Front Line
news from the Department of Pharmacology and Experimental Neuroscience

Education
Training the next generation of scientists

An academic medical center is commonly thought of as being a medical school that trains health professionals – doctors, nurses, pharmacists and others. Among these students is a special group whose role goes well beyond that of being a student and whose distinct function is critical to the mission of research in an academic medical center.

In the first two years of training, Ph.D. students mainly focus on learning general knowledge about their chosen field; but for the majority of their training, they will learn the more important skill of how to gain new knowledge.

The first step in this process is to become intimately familiar with a highly specific area of scientific literature. Then, with the assistance of a faculty mentor, students use this information to develop new questions that need to be answered. At the same time, students also learn how to apply existing research methodologies (and occasionally develop new ones) to

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2010 Community Pride Honorees

For the past five years, the Department of Pharmacology and Experimental Neuroscience has honored members of the Omaha community for their behind-the-scenes support at an annual Community Pride in Neuroscience dinner.

Denny and Lisa Lewis are honored this year for their behind-the-scenes support of education.

In 2004, the Travis B. Lewis High School Scholar Program was established. Each summer two high school students are selected to participate in a ten-week internship program. Students get firsthand knowledge of neuroscience by working side-by-side with faculty, postdoctoral fellows and graduate students.

The award is Mr. and Mrs. Lewis’ way of thanking Dr. Howard Gendelman and his laboratory for the extraordinary experience their son, Travis, had at

see Community Pride pg 6
What an amazing year! The word “superb” likely falls short. If last year was yesterday, the past 18 years passed away in weeks. It was then we first dreamt of making the University of Nebraska Medical Center’s (UNMC) neurosciences program world class. Today, the dream is our reality.

The accomplishments reside not within a single department but span UNMC and beyond. Collective efforts joined nanotechnology, vaccines, mental health and viral biology with colleges, campuses and universities locally and internationally. Visits, lectures, students and collaborations with colleagues in Russia, China, Japan and India are a reality. Such a global enterprise seeks to someday reverse the most dreaded diseases of the mind.

Within UNMC, efforts are underway to develop nanomedicines for effective drug delivery to the brain and other body tissues. The drugs go specifically to sites of disease and offer greater outcomes with lowered toxicities.

Clinical diagnostics have moved from the laboratory bench to patients’ bedsides. Groundwork for vaccine trials in Parkinson’s disease is at our doorstep here in Omaha, Neb. Partnerships with private and university doctors and basic scientists afford our students and researchers new opportunities that were not imagined a few years ago.

In the past six years, we have grown substantially in research dollars. Today, we are in the top 10 of pharmacology departments’ funding. Wow! With four interactive program grants and scores of individual research initiatives, we have climbed the mountain. Achievements in basic and translational studies in virology, drug abuse, Alzheimer’s and Parkinson’s diseases, stem cell biology, nanomedicine, and notably HIV diseases abound.

This is not the work of a single person - it is our teamwork that truly sets us apart. Howard Fox, Shilpa Buch, Jialin Zheng, David McMillan, Kenneth Follett, Michael Boska, Alexander Kabanov, Courtney Fletcher and Susan Swindells are but a few who have achieved beyond what others thought possible.

Not to be undercut, our education program is on the move! Indeed, this is the theme of this issue. Looking back, we see reflections of a 12-year-old boy who today is a man. Travis Lewis, with a twinkle and promise in his eye, has grown to be a distinguished physician-scientist and a pillar of our own and broader communities. To this end, we salute Travis and his parents, Lisa and Denny Lewis for their leadership and vision and for what their support means to us all.

In closing, let us be mindful of the tasks that lie ahead. They are daunting. Yet, I look to our future with awe and am proud to share this journey. Thank you for your support.

Howard E. Gendelman, M.D.
Chair, Department of Pharmacology and Experimental Neuroscience
Larson Professor of Internal Medicine and Infectious Diseases
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their questions. These laboratory skills allow students to test their hypotheses and validate the scientific concepts that they are developing. In this manner, Ph.D. students push beyond previously known knowledge and generate new scientific understanding that is then made known to the world. The faculty mentor and student work closely to develop the skills necessary to conceptually work with the scientific literature and to develop the skill set to generate and interpret scientific results. Thus, the art of Ph.D. training is to successfully combine theory with the real-world practice of generating raw experimental results.

