K-INBRIEF

News from the Kansas IDeA Network of Biomedical Research Excellence

K-INBRIEF is published by the Kansas IDeA Office based at the University of Kansas Medical Center, 3901 Rainbow Blvd., Mail Stop 3050, Kansas City, Kansas 66160-7104. For additional information, contact Renee VanErp, 913-588-9819.

This newsletter is made possible by NIH Grant # P20 RR16475 from the INBRE program of the National Center for Research Resources. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of NIH. To learn more about the K-INBRE, visit www.kumc.edu/kinbre.

June 2008

At the Eighth Annual University of Kansas – Haskell Indian Nations University Research Symposium April 29 on the Haskell campus, more than 30 bright, young scientists talked about saving lives, improving drug effectiveness and protecting our water resources. Read more on page 2.

Also in this issue...

It's a First!

Welcome to the first edition of our online K-INBRIEF to bring you news from the Kansas IDeA Network of Biomedical Research Excellence, a $25.6 million research initiative designed to boost biomedical research capacity and strengthen a life sciences work force for Kansas. Funded by the National Center for Research Resources at the National Institutes of Health, the K-INBRE serves students and faculty on 10 campuses.

Our K-INBRIEF masthead image is a time-lapse movie of avian heart development, depicting the substantial motion of both endothelial cells and their surrounding extracellular matrix as the bilateral heart tubes roll up and fuse at the midline. (Computational Imaging Group at the University of Kansas Medical Center: Charles Little, Brenda Rongish, Andras Czirok, Alan Petersen, Michael Filla and Tracey Cheuvront.)

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A Symposium Full of Promise

For some of Kansas' bright, young scientists, it's all about saving lives, improving drug effectiveness and protecting our water resources.

At the Eighth Annual University of Kansas – Haskell Indian Nations University Research Symposium held April 29 on the Haskell campus, more than 30 students showcased their scientific research and the passion behind their work.

Students who presented at the April 29 Eighth Annual University of Kansas – Haskell Indian Nations University Research Symposium included (from left): Jason Koontz, Tennille Begay, Yvonne Kamau and Cassandra Lamar.

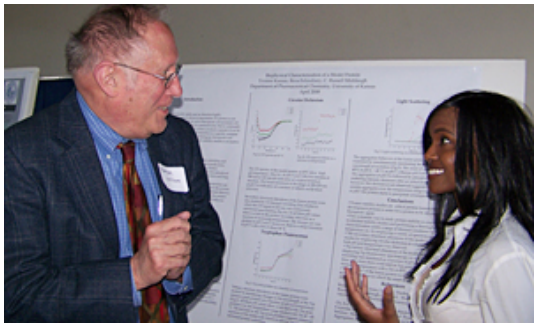
"It all comes back to human health," explains Jason Koontz, a recent Haskell graduate who will be pursuing his master's degree in environmental science this fall at KU-Lawrence. "By protecting our water resources, we protect our drinking water and wildlife. We get our drinking water from the Kansas River, so if we can reduce the contaminants, we won't have to spend so much money treating it."

Jason's current work is supported by the Post Baccalaureate Research (PREP) program, one of several NIH-funded initiatives within the Office of Diversity in Science Training based at KU. PREP is a research scholarship program that promotes diversity in scientific research, providing mentored research experiences and training to help recently graduated students prepare for graduate school in a science -related field.

"Providing research experience is a step in the right direction, an opportunity for the student to get a better understanding of science," says Jim Orr, professor of molecular biosciences and director of the Office for Diversity in Science Training at KU. Orr also serves as the campus coordinator for the KU-Lawrence K-INBRE program.

After earning her associates degree from Haskell, Tennille Begay is continuing her scientific studies on the KU campus, studying microsatellite genetic markers as a tool to evaluate pollution in streams. Because of her interest in pursuing a career in biomedical research, she received support from the 500 Nations Bridge Program, which helps students transition from Haskell to other universities.

"The symposium provides an opportunity for Haskell students to showcase their research on their own campus, so the community can see what they have achieved," says Bridgett Chapin, faculty member in Haskell's environmental science department and K-INBRE campus coordinator. "And, the students benefit so much from the scientific investigations they undertake here and at KU."



George Wilson, associate vice provost of research and graduate studies at KU – Lawrence, discusses the thrill of discovery with Yvonne Kamau.

