



UNIVERSITY OF WYOMING

# INBRE

IDeA Networks of Biomedical Research Excellence

Winter 2010

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## UW Announces Grant Renewal

The University of Wyoming has received a five year, \$16.959 million grant from the National Institutes of Health (NIH) to continue to expand the university's biomedical research capabilities. The award is for the continuation of the Wyoming IDeA Networks for Biomedical Excellence (INBRE) program. It is the largest single research award in the university's history.

The first INBRE award for \$13 million was received in 2004.

The new competitive renewal grant recognizes advances made by the institution and sound planning for continuing development of biomedical research, infrastructure, and education at UW and Wyoming's community colleges. Jun Ren, associate dean of research in the UW College of Health Sciences and professor of pharmacology, will be in charge of administering the grant. He will be assisted by program coordinator Scott Seville, associate dean of the UW Outreach School and associate professor of zoology and physiology, and associate program coordinator Heywood Sawyer, a research professor in the UW Department of Medical Education and Public Health.

The grant is from NIH's Institutional Development Award (IDeA) program. Established in 1993, the program's goal is to foster biomedical and behavioral research, and increase research capacity at institutes and institutions located in states with a historically small number of NIH grant awards, reflecting their low representation of research grant applications submitted to NIH each year.

IDeA grants are administered by the National Center for Research Resources, a component of NIH, and are designed to address the lack of adequate infrastructure and too few competitive investigators at institutions located in the currently eligible 23 states and Puerto Rico.

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## Ma's Research to Benefit Wyoming Families

Heng Ma, research scientist with the University of Wyoming, is no stranger to the investigation of cardiac function. He was trained on cardiovascular research at the Fourth Military Medical University in China before arriving at UW as a postdoctoral fellow in 2007. Within the last two years, Ma has published two articles in the *Journal of the American College of Cardiology* and the *Journal of Cellular and Molecular Medicine*. The focus of his research is on cardiac cellular function and the signaling mechanism of insulin resistance and diabetes.

This experience has served him well throughout his work at UW. Since joining Jun Ren's research group, Ma has been interested in projects that would directly benefit Wyoming and its citizens. Since Wyoming is an energy-producing state, he chose to research the effect of fossil fuel particulate matter on cardiac function, especially upon residents near and workers in the oil and mining industries.

"Wyoming is the leading energy-producing state in the U.S.," Ma explained. "with the highest level of per capita fossil fuel emissions, even though Wyoming is the least populated state."

With his research, Ma aims to detect the mechanisms of action behind particulate matter exposure-induced heart disease, and is trying to find a therapeutic rationale for air pollution-associated heart problems.

"Air pollution remains a serious threat to public health and the environment," said Ma. "The World Health Organization (WHO) estimates that air pollution is responsible for three million premature deaths each year.

This represents about 1.2 percent of total annual global deaths. I hope our research can potentially help prevent or treat cardiovascular disease in residents and workers in the energy industry," said Ma.

Ma and his assistants, research scientist Lu Yu and pharmacy graduate student Emily Byra, have discovered that exposure to air pollution is associated with significant increases in cardiovascular disease, as well as myocardial ischemia, heart failure, and metabolic syndrome. Currently, they are using this discovery to analyze environmental toxins and adverse metabolic conditions leading to endoplasmic reticulum (ER) stress. The team recently concluded that ER stress contributes to cardiomyocyte dysfunction. The next phase of their research will include the investigation of particulate matter's impact on the heart function at the organ level.

"INBRE has given me great support and training," added Ma. "We have a highly interactive and collaborative group, which provides me with an outstanding training environment. Dr. Ren has effectively guided my career development as an independent scientist."

Ma's research through INBRE support helped him obtain an American Heart Association (AHA) postdoctoral fellowship last July, which according to Ma was the only AHA fellowship awarded in Wyoming. He is hopeful to receive additional national and regional independent funding, including AHA and ADA new investigator grants. "INBRE has helped me to pursue my research, and acquire new research capacity," said Ma. "It has benefited my career development as an independent scientist."