While an obvious purpose of Ph.D. training is to provide the next generation of biomedical scientists, Ph.D. students have an additional, immediate contribution to make in an academic medical center - their roles as critical players on cutting-edge research teams.

Biomedical science is vast, complex and constantly evolving. In this environment, research problems are better addressed by teams rather than by individual scientists. Ph.D. students are important because they motivate laboratories to explore unfamiliar scientific literature to create new ideas, and they challenge laboratories to develop novel techniques. It is this infusion of new ideas and techniques that is the life-blood of a research laboratory in a constantly changing and competitive research world.

During this process, the mentor-student relationship often rapidly evolves into more of a mentor-colleague one. Indeed, it is part of a successful student's role to challenge his/her mentor's scientific positions just as the mentor oversees the thinking and technical work of the student. From this "apprenticeship" relationship, a colleague emerges that improves the research program and accelerates the advancement of science.

Graduate student training is essential to the vitality of an academic medical center and can be very rewarding for both the student and the mentor.

Postdoctoral Training

The time after graduating with a Ph.D. and/or M.D. is crucial to becoming an independent scientist in an academic center or a pharmaceutical company.

Postdoctoral training offers individuals additional time to acquire expertise and experience under the direction of a faculty mentor. Training involves staying up to date on literature, developing a new research direction and sequential experiments for the project, interpreting research findings, preparing manuscripts, writing grants and giving scientific presentations nationally and internationally.

The Department of Pharmacology and Experimental Neuroscience has a strong postdoctoral training program. After 3-4 years of training, many postdoctoral fellows go on to other institutions to further their careers, while others stay with the department and advance to become instructors, assistant, associate and full professors (see Promotion and Tenure pg 7).
When the Department of Pharmacology joined with the Center for Neurovirology and Neurodegenerative Diseases in 2004, Ph.D. students at UNMC had a new and exciting graduate program in which to receive their research training.

This merger, between a traditional pharmacology department and a neurosciences research center, broadened the scope of the department’s research enterprise and created a unique identity that distinguishes our program from others around the country.

More importantly, the re-named Department of Pharmacology and Experimental Neuroscience, or PEN for short, could now bring scientists with different backgrounds together to work towards two related goals: developing novel approaches to understanding and treating neurodegenerative diseases, and producing the next generation of pharmacology-oriented neuroscientists who will discover the medicines that will one day cure these diseases.

As chair of the department, Dr. Howard Gendelman’s laboratory epitomizes the concept underlying the PEN merger. Already a highly regarded infectious diseases physician/scientist, Dr. Gendelman incorporated his research program the emerging field of nanomedicine; and thus, the new discipline of neuroimmune pharmacology was born.

As this enterprise grew and achieved critical mass both within and outside of UNMC, scientists became successful in their own right, and these “scientific offspring” began to train their own graduate students.

Now that the discipline of neuroimmune pharmacology has matured, students who matriculate into this UNMC doctoral program can draw on a variety of resources that contribute to their education including an impressively detailed textbook, a high-impact journal and a professional organization, the Society on NeuroImmune Pharmacology.

The Big Picture - Educating Biomedical Professionals at UNMC

Teaching in an academic medical center entails two very different kinds of teaching, each targeted to very different student audiences in preparation for very different careers.

“Professional education” or teaching “professional students” are terms often used to describe the teaching of students in medical, pharmacy, nursing, dental and allied health “professions.” These students will go on to deliver health care to the community.

In contrast, “graduate education” is the term used for the training of students seeking degrees that will prepare them for careers in biomedical research.

The training of medical and other professional students generally involves two years of basic science training to understand normal structure and function of the human body, how those processes are altered in disease, and how those diseases can be treated with drugs. This is followed by two years of clinical training to learn to apply this basic science knowledge to real patients with real diseases.

To work at UNMC who have continued to broaden the scope of the department’s activities. Drs. Howard Fox and Shilpa Buch are two of the most recent additions to the department. Their strong research programs add to the list of laboratories students can choose from to perform their dissertation research projects.

These achievements are remarkable because as the direction of our department has changed to emphasize its pursuit of opportunities in neuroscience, our approach to pharmacology and the training of graduate students remains truly interdisciplinary.

In addition to neuroscience, PEN faculty also train students to perform research in diverse areas such as drug receptors, cardiovascular pharmacology and proteomics.

With all the bases covered, Nebraskans can be proud of the unique and special educational graduate training offered in the department.
Students come to the department to train in established research areas or to bring their own ideas to the laboratory.

