2021 STUDENT SUCCESS REPORT

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The Delaware IDeA Network of Biomedical Research Excellence (DE-INBRE) is a statewide collaborative network that seeks to expand research activities across basic, translational and clinical areas while increasing Delaware’s competitiveness for federal biomedical research funding. In doing so, DE-INBRE supports impactful, state-of-the-art research that creates jobs, prepares tomorrow’s workforce, and improves the health of Delawareans. This happens in three ways: by providing biomedical research opportunities for undergraduates; supporting early-career investigators on their quest to become independent researchers; and improving Delaware’s research infrastructure with a collaborative network of over twenty Core Facilities offering state-of-the-art research equipment and expertise.

This report focuses on programs that support students across our institutions and network.

Delaware INBRE is supported by a grant from the National Institute of General Medical Sciences Institutional Development Award (NIH-NIGMS: P20 GM103446, PI: Stanhope) and the State of Delaware.

Delaware INBRE’s goals are:
- Foster a statewide network for biomedical research
- Develop independent and inter-dependent researchers and institutions
- Cultivate Delaware INBRE initiatives
- Enhance Delaware’s knowledge of biomedical science and technology
Program Overview: Selected undergraduate students are placed into full-time, 10-week long research internships working with faculty or clinicians who conduct research in one of the partnering institutions, clinical facilities, or with active researchers affiliated with INBRE programs based in other states.

Summer Scholars are required to complete responsible conduct of research training and are invited to participate in professional development workshops focused on scientific and professional skills such as scientific communication and applying to graduate and professional school.

Students from groups traditionally underrepresented in biomedical fields, including first generation college students, students from low-income families, students with disabilities, and/or students from racial and ethnic minority groups are especially encouraged to apply for the program.

At the conclusion of the program, Summer Scholars participate in an oral or poster session at their host site and/or at the University of Delaware Undergraduate Research and Service Learning Celebratory Symposium organized by the University of Delaware Undergraduate Research Program.
Victoir was placed in the biomedical laboratory setting at Wesley College’s Chemistry Lab and the Green Clinics Laboratory in Dover, DE. Alongside his mentor, Dr. Malcom D’Souza, he increased his biomedical research skills in studying chemical genetics as well as conducting, reading, and analyzing COVID-19 test results.

His research experiences led him to develop a deep appreciation for the field of science, witnessing the time and effort it takes to make data relevant. Victoir explains that his experiences led him to develop more expertise, fueling his intentions to continue his educational and occupational pursuits in the medical field. He has stated, "Before, I never even knew research was an option for me. I’ve loved it ever since!"

Working with mentor Dr. Kimberly Gannon at ChristianaCare during the summer of 2019 gave Amber the opportunity to conduct research involving patients with symptoms or diagnoses of ischemic stroke and atrial fibrillation.

The time she spent with Dr. Gannon and other physicians during her summer experience was perhaps the most impactful for it led Amber to an amazing breakthrough in terms of her career plans. "I shadowed my mentor and loved it. I learned that I actually wanted to become a doctor."
Students who participate in DE-INBRE supported programs pursue employment and higher education in Biomedical and STEM (Science, Technology, Engineering, and Math) related fields in Delaware, thus expanding and strengthening the biomedical research capacity across the state.

Despite the impact of COVID-19 upon the collegiate community as a whole, the 2020 DE-INBRE Summer Scholar program still provided meaningful research opportunities for undergraduate students. Almost all of the students were required to participate virtually and many assumed data science and data analysis roles.

One student shared that analyzing data allowed her to study the “more qualitative side of science” since the analysis involved the transcription of previously recorded interviews. Other students mentioned benefitting from learning how to better read, understand, and interpret scientific literature. It helped me “become a better applicant for grad school,” proclaimed one sophomore.