Yu, Ma, and Byra



## UW Pilot Projects

Principal Investigator	Department	Project
Mark Gomelsky	Molecular Biology	Engineering red-light activated nucleotide cyclases
Paul E. Johnson	Physics and Astronomy	Rapid diagnosis of invasive Aspergillosis with fountain flow cell sorting of Bronchoalveolar lavage fluid followed by molecular species identification
Teresa Lehman	Chemistry	Structural studies of metallo-bleomycin complexes through NMR and molecular dynamics
Daniel Wall	Molecular Biology	Antibiotic drug discovery from myxobacteria
Arthur Zhu	Kinesiology and Health	Interlimb transfer of learning and electro stimulation of acupoints: Their respective and coupled effects on acquisition of the aimed ballistic motor skill
Meijun Zhu	Animal Sciences	Maternal obesity and development of Type I Diabetes in NOD mice offspring

### Grant Renewal *(continued from page 1)*

The \$16.9 million INBRE grant will fund continued development of the Wyoming INBRE program, which has the following goals:

- establish a multidisciplinary research network with scientific focus that will build and strengthen biomedical research at UW and its partner institutions;
- provide research support to faculty, postdoctoral fellows, and graduate students;
- create a “pipeline” for undergraduate students at UW and Wyoming community colleges to continue health research careers within IDeA states;
- provide outreach activities for UW students and the community colleges that are part of the university’s INBRE network;
- enhance science and technology knowledge of the state’s workforce; and
- expand Wyoming research opportunities across the western IDeA region.

The new INBRE will focus on two specific research areas: cardiovascular health and obesity and diabetes mellitus. Seven campus research projects lead by junior faculty will be funded initially focused on these health issues. These two thematic research areas are among the leading causes of morbidity, mortality and high health care costs in the United States, and are well within the scope of efforts for a healthy 21st century for Americans. Additional funding will be directed at pilot projects with potential for NIH or other extramural funding, and to researchers on Wyoming community college campuses to support biomedical research and educational opportunities for students on their campuses.

## Journal Club Expands Horizons

At Western Wyoming Community College (WWCC) in Rock Springs, principal investigator Bud Chew leads a unique Journal Club, where INBRE students and faculty members from various disciplines collaborate to discuss published papers on topics of interest.

WWCC faculty members John Liccardo (exercise science), Emma Chaput (public health), Dee Forrest (physiology), Sandy Mitchell (ecology), Rob Carey (plant genetics), and Tom Murosky (molecular toxicology) join Chew discussing advances in various areas of biomedical science with students.

“We choose one faculty member and one INBRE student to work together for each meeting, which usually happens every two weeks,” explained Chew. “The faculty



member helps the student choose a paper related to the faculty member’s expertise, that is then distributed to all involved. The student puts together a PowerPoint to keep the discussion focused, and leads the group.”

The student-led discussion of the chosen paper runs approximately two hours. This format provides for diverse learning opportunities in many scientific fields.

“Our goals are just to have some fun, and expand our intellectual horizons a bit,” said Chew. “I think we all enjoy the fact

that our discussions are often in areas that we know little about, except for our one expert faculty member.”

While all INBRE students at WWCC participate in the Journal Club, everyone is welcome to attend.

## INBRE Undergraduate Student Research Grant Award Recipients

### Mentor

David Liberles  
Milan Balaz  
John Willford

Chris Hall  
Mark Gomelsky  
Mark Stayton  
Donal Skinner

### Student

Mikayla Tisdale  
Murtaza Shabbir-Hussain  
Raymond Soto and  
Jacob Greenlee  
Choong Kim  
Joseph Reed  
Kevin Grauberger  
Jennifer Smith

### Department

Molecular Biology  
Chemistry  
Molecular Biology and  
Microbiology  
Mathematics  
Molecular Biology  
Molecular Biology  
Zoology and Physiology

## Outreach Video Conference Seminar Series

Each semester, UW INBRE sponsors a video seminar series, introducing UW researchers and campus visitors to Wyoming community colleges through the UW Outreach Videoconference Network. The technology allows INBRE communities throughout the state to participate in real-time seminars with experts in their fields. Past presenters include UW associate professor of kinesiology and health Derek Smith, UW assistant professor of family and consumer sciences and human nutrition Enette Larson-Meyer, and UW associate professor of molecular biology David Fay. Bud Chew, associate professor of biology at Western Wyoming Community College, will present in March 2010. Visit the INBRE Website at [www.uwyo.edu/inbre](http://www.uwyo.edu/inbre) for information and updates on scheduled seminars.