Not all ideas are successful, but that doesn’t mean the idea was a failure. In fact, a failed idea might be the first step toward finding the right answers to a debilitating disease.

Case in point – In 1999 M.D., Ph.D. student Eric Benner approached Dr. Howard Gendelman about working in his laboratory. Eric had an idea for a Parkinson’s disease vaccine – an area not in Dr. Gendelman’s research plans.

With no federal funding available but an enthusiastic student, Dr. Gendelman found community support for the project.

The original project failed, BUT answers were found that have now moved to a Parkinson’s disease vaccine clinical study. The first study started in 2009 at the University of Alabama at Birmingham under the direction of David Standaert, M.D., Ph.D., and support from UAB graduate students, including Travis Lewis (see Community Pride page 1). The second is under the direction of Pamela Santamaria, M.D., here at The Nebraska Medical Center.

Eric Benner graduated in 2005 and is a Neonatology Fellow at Duke University, Durham, N.C.

Students come and students go – go on, with the support of mentors and the community, to become the next generation of scientists.

Graduates from the past five years - where they are now.

Edward Arvisais, Ph.D.
Postdoctoral Fellow
Pharmaceutical Science
UNMC

Sugato Banerjee, Ph.D.
Postdoctoral Fellow
Neuroscience
University of California, San Diego
San Diego, Calif.

LeDon Bean, Ph.D.
Assistant Professor, Biology
Dillard University
New Orleans, La.

Eric Benner, M.D., Ph.D.
Fellow, Neonatology
Duke University
Durham, N.C.

Jeffrey Boyle, M.D., Ph.D.
Resident, Neurology
University of Iowa Health Care
Iowa City, Iowa

Crystal Cordes, Ph.D.
Postdoctoral Fellow, Surgery
Veterans Administration Health Care
Omaha, Neb.

Dawn Eggert, Ph.D.
Staff Fellow
U.S. Department of Agriculture
Athens, Ga.

Nathan Erdmann, M.D., Ph.D.
Resident, Internal Medicine
University of Alabama
Birmingham, Ala.

Vivek Gautam, Ph.D.
Research Fellow, Neurology
Harvard University
Cambridge, Mass.

Yunlong Huang, Ph.D.
Instructor
Pharmacology and Experimental Neuroscience
UNMC

Irena Kadiu, Ph.D.
Research Associate
Pharmacology and Experimental Neuroscience
UNMC

Karen Kassel, Ph.D.
Postdoctoral Fellow
Pharmacology
University of North Carolina
Chapel Hill, N.C.

Megan Kozisek, Ph.D.
MDS Pharma Services
Lincoln, Neb.

Toni Luke, Ph.D.
MDS Pharma Services
Lincoln, Neb.

Jessica Mercer, Ph.D.
Editorial Grants Associate
UNMC

Megan Montgomery, Ph.D.
Postdoctoral Fellow
Cardiology
University of California, San Francisco
San Francisco, Calif.

Abbey Reed, Ph.D.
Medical Student
UNMC

Ashley Reynolds, Ph.D.
Medical Student
UNMC

Lynn Roy, Ph.D.
Intern
Novartis, Basel, Switzerland

Nicholas Whitney, Ph.D.
Postdoctoral Fellow
Chemical and Biomolecular Engineering
University of Nebraska-Lincoln
Lincoln, Neb.

Johnny Xu, Ph.D.
Postdoctoral Fellow
Salk Institute
San Diego, Calif.
UNMC when he was in high school. Travis interned with Dr. Gendelman not only in high school but also during summer breaks while a student at Washington University in St. Louis, Mo. He joined the lab as a technician after graduation. Currently, Travis is an M.D., Ph.D. student at the University of Alabama at Birmingham, studying Parkinson's disease.

Mr. and Mrs. Lewis wanted other high school students to have the same opportunity as Travis. Mr. Lewis said, "We never cease to be amazed at the intellect and ability to grasp scientific research exhibited by the students." Mrs. Lewis added, "Their skill in being able to translate the laboratory work they did into cogent and interesting presentations is remarkable. The scientists are so generous with their time and talent in working with these young people."

Their support has given 13 students the opportunity to get a firsthand look at doing basic science research. The program has become very competitive. Preference is given to students in the Cornhusker State but applications are received from around the country. "We are delighted to provide a jump-start to future scientists and physicians with this educational program," said Mr. and Mrs. Lewis.