Cassandra Lamar, who will be a junior at KU this fall, studies shigellosis, severe diarrhea, which is often prevalent in undeveloped countries and in places where sanitation systems are compromised from the result of natural disasters, such as Katrina. Because shigellosis can be life-threatening when dehydration results, Cassandra joins teams of scientists who are developing vaccines to prevent severe diarrhea. Cassandra's work is supported by the Initiative for Maximizing Student Diversity (IMSD), designed to enhance the experience of a diverse group of students at KU who are interested in pursuing graduate study and a research career in a field related to biomedical research.

"Store in a cool, dry place" is found on several medications, because scientists such as Yvonne Kamau, a junior at KU, evaluate the stability of proteins which keep drugs effective, leading to determination of the most stable conditions for drug proteins. Yvonne's work is also supported by the IMSD program.

The Office of Diversity in Science Training focuses on these objectives:

- Train tomorrow's scientists who reflect the population diversity of the nation as a whole.
- Achieve scientific excellence by fostering a diversity of perspectives and points of view.
- Invite students to participate in hands-on lab experiences as undergraduate research scholars.
- Assign mentors who can engage students in rigorous scientific inquiry and reinforce successful critical thinking skills.
- Introduce students to biomedical research careers by attending symposiums and giving students opportunities to present their research at professional events.

To learn more about the initiatives sponsored by KU's Office of Diversity in Science Training, visit http://www2.ku.edu/~odst.

Spinning Straw into Gold

Growing up with a chromosome deficient brother, Tanner Welsch decided at a young age to dedicate his life to learning and to helping others. Now on a path to pursue an MD/PhD, the junior in Biological Sciences at Fort Hays State University seizes every opportunity to advance his research and to shadow physicians in a variety of different specialties.

"My brother has had one of the greatest impacts on my decision to pursue a medical degree and inspired me to help others," says Welsch. "I wanted to know why my brother was the way he was and that made me very inquisitive. Though we can't change my brother's condition, my parents, sister and I have worked hard as a team to help ensure his quality of life."

Improving the quality of life is at the center of Welsch's research, which is testing for traces of antibiotic-resistant bacteria in soil samples from residential sites.

"We know that antibacterial agents such as triclosan are found in a variety of consumer products, including hand soaps, shower gels, deodorant soaps, toothpastes, mouthwashes and underarm deodorants," Welsch explains. "Because bacteria resistant to triclosan have been detected in wastewater, surface water, ground water, sediments and soil, we want to learn if triclosan-resistant microorganisms may directly contribute to the evolution of microorganisms resistant to antibiotics as well."

Welsch hopes his research will lead to improvements in treatments for infectious diseases, a growing concern with the increase in the number of antibiotic-resistant bacteria.

This spring, Welsch earned a Star Trainee grant from the K-INBRE. The Star Trainee program is designed to identify outstanding prospective biomedical researchers, who are supported with a $7,500 scholarship during their senior year. An additional $2,500 is allocated to the advisor/mentor.

Tanner Welsch, a junior in Biological Sciences at Fort Hays State University, gathers soil samples for his research on antibiotic-resistant bacteria.

"Tanner's work shows great promise," says Eric Gillock, PhD, Welsch's mentor at Fort Hays. "He brings an inquisitive mind and a passion for biomedical research to this effort, and we want to encourage him in his career."

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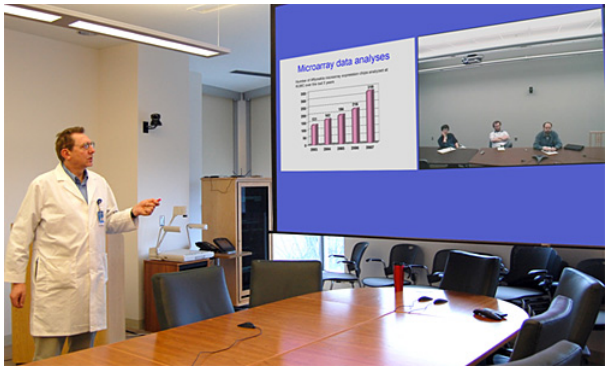
Good Connections

By Gerald Lushington, KU-L, Director of the Bioinformatics Core for the K-INBRE

It is important every once in a while to step back from what we're doing and remember that the "N" in INBRE stands for Network. Strategically located between the "I" that defines what the prevailing winds made us (i.e., IDeA states), and the "BRE" (Biomedical Research Excellence) to which we aspire, is the nexus, "N."