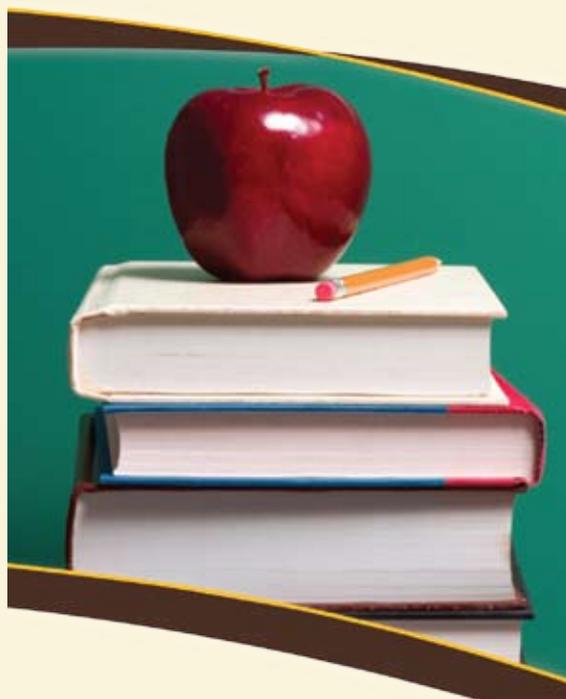
## INBRE Transition Course Program

Seven INBRE-supported undergraduate life science courses are now offered to individuals across Wyoming, allowing community college students the opportunity to earn credits toward a bachelor's degree in biomedical related programs before transferring to a four-year campus. Created through INBRE-1, these courses include general microbiology, genetics, evolutionary biology, principles of biochemistry, cell biology, microbial ecology, and HIV/AIDS: The epidemic and dilemma. As INBRE-2 gets underway, the focus will be enhancing existing courses through podcasting, videostreaming, and webconferencing. Additional courses will also be developed, including biostatistics, biomedical/research ethics, and informatics/computational biology.

## INBRE Offers Resources for K-12 Students, Teachers

UW INBRE is currently developing educational resources for students and teachers in grades 7-12. The goal of this enterprise is to promote biomedical sciences in the public schools, and build student interest in the various biomedical fields. Resources will be described and many directly available via the INBRE Website.

Resources on the Website will include informational videos linked to the sites of INBRE-supported researchers. The "You Tube-like" videos will describe the researchers' work, how they got where they are, and what their lives are like. The first video will feature Enette Larson-Meyer, assistant professor of family and consumer sciences at UW.



In addition, program developers are discussing the creation of summer workshops for middle and high school teachers, counselors, and students. These workshops will introduce biomedical techniques and topics to integrate into classroom educational units. Collaboration with another program, the UW Science Posse, is also being discussed to create biomedically-focused programs the Posse can offer to public school audiences across Wyoming.

For more information on these programs as they develop, visit the INBRE Website at [www.uwyo.edu/inbre](http://www.uwyo.edu/inbre), and proceed to "Teacher Resources".

## UNM Offers Summer Research Experience

The University of New Mexico in Albuquerque (UNM) will host the Undergraduate Pipeline Network (UPN) Program again this summer. Participating selected students will conduct clinical and translational research at a nationally recognized health sciences center; assist in the design, collection, processing, and analysis of scientific data; learn cutting-edge research techniques and use state-of-the-art technology; have the opportunity to present research at local and national meetings; and build credentials for graduate, medical, or other professional training. They may also earn up to \$5,000 while working in the program for up to 10 weeks.

In addition to working 30 paid hours per week, students will spend the remaining 10 hours per week in

training, participating in lab meetings, attending seminars, and shadowing various investigators. They will complete their summer program by giving an informal presentation on the research they conducted during their experience.