Other scholars voiced that emphasis on data science allowed them to understand the populations and settings they would like to work with in the future. Additionally, it influenced future career plans. One student voiced, “Now I know I want to be a physician who also has a knowledge of public health.”
Akram Ahamed is a senior engineering major at the University of Delaware who worked with Dr. Jennifer Goldstein at ChristianaCare during the summer of 2019. His research involved the collection of data pertaining to the advertisement and illegal sales of life-saving prescription drugs on online shopping markets such as Craig’s List.

In addition to data collection, Akram improved his technical communication skills, learned how to write abstracts for scholarly publications, and created a scientific poster that depicted and described his work in detail. “It was a very good experience. I learned a lot,” Akram explained.

His plans to attend medical school did not change, but Akram is now interested in “both practice and research, like Dr. Goldstein.” Akram’s ability to connect with other doctors at ChristianaCare, who he now feels comfortable reaching out to, is an additional opportunity he was grateful for as a result of his summer experience.

Akram is a co-author on the publication from his summer work, “Analysis of Unregulated Sale of Lifesaving Prescription Drugs Online in the United States” published in JAMA Internal Medicine.

Riley worked with her mentor Dr. Sharon Gould at Nemours/Alfred I duPont Hospital for Children to explore how computed tomography (CT) can be used to better understand the causes of death. Riley is a co-author on two publications from her summer work: “Pediatric postmortem computer tomography: initial experience at a children’s hospital in the United States” published in the journal Pediatric Radiology. “Tibial Intraosseous Insertion in Pediatric Emergency Care: A Review Based upon Postmortem Computed Tomography” published in the journal Prehospital Emergency Care.

Riley is currently enrolled in medical school at West Virginia University School of Medicine, class of 2024.
Wesley College has been an active participant in the DE-INBRE network since its inception in 2002. Wesley’s Mentored Directed Undergraduate Research Program is a unique and impactful STEM-related initiative that has been successfully implemented with DE-INBRE support. Under this program, incoming freshman participate in STEM research projects and are immersed in the field through course-embedded research opportunities, paid research internships, and senior research capstone projects. The program has also supported the purchase of biomedical instrumentation and supplies, renovation of lab spaces, and access to online library resources.

Many Wesley students come from groups that are traditionally underrepresented in STEM, including racial/ethnic minority, first-generation college, low-income, and academically challenged students. Many of these students go on to find future success in STEM-related academic and professional endeavors.

In July 2021, Wesley College became part of the Delaware State University heritage.

"Prior to 2002, only one Wesley graduate had completed Medical School. Now, the majority of Wesley STEM graduates (upwards of 90%) continue to work in STEM fields, either through postgraduate study, research careers or in teaching."
In 2014, Brett Sansbury graduated from Wesley College with her Bachelor's degree in Biological Chemistry. Prior to her graduation, she participated in the 2011 DE-INBRE Summer Scholar program at Wesley College under mentor Dr. Malcom D'Souza studying the "Solvent Reaction of 4-Chlorophenyl Chlorothionoformate". She then went on to pursue her PhD in Medical and Molecular Sciences at the University of Delaware, working in the Gene Editing Institute in the Helen F. Graham Cancer Center at ChristianaCare.

Upon graduation, Brett transitioned to a full-time position at the Gene Editing Institute where she continues her research with CRISPR gene editing technology, working with colleagues to currently understand the role of gene editing in diagnosing COVID-19. Presently, she is also an instructor for the 2021 Delaware Mini-Medical School program, open to adults and high school students across the state.

In 2015 and 2016, Riza participated as an undergraduate student in the INBRE Summer Scholars Program at Wesley College analyzing epidemiological data involving obesity rates across Delaware. After graduating from Wesley in 2016, she began her Master's degree in Bioinformatics at the University of Delaware. Shortly after, she was accepted into the NSF-funded IGERT (Integrative Graduate Education and Research Traineeship) program.

