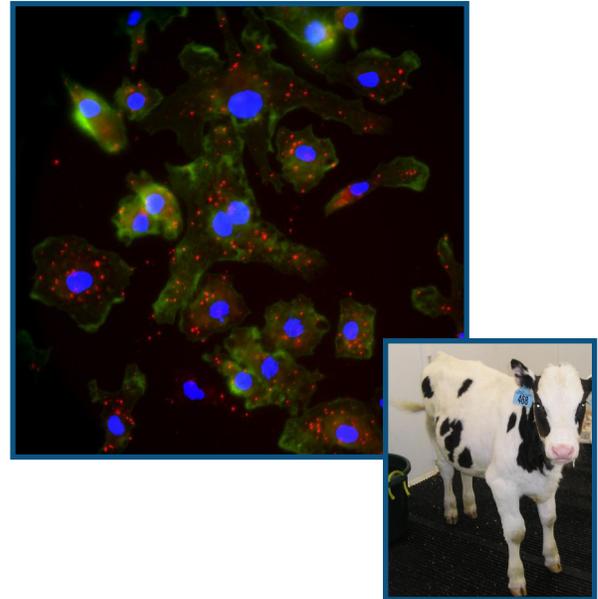


Increasing South Dakota's Science & Technology Research Capacity

The BioSystems Networks / Translational Research, or **BioSNTR** (pronounced "bio-center") is a statewide, multidisciplinary group of scientists and researchers with three core areas: computational science, cell imaging, and biomaterials. BioSNTR uses cutting-edge scientific technologies with applications to support South Dakota bioscience industry.

In 2017, Building Genome-to-Phenome Infrastructure for Regulating Methane in Deep and Extreme Environments or **BuG ReMeDEE** was awarded a NSF EPSCoR Trak-2 Award. This research (pronounced "bug remedy") explores using microbes collected at the Sanford Underground Research Facility (SURF) to convert methane into commercially viable products.



The NSF EPSCoR RII Track 1 project provides research infrastructure and activities supporting South Dakota's bioscience businesses, such as SAB Biotherapeutics, develop, test and produce innovative new products. SAB Biotherapeutics (SAB) TC Bovine cattle produce human antibodies currently in human clinical trials. BioSNTR researchers are collaborating with SAB to visualize how human antibodies produced by SAB's TC Bovine cattle attack the influenza virus.

Supporting South Dakota

Workforce Development

In partnership with the Governor's Office of Economic Development, SD EPSCoR has implemented the Dakota Seeds Internship Program to help South Dakota companies connect with student interns to help meet their workforce demands. Since 2014, Dakota Seeds has supported 602 interns working for 125 South Dakota companies. Thirty percent of the interns take full time employment with the company do their internship.

Education and Outreach

Given the wide variety of out-of-school STEM programs and the difficulty of measuring their outcomes, there are no measurable methods to determine their outcomes. SD EPSCoR has addressed this by developing an extensive but user-friendly database system that not only tracks programs, but also participating students, teachers, schools, industry and research professionals.



South Dakota tribal college students conduct research with support of the NSF EPSCoR programs. Participants of Sinte Gleska University's STEM Horse Camp are pictured on the left.

A History of Achievements

- EPSCoR researchers and their innovations have won the South Dakota Governor's Giant Vision Business Plan competition in 2014, 2016 and 2017.
- Building partnerships between public, private, and tribal colleges and universities.
- Connecting STEM students with South Dakota employers through the Dakota Seeds Internship Program since 2007.
- Established partnerships with Fisher Science Education to provide additional science fair awards and discounts to all South Dakota Schools for equipment .
- Developed and updated the 2020 Vision: The South Dakota Science & Innovation Strategy, South Dakota's science & technology plan.



Strengthening South Dakota's Research Infrastructure to Support NASA's Science & Technology Needs

SD NASA EPSCoR

Since 2007, SD NASA EPSCoR has received \$10.75 million in NASA funding and secured more than \$6.66 million in non-federal matching funds to improve research capacity in science and engineering fields that are critical to NASA's mission and to promote science and technology-based economic development in the state.