The Lewis support didn’t stop with high school students. Over the years, they heard many teachers and principals praise the student program and ask about opportunities for teachers. Beginning in 2011, there will be two Travis B. Lewis High School Programs – one for students and one for teachers.

Along with the Lewis’, William Mobley, M.D., Ph.D., professor and chair, Department of Neurosciences, University of California, San Diego, is honored for his contributions to neuroscience. A native of Nebraska, he is considered one of the most outstanding academic neurologists in the nation.

“\textbf{We are delighted to provide a jump-start to future scientists and physicians with this educational program.}”

\textit{Denny and Lisa Lewis}

**Travis B. Lewis High School Scholar Awardees - Where they are now**

**2005**
Alisha O’Malley - UNMC Medical School
Lance Villeneuve - UNMC Graduate Student

**2006**
Francis VanWetering IV - College of William and Mary
Isha Labhasetwar - Iowa State University

**2007**
Ben Robbins - Yale University
Sidra Akhter - Creighton University

**2008**
Allyson Lamb - University of Nebraska - Lincoln
Abigail Schweitzer - University of Nebraska - Lincoln

**2009**
Mohammed Ali - University of Chicago
Alexandra Tran - University of Pennsylvania

**2010**
Joshua Temple - Millard North High School
Alexander Wynn - Creighton University
Yan Zhang - Millard West High School

For donor information, contact the University of Nebraska Foundation at 402-502-0300; http://www.nufoundation.org.
The UNMC High School Alliance is a partnership between the University of Nebraska Medical Center (UNMC) and school districts in the greater Omaha area, designed to offer unique and innovative science classes to high school juniors and seniors. The program is partially funded through the generosity of The Sherwood Foundation.

Beginning in the 2010-2011 academic school year, students can select classes that are not available in the traditional high school setting. These accredited classes will be taught in partnership by UNMC faculty and a certified high school teacher on the UNMC campus.

The alliance will provide students with the opportunity to observe, shadow and work alongside world renowned health care professionals and researchers at UNMC. All students interested in pursuing a career in health care should strongly consider applying to the UNMC Alliance. Most classes will be eligible for dual enrollment through the University of Nebraska at Omaha (UNO).

Course offerings for the 2010-2011 year include Biomedical Research I & II, Bioscience Innovations I & II, Exploration of Human Anatomy, Healthcare Careers Exploration, and Medical Decision Making. Read more on-line at http://www.unmc.edu/alliance

**Promotion and Tenure**

Yunlong Huang, Ph.D., Instructor
Changhai Tian, Ph.D., Instructor
Gurudutt Pendyala, Ph.D., Instructor
Chun-Hong Shao, Ph.D., Instructor
Hui Peng, M.D., Assistant Professor
David McMillan, Ph.D., Associate Professor (Tenure)
Huangui Xiong, M.D., Ph.D., Professor

**Awards**

**Distinguished Scientists**
Howard Fox, M.D., Ph.D.
Tsuneya Ikezu, M.D., Ph.D.

**Society on NeuroImmune Pharmacology**

**Young Investigator Travel Award**
Benjamin Reiner (Huangui Xiong, M.D., Ph.D., mentor)
David Stone (Howard E. Gendelman, M.D., mentor)

**8th HUPO World Congress**

**Young Investigator Travel Award**
Gurudutt Pendyala, Ph.D. (Howard Fox, M.D., Ph.D., mentor)

**Bernice & Norman Harris Graduate Student Alzheimer’s & Lewy Body Research Fellowship**
Agnes Constantino (Jialin Zheng, M.D., mentor)
Xiuyan Huang (Howard E. Gendelman, M.D., mentor)
Aaron Mercer (Wallace Thoreson, Ph.D., mentor)
Benjamin Reiner (Huangui Xiong, M.D., Ph.D., mentor)
David Stone (Howard E. Gendelman, M.D., mentor)

**Silver ‘U’**
Yunlong Huang
Na Ly
Jayme Wiederin

**Graduates**

Lynn Roy, Ph.D.
Intern
Novartis, Basel, Switzerland

Nicholas Whitney, Ph.D.
Postdoctoral Fellow
University of Nebraska - Lincoln

Johnny Xu, Ph.D.
Postdoctoral Fellow
Salk Institute, San Diego, Calif.
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Department of Pharmacology and Experimental Neuroscience
2010 Graduate Students