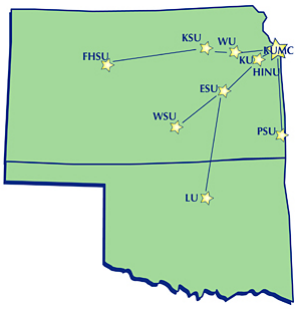
Unlike top Research I institutions, universities in IDeA states have little chance of amassing every resource and area of expertise required to address all of their researchers diverse interests. Regional networking among IDeA institutions, however, can foster the coordination of objectives and the assembly of multi-institutional consortia of complementary resources and expertise. If pursued diligently, such coordination can build the sort of powerful research environment that IDeA states have not traditionally enjoyed, and thus support the development of highly competitive proposals for the most lucrative research opportunities in the country.



Stan Svojanovsky (KUMC, left) answers questions from Gerry Lushington (KU-L, right in screen) about recent

Such transformations don't happen overnight, and we in K-INBRE are well aware of how far we have yet to go, but there is a confidence within our program that Kansas is a great place to attempt such a grand experiment. A strong history of collaboration already exists between the four main research intensive campuses in Kansas, and some natural non-redundant specializations have already taken place that distinguish the services and expertise at each school. In addition, our primarily undergraduate institutions are staffed by engaged and research savvy faculty who value the enhanced opportunities their students can have by interacting with larger universities. Finally, and perhaps most importantly, our cross-institutional interactions are uncommonly warm and collegial. Given this strong foundation, the K-INBRE program has sought to foster cross-campus communication in a variety of ways. For example, our annual symposium has always been very well attended (even under some very adverse weather conditions) and has initiated very productive cross-campus collaboration. Given this enthusiasm, most of us yearn for more than one meeting a year, but travel budgets are strapped and time is precious. Thus we have turned this past year, more seriously than ever before, to electronic communications.

Pioneers don't wait for four-lane highways



Our research culture embraces new technology, but often views videoconferencing with skepticism. For every idyllic television commercial of corporate executives conversing casually across three continents, there are many real-life meetings spent mostly on the cell phone to IT specialists addressing failed connections and random hissing static. We worry that those subtle features of our confocal laser scanning graphs might not come across as clearly as those trivial tricolor pie charts that decorate the TV ads. We fret about how many times we're going to have to repeat the phrase "phylogenetic parsimony" across the poor audio link. However, in Kansas the pioneer spirit lives on; pioneers don't wait for four-lane highways.

Building a backbone

Our journey with videoconferencing began in the early K-BRIN days with four TeleResearch stations situated in the bioinformatics satellite cores in the main partner institutions. In the past several years our backbone has become substantially more robust and widely interoperable with the purchase of high-end Polycom units courtesy of an earmark engineered by the office of U.S. Senator Pat Roberts for bioinformatics infrastructure and an NCRR supplement awarded to K-INBRE specifically for the purpose of extending an electronics collaborative system as broadly as possible across our network of institutions. As of early summer 2007, videoconference units had been installed at KUMC, KU-L, KSU, WSU, Washburn, Pittsburg State, Emporia State, Fort Hays State, and Langston. On July 19, the K-INBRE Bioinformatics Core held an online meeting to which campus representatives from all of the primarily undergraduate institutions were invited to attend electronically. In the meeting, it was proposed that we hold a regular online seminar/meeting series, occurring on an approximately monthly basis, and featuring bioinformatics-oriented lectures (i.e., new or emerging core capabilities, novel approaches, etc.) that would hopefully be of interest not just to K-INBRE Bioinformatics Core personnel, but also students and faculty at the primarily undergraduate institutions. Starting in the fall of 2007, this series became a reality. Highlights have included Li Jia speaking (10/2007) about the capabilities of the WSU Bioinformatics Core, Jianwen Fang discussing his work on protein-protein interaction prediction (11/2007), Gerry Lushington's and Aaron Smalter's tag-team talk (1/2008) on new algorithms in chemical biology, and

Stan Svojanovsky's presentation (3/2008) about KUMC Core resources. Sanjay Chellapilla of the KSU Bioinformatics Core led a discussion in April about tools for automated EST data analysis.

As with any dynamically evolving process, there have been problems and challenges. Meetings have been interrupted by connection and transmission problems. Presenters have had to adapt their slide content, font and color schemes to cater to mediocre resolution. Conversations have encountered the occasional awkward stumble as participants adjust to the split-second delay in audio transmissions. Nonetheless, thanks in large part to the heroic troubleshooting efforts of Doug Brownyard at KUMC, the technical environment and stability are continually improving. Our participants, both from the bioinformatics cores and primarily undergraduate institutions, remain committed to making this work. Useful discussions have emerged from the meetings and been propagated down the road toward prospective future collaborations.