The NASA EPSCoR program is administered through the SD NASA Space Grant Consortium which includes public, private, and tribal universities; informal science centers; industry partners; and state and federal government agencies such as the Sanford Underground Laboratory located at the former Homestake gold mine in Lead, SD, and the USGS EROS Data Center in Sioux Falls, SD.

SD NASA EPSCoR has contributed to the research capacity of the state by supporting collaborative, multi-institutional research in:

- Nanotechnology
- Bioengineered renewable fuels
- Flexible electronics & wearable sensors
- Advanced composite materials
- Monitoring and modeling crop health
- Photovoltaic devices to harvest solar energy
- Advanced aerospace batteries for energy storage

What is NASA EPSCoR?

NASA EPSCoR is part of NASA's Office of Education and supports state-based strategies to improve research and development competitiveness through (1) Research Infrastructure Development awards (\$125,000 per year) and (2) Research Implementation Awards which are selected through a competitive review process (\$750,000 over three years).



SDSU graduate student Behzad Bahrami working on next generation perovskite solar cell.

Supporting South Dakota

Special focus is directed to projects that utilize major federally funded facilities such as the EROS Data Center and the Sanford Underground Lab as well as technology priorities outlined in the state's 2020 Vision: The South Dakota Science and Innovation Strategy. In addition, SD NASA EPSCoR promotes research and training partnerships between the state's public universities and tribal colleges and universities.

During the period 2007–2017, NASA EPSCoR funds in South Dakota were matched with non-federal funds at an average rate of 61%. This cost-sharing plus competitive NASA grants and other follow-on grants gives a return on investment of more than 50 dollars for every dollar of NASA base funding. These funds have supported more than 80 faculty and postdoctoral researchers and more than 350 graduate and undergraduate students representing seven public, private and tribal universities.



South Dakota Biomedical Research Infrastructure Network

NIH IDeA/INBRE/COBRE

brin.usd.edu

Enhancing basic biomedical research in cell biology with a network of a research intensive institution and partner undergraduate institutions

South Dakota NIH IDeA/INBRE/COBRE

Since 2001, SD BRIN/INBRE has received more than \$44 million in NIH funding for the partner institutions of the University of South Dakota (USD), Augustana University, Black Hills State University, Dakota Wesleyan University, Mt. Marty College, Oglala Lakota College, Sisseton Wahpeton College, and the University of Sioux Falls.

This funding supports Bioinformatics, Nucleic Acid Sequencing and Genotyping, Genomics, and Proteomics Core Facilities for all SD and regional researchers through its first goal of improving research capabilities in cell biology with special emphases on proteomics, genomics, and bioinformatics. SD BRIN's second goal is developing human resources in biomedical sciences and bioinformatics by supporting research of students and faculty from predominantly undergraduate institutions and tribal colleges.

South Dakota has two Centers of Biomedical Research Excellence (COBRE) at Sanford Research. The Center for Biology Research focuses on cancer research with direct translational relevance to human patients. The Center for Pediatric Research seeks to establish a foundation of basic scientists with translational research projects studying developmental mechanisms underlying pediatric diseases.

What is NIH INBRE?

NIH INBRE is one of the three Institutional Development Award (IDeA) programs offered by the National Institutes of Health National Institute of General Medical Sciences. INBRE stands for IDeA Network of Biomedical Research Excellence. The INBRE program in each state is funded by \$2.5 million in direct costs annually.

SD Biomedical Network



Supporting South Dakota

In addition to providing services from the core facilities at free or reduced rates to all SD researchers, SD BRIN invests in its undergraduate partner institutions providing summer research support for 30 science faculty, summer student research fellowships for 55 undergraduates, and over \$260,000 in scientific library databases for access to journal articles.

An additional two dozen faculty at Avera Research, Sanford Research, South Dakota State University, and USD are chosen as mentors for the summer undergraduate fellows from the partner institutions. An annual convocation for both faculty and student researchers (with a student poster session) is held at the end of the summer program.