By the Spring of 2017, Riza successfully converted to the PhD program and began her doctoral studies. Ms. Li is currently working on her dissertation entitled "Predicting Long-term Diabetic Complications by Utilizing Electronic Health Records" with the ChristianaCare Value Institute. Riza has also recently co-authored "Twenty-Year Observational Study Shows Rising Alcohol-Attributable Death Profiles in the U.S. and Delaware" with her former INBRE summer scholar mentor, Dr. Malcolm D'Souza.
As an initial recipient of DE-INBRE support in 2002, Delaware Technical Community College (DTCC) has developed and expanded their Biological Sciences program to include course embedded and mentored undergraduate research experiences (UREs) to enhance student training in biomedical and biotechnology fields.

DE-INBRE support has provided DTCC faculty with professional development and the purchase of supplies and equipment to enhance the curriculum with high-impact practices. These initiatives increase statewide science and technology competencies through training, seminars, courses, tutoring, and workshops.

DTCC student participation in DE-INBRE Summer Scholar internships has also forged connections between DTCC and partner institutions to further support the DE-INBRE goal of expanding the pipeline of students into biomedical research and the bioscience workforce across Delaware.

Dr. John McDowell
DTCC
DE-INBRE Site Principal Investigator

“\textit{A real focus of the Delaware INBRE program over the past several years has been to highlight the unique nature of each institution and allow Delaware INBRE to be utilized and leverage activities to support what is going on at that institution... and that’s certainly true at Del Tech.}”
Many DTCC Biomedical Studies/Biotechnology (BIS-BIT) students obtain Associates degrees prior to entering the biomedical workforce, while others go on to pursue Bachelor's degrees at other institutions. Of these students, some go on to complete graduate degrees in biomedical fields, sometimes conducting research along with new DTCC BIS-BIT students, thus creating a cyclical impact of biomedical study across the state.

**THANH NGUYEN**  
**2014 SUMMER SCHOLAR**

2014 - Del Tech Community College:  
AS Biological Sciences  
2016 - Delaware State University:  
BS Biology/Biological Sciences  
2021 - University of Delaware:  
MS Candidate, Biological Sciences

Thanh Nguyen spent four years engaged with undergraduate biomedical research at DTCC Stanton campus while working full-time at her family's business and taking classes to earn two Associate of Science degrees. The scientific knowledge, laboratory skills, and support she received at DTCC and as a DE-INBRE Summer Scholar were vital to advancing her educational pursuits in research.

Upon pursuit of her BS from Delaware State University, Thanh was the first DSU undergraduate to receive the NSF Undergraduate Student research fellowship. She states that without her Delaware INBRE Summer Scholar experience, where she was able to present her research and network with key individuals in the Delaware biomedical field, she "would never have received the fellowship."

After graduating in 2016 with her BS from DSU, Thanh began her graduate work at the University of Delaware where she is currently pursuing her Master's degree in Biological Science and instructing undergraduate students. Her future plans include applying to medical school and pursuing an MD-PhD.

**KRISTEN PISCARIK**  
**2016 & 2017 SUMMER SCHOLAR**

2017 Del Tech Community College  
AS Biotechnology, Biological Sciences, Biotechnology Technician & Chemistry/Math Conc.  
2021 University of Delaware - Senior  
Applied Molecular Biology and Biotechnology

Kristen first became involved in undergraduate research at DTCC and was able to continue over two summers via the DE-INBRE Summer Scholars program. Along with her mentors at the ChristianaCare Gene Editing Institute (GEI), her initial summer research led her to obtain her four-year position with the GEI funded by the Technical Training in Gene Editing NSF-ATE grant.

In her position as Research Assistant and Science Educator she conducts gene editing experiments and translates them into laboratory exercises and curriculum for a variety of audiences. She describes her role as, "an amazing experience that has allowed me to become a better researcher, student, and person overall." Kristen is due to graduate from the University of Delaware with a BS in May 2022.
The partnership between DE-INBRE and Delaware State University has forged many educational and professional development opportunities in biomedical fields for a diverse population of undergraduate and graduate students. As a Historically Black Colleges and University (HBCU), DSU is uniquely poised to create opportunities for students from groups that are traditionally underrepresented in STEM fields.