Looking toward the future

With the electronic environment becoming smoother, our growing confidence in the technology is leading to more ambitious plans. A couple of years ago, Jim Miller (KU Electrical Engineering Computer Science Department, and an expert in scientific visualization and electronic communication) assembled a multidisciplinary team involving aeronautical engineers, biologists (including K-INBRE Bioinformatics Core personnel), chemists, computer scientists, geographers, and geologists divided approximately equally between KU and WSU for the purpose of developing a proposal for designing an immersive, high-resolution graphics environment that would augment traditional videoconferencing with interactive visual collaboration. The first two nodes in Lawrence and Wichita would enable researchers at each site to interact with graphical models at the other site as if they were on their own computer, and would add the benefit that stereoscopic projection could render complex images in three dimensions. The resulting NSF CISE proposal wasn't funded, but it has laid the foundation for future development plans. Additional plans have emerged to work toward integration of K-INBRE electronic collaboration resources with those of the renowned KU Telehealth and Telemedicine program and the KanREN electronic network infrastructure to form a state-wide collaborative network for research collaboration, remote physician-patient consultation, clinical trial coordination and other activities related to health care.

Such goals are unquestionably ambitious, but also feasible. The path may be a long one, but a commitment has emerged to bring the geographically dispersed people and research activities in Kansas all together into one virtual room to work together for a better future.

More Information:

For more information regarding the various programs discussed herein, please contact Gerry Lushington (glushington@ku.edu; 785-864-1140). K-INBRE network members or other interested parties who would like to be notified regarding the scheduling of upcoming electronic bioinformatics meetings are urged to contact Greg Matuszek (matuszek@ku.edu; 785-864-3528). Those interested in DVD recordings of meetings should contact Doug Brownyard (dbrownyard@kumc.edu; 913-588-5356). Finally, those researchers and collaborators within the K-INBRE network who are interested in using our videoconference equipment or connecting to a given site should contact the appropriate on-site contacts:

- Emporia State University: Kay Shireman; eshirema@emporia.edu
- Fort Hays State University: Ron Hart; rhart@fhsu.edu
- Langston University: K.J. Abraham; kjabraham@lunet.edu
- Kansas State University: Robert LeHew; rlehew@ksu.edu
- Pittsburg State University: Virginia Rider; vrider@pittstate.edu
- University of Kansas: Greg Matuszek; matuszek@ku.edu
- University of Kansas Medical Center: Doug Brownyard; brownyard@kumc.edu
- Washburn University: Janice Barton; janice.barton@washburn.edu
- Wichita State University: Li Jia; li.jia@wichita.edu

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Driving Force

Some said it couldn't be done. But just as the "Little Engine that Could" defied the odds, today more Kansas students are pursuing health sciences careers, and 10 campuses are linked through an interactive network to support biomedical research.

The engine fueling this transformative effort is the Kansas IDeA Network of Biomedical Research Excellence, K-INBRE, funded by the National Center for Research Resources at the NIH. And the time has come for its renewal.

"The K-INBRE helps us develop life sciences researchers in Kansas, foster communication among researchers throughout the state, recruit talented faculty, and attract increasing amounts of federal research dollars to Kansas," says Principal Investigator Joan Hunt, University Distinguished Professor at the University of Kansas Medical Center and Vice Chancellor for Biomedical Research Infrastructure. "These are tools for developing effective multidisciplinary teams that someday will discover some of the secrets of human health."

Working with her mentor, Tim Burnett, Emporia State University senior Aniesa Slack expanded her career options through the K-INBRE.

The Link
Participating universities in the K-INBRE network include the University of Kansas Medical Center, the University of Kansas - Lawrence, Kansas State University, Wichita State University, Emporia State University, Fort Hays State University, Haskell Indian Nations University, Pittsburg State University, Washburn University and Langston University in Langston, Oklahoma.

The K-INBRE's long-range objectives are based on these fundamental principles:

1. Continue to build on the established multi-disciplinary research network with a focus on Cell and Developmental Biology to strengthen biomedical research expertise and infrastructure;
2. Build and increase the research base and capacity by providing support to faculty, postdoctoral fellows and graduate students at the participating institutions;
3. Provide research opportunities for students from undergraduate institutions, community colleges and tribal colleges and serve as a pipeline for these students to continue in health research careers; and
4. Enhance science and technology knowledge of the state's work force.