To meet the requests of prior participants, UNM has increased the internship length, the amount of funding earned, and the amount of students that will be accepted into the summer research experience.

Applications must be submitted by February 15. For more information, contact Biomedical Research Education Programs of UNM at [BREP@salud.unm.edu](mailto:BREP@salud.unm.edu) or (505) 272-1887. You may also visit their Website at <http://hsc.unm.edu/som/research/brep/pipeline.shtm>.

### Announcements

Check out these upcoming events:

- ✓ March 23 – 24  
**Mountain West CTSC/INBRE/COBRE Consortium Collaborative**  
Albuquerque, New Mexico
- ✓ March 25 – 26  
**New Mexico Bioinformatics Symposium (NMBIS)**  
The Inn at Loretto  
Downtown Santa Fe, New Mexico
- ✓ March 29  
**Wyoming INBRE External Advisory Committee Spring Conference**  
UW Coe Library, 5th Floor Conference Room  
Laramie, Wyoming
- ✓ April 24  
**Wyoming Undergraduate Research Day**  
Laramie, Wyoming
- ✓ June 15 – 18  
**NIH NISBRE Meeting**  
Bethesda, Maryland

## INBRE Secret of Smith's Success



Arik Smith, a post-graduate student at the University of Wyoming, will graduate with a master's degree in neuroscience this May, and will soon be working on his Ph.D. in neuroscience. As he applies to schools in California, Oregon, Massachusetts, and Colorado, he reminisces about his

sophomore year at Casper College, when he was first introduced to INBRE.

Smith began his research education while working in Scott Seville's laboratory at the University of Wyoming/Casper College (UW/CC) Center, where he examined parasitic protists in the genus *Eimeria*. Successfully differentiating morphologically similar species and creating phylogenies representing evolutionary relationships, Smith co-published his first work and began to foster a passion for research.

"Through the work in Seville's lab, I first became interested in research, and learned invaluable techniques such as PCR and cell cloning," recalled Smith.

After he transferred to UW in Laramie to complete his bachelor's degree in zoology and physiology, which he earned in 2008, Smith joined the research laboratory of Donal Skinner, and continues to assist on Skinner's reproductive neuroendocrinology research. In this lab, he is

examining the effects on the mammalian pituitary gland of chronically administering gonadotropin-releasing hormone (GnRH) agonists - drugs regularly used to contracept animals, and treat disease such as endometriosis and advanced prostate cancer. Smith and Skinner have shown that GnRH agonists drastically decrease the number of pituitary cells necessary to maintain reproductive function.

"Our data may explain, at least in part, the delayed return to normal reproductive function after discontinuing treatment with GnRH agonists, which can last up to two years," explained Smith. "I am planning to publish two papers regarding this work."

While working with Skinner, Smith was funded by the British Society for Neuroendocrinology to travel to the United Kingdom, where he worked with Jane Robinson, Ph.D. of the University of Glasgow Veterinary School. The project involved prenatal programming of the reproductive axis.

"The effects of prenatal androgens on the pituitary remain largely unstudied," added Smith. "So we examined how ovine gonadotropes changed in response to prenatal testosterone in ewes. We found that a specific cell population in the pituitary of androgenized ewes was significantly altered compared to controls. Perhaps, this alteration plays a role in the observed neuroendocrine dysfunction in adult ewes. This work helped me gain a deeper understanding of how gonadal hormones can vastly influence the developing neuroendocrine system."

A promising scientist who found success through INBRE, Smith is looking forward to a career in biomedical research. He hopes to work with the National Institutes of Health and eventually become a university professor.

## Who's Who

Principal Investigator: Jun Ren, M.D., Ph.D.

Program Coordinator/Outreach Core Director: R. Scott Seville, Ph.D.

Associate Program Coordinator: Heywood R. Sawyer, Ph.D.

Chair, Wyoming EPSCoR/IDEA: William A. Gern, Ph.D.

Bioinformatics Core Administrator: Rex E. Gantenbein, Ph.D.

Writer/Designer, INBRE Newsletter: Tammi Hanshaw



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