The novel DE-INBRE-supported DSU Graduate Student Training Program aims to support the recruitment and retention of high quality graduate students in biomedical disciplines. Graduate student fellows in the program mentor undergraduate students in research laboratories during the academic year as well as participate in K-12 student outreach and professional development training.

DE-INBRE support compliments other training grants at DSU including the Undergraduate Research Training Initiative for Student Enhancement (U-RISE) program, which provides skill-development workshops and summer training opportunities, and the Science Education Partnership Award (SEPA) program, which facilitates the interaction of DSU students with middle-school students during their summer camp experiences.

DSU is also a host site for DE-INBRE Summer Scholars, who participate in undergraduate summer research experiences at the institution.

“The way we evaluate the successes of our students is really through stories... because hidden in the numbers are the full stories of students who come from very different backgrounds...we give them this chance and they build from that and move toward a research pathway.”

Dr. Hacene Boukari
DSU
DE-INBRE Site Principal Investigator
DSU STUDENT OUTCOMES

The comprehensive nature of DE-INBRE programming at DSU impacts students at the undergraduate and graduate levels. Students have the ability to learn and engage in biomedical research utilizing cutting-edge equipment working alongside highly-skilled faculty and mentors.

OCSAR IMAGING FACILITY

The Optical Science Center for Applied Research (OSCAR) imaging facility provides DSU students, professors, and scientists with immediate hands-on research experience using cutting-edge light-based technologies to address current societal challenges. DSU-INBRE students gain access to this invaluable resource through summer research programs, paid internships, and various research projects.

GROWTH OF SUMMER UNDERGRADUATE RESEARCH PARTICIPATION AT DSU

"INBRE support has undoubtedly been instrumental in achieving my goals."
- Holly Miller

TIARA WHITE
2018 & 2019 Summer Scholar
2020 Delaware State University
BS, Biology Health Professions
PhD Candidate - Stony Brook University, Genetics

During her time as a DSU-INBRE Summer Scholar student, Tiara had the opportunity to intern at the Vermont College of Medicine, gaining laboratory research experience in studying Hantavirus. By providing funding for traveling expenses, DE-INBRE also supported Tiara in presenting her research at conferences across the country in California, Washington DC, and Maryland.

The research aptitude she gained from her experiences made her a strong candidate when applying for graduate school. Currently, Tiara is pursuing her PhD in Genetics at Stony Brook University, citing that the research aptitude she gained from her undergraduate experiences is contributing to her graduate study success as well.

HOLLY MILLER
2017 Summer Scholar
2017 - Delaware State University
BS, Biology/Biological Sciences
2020 - Delaware State University
MS, Cellular and Molecular Neuroscience

By the end of her 2017 Summer Scholar experience at DSU, Holly learned valuable research techniques that allowed her to perform complex experiments, present her findings at multiple symposiums, and continue as an INBRE-funded Undergraduate Research Assistant in the DSU Miletti lab. Holly’s summer experience also inspired her to apply to the DSU Graduate Program, where she was given a DE-INBRE Graduate Research Fellowship.

As a graduate student, Holly advanced her research capabilities, attended more conferences, and received a scholarship to attend the Frontiers in Stem Cells in Cancer (FriSC2) Training Program in Puerto Rico. As a wife and a mother of two daughters, she was grateful to receive the support of DE-INBRE and her mentors, Dr. Boukari and Ms. Niamat, while maintaining a family. She states, “INBRE not only provided me with financial peace of mind, but also with invaluable opportunities and experiences.”

After graduation, Holly began her current position as a Molecular Biologist for the Delaware Department of Health and Social Services at the Delaware Public Health Lab (DPHL) where she is currently working on a special project performing whole genome sequencing on COVID-positive samples to determine how COVID variants are moving through communities. In addition to her current position at DPHL, she also teaches as an Adjunct Professor at DSU.