The Pipeline
One of the successful outcomes of the K-INBRE initiative has been the increase in the number of students pursuing advanced degrees in biomedical-related programs.

"As an undergraduate, I had no idea what I could do with my career until I stumbled into the K-INBRE program," says Aniesa Slack of Emporia State University. "This program and the recent symposium have given me fantastic insight as to what direction to take."

According to S. Keith Chapes, director of the Undergraduate Support Core for the K-INBRE and professor in the Division of Biology at Kansas State University, the number of K-State biology majors pursuing advanced degrees in biomedical-related fields has reached 47.8 percent, nearly 3 times the national average, thanks, in part, to undergraduate research laboratory experiences funded by the K-INBRE.

The Value of Collaboration
Another major benefit of the K-INBRE funding has been the opportunity to create and expand bioinformatics capacity. Linked through an interactive network, researchers now can analyze massive amounts of information. Led by Gerald Lushington, director of the Bioinformatics Core for the K-INBRE and associate scientist in the Molecular Structure Group on the KU – Lawrence campus, this collaboration among both students and faculty fosters scientific discovery in ways never possible before such funding.

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To build on the successes of the current K-INBRE and to further strengthen the state's research capacity, the program is exploring these opportunities:

1. Further strengthen network communications and career pathways;
2. Promote an integrated systems biology approach within bioinformatics network; and
3. Incorporate training for translational research into the K-INBRE.

The RFA for the K-INBRE was received April 22 announcing the application deadline of July 22. The K-INBRE administrative team appreciates the efforts of those who have responded to the recent survey to document the outcomes of awards to faculty scholars, star trainees, summer scholars, recipients of major starter grants, as well as grants for recruitment packages, pilot and bridging programs, and core facilities.

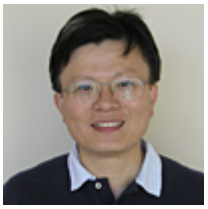
Standout Scientists Earn Funding

Springtime brings daffodils, tulips, redbud trees and another round of grant-making from the K-INBRE. Listed below are some of this year's recipients.

Major Starter Grants are awarded to new faculty with outstanding research proposals in the scientific focus of the K-INBRE: cell and developmental biology. An NIH grant submission is expected by the end of the 2.5 year award. After a competitive review, the K-INBRE Scientific Steering Committee has awarded major starter grants to investigators Ok Jin Kim of the University of Kansas – Lawrence, Dingbo Lin of Kansas State University, Bin Shuai of Wichita State University and Gaurav Chaturvedi of the University of Kansas Medical Center. Here is a brief summary of their studies:

Ok Jin Kim
Department of Pharmacology and Toxicology
University of Kansas - Lawrence
Cellular & functional characterization of dopamine receptor interacting proteins

These studies will provide a better understanding of D2DAR expression by ZIP1 and begin to elucidate how D2DAR is regulated by ZIP1. These findings would be important, because it would allow, for the first time, to provide a novel D2DAR interacting protein to regulate the expression of D2DAR in the dopaminergic neuronal cells and further dopaminergic neuronal development. These studies will contribute to an NIH proposal that will be investigating the underlying mechanisms of endocytic/trafficking of D2DAR and examining the role of ZIP1 in regulating D2DAR expression and function.



Dingbo Lin
Department of Biochemistry
Kansas State University
The role of gap junctions in oxidative neurodegeneration in cerebellum

This information will be used to develop potential methods for therapeutic delivery of C1B1 peptides or gap junction inhibitors to control the gap junctions and to prevent oxidative stress damage in the brain. Regulation of gap junctions is necessary for proper control of cell-to-cell communication. This data will be used to submit a grant proposal to NIH/NINDS to extend these studies.

Bin Shuai
Department of Biological Sciences
Wichita State University
Understanding the role of small RNAs in Arabidopsis pollen development

The objective of this research is to identify small RNAs expressed in four different developmental stages of Arabidopsis male gametophyte. This project will be an important step toward understanding the role of small RNAs in pollen development.

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Gaurav Chaturvedi
Department of Molecular and Integrative Physiology
University of Kansas Medical Center
Directed differentiation of human embryonic stem cells toward renal lineage

This grant will enable us to identify unique markers for detection of kidney specific cells and assist in the formulation of a synthetic media which could specifically direct the differentiation of human embryonic or adult stem cells toward kidney lineage, thus setting the stage for renal regeneration therapy.

Previous Major Starter Grant recipients are **Michael Johnson** of the University of Kansas – Lawrence and **Chris Thorpe** of Kansas State University. **David Davido** of KU - Lawrence and **Hiroshi Nishimune** of KU Medical Center successfully leveraged their Major Starter Grants for external funding.

The **Faculty Scholar** program was designed to retain outstanding mid-level faculty, who are often targets of recruiting efforts by other institutions. These Faculty Scholar awards comprise $10,000 in flexible funds for academic/scholarly expenses allowable by NIH, such as travel to scientific meetings, purchase of books and computers.

2008 recipients:

James Bann, Wichita State University
Jeffrey Burns, University of Kansas Medical Center
Bryan Copple, University of Kansas Medical Center
Sherry Fleming, Kansas State University
Jeffrey Krise, University of Kansas – Lawrence
Audrey Lamb, University of Kansas – Lawrence
Dennis O'Malley, Haskell Indian Nations University
Margaret Petroff, University of Kansas Medical Center
Quize Wei, Kansas State University
Thomas Wiese, Fort Hays State University

Pilot Grant and **Bridging Grant** proposals are reviewed by external reviewers, with the major criteria being the importance and strength of the science and the likelihood of developing successfully into an NIH-funded project.

2008 recipients:

Juan Bruses, University of Kansas Medical Center, Pilot and Bridging
Soumen Paul, University of Kansas Medical Center, Pilot
Dolores Takemoto, Kansas State University, Bridging
Larry Takemoto, Kansas State University, Bridging
Thu Nguyen, Kansas State University, Pilot
Michael Detamore, University of Kansas - Lawrence, Bridging
William Dentler, University of Kansas - Lawrence, Pilot

Core Facility grant proposals are evaluated in terms of importance to cell and developmental biology research initiatives.

David VanderVeld, University of Kansas – Lawrence
Acquisition of Data Analysis Capability for NMR-Based Metabolomics on Biofluids and Cell Extracts

Xinkum Wang, University of Kansas – Lawrence
Genomics Facility Upgrade for Whole-Genome Genotyping (PCR System/Tehrmal Cycler)

William Hendry, Wichita State University
Light Microscopy Upgrade for the Cell Imaging Core Facility

William Chen, University of Kansas – Lawrence
Transgenic & Knockout Mouse Facility Proposal

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Recruitment Packages are awarded to institutions to attract outstanding scientists to Kansas, with the goal of increasing competitiveness for NIH funds.

2008 recipients:

James Triplett, Pittsburg State University, to recruit Xiaolu Wu
Roy Jensen, University of Kansas Medical Center, to recruit Philippe Prochasson
Patricia Thomas, University of Kansas Medical Center, to recruit Nikki Cheng
Curtis Klaassen, University of Kansas Medical Center, to recruit Udayan Apte

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The K-INBRE **Star Trainee** program is designed to identify outstanding prospective biomedical researchers who intend to pursue graduate school. Identified in their senior year of undergraduate studies, students in this program are supported with a scholarship and an additional stipend for their mentors. When accepted into Kansas graduate school, the university graduate program will receive a $10,000 scholarship for the student's first year of graduate training.

2008 recipients:

Emily Walters, Pittsburg State University
Tanner Welsch, Fort Hays State University
Jennifer Booth, Wichita State University
Tyler Goetz, Washburn University

Summer Scholars are selected based on proposals submitted by outstanding undergraduates from any of the 10 K-INBRE campuses.

2008 recipients (as of May 14):

Emporia State University
Aniesa Stack
Anthony Westby
Elsie Haynes

Fort Hays State University
Sarah Rogers
Randi Welch

Haskell Indian Nations University
William Bennett

Kansas State University
Ryan Gallagher
Miguel Martinez
Heather Wilkins
Abraham Scott McCall

Langston University
Stacy Bean
Stephanie Wimberly

Pittsburg State University
Carrie McDowell
Emma Hayes
Kylie Quick
Nathan Woodward

University of Kansas – Lawrence
Philip Adam
Stephen Sai Folmsbee
Brandon Hidaka
Stephanie Hill

University of Kansas Medical Center
Katherine Jones
Eric Hamilton

Washburn University
Samson Smith
Michelle Cox
Scott Ashley

Wichita State University
Alisa Nola

What's Happening

Date(s)	Event
July 22, 2008	K-INBRE renewal application due
August 6 – 8, 2008	Biennial National IDeA symposium Washington, DC Wardman Park Marriott Hotel
January 17 and 18, 2009	K-INBRE Symposium Manhattan, Kan.

The current issue of K-INBRIEF is online at www.kumc.edu/kinbre/kinbrief