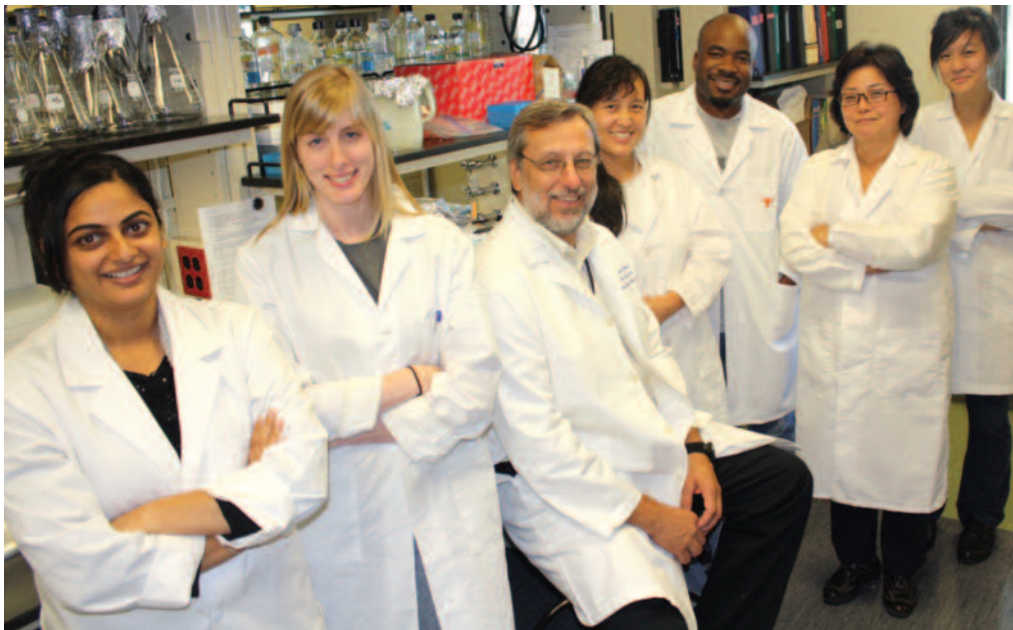


 COLLEGE of PHARMACY
THE UNIVERSITY OF TEXAS AT AUSTIN

FACULTY RESEARCH INITIATIVES



WHAT STARTS HERE CHANGES THE WORLD



 COLLEGE *of*
PHARMACY
THE UNIVERSITY OF TEXAS AT AUSTIN

M. Lynn Crismon, Dean
Carlton K. Erickson, Associate Dean for Research and Graduate Studies
Susan Brown, Assistant Dean for Development

NEW CHALLENGES

NEW PARTNERSHIPS

Thanks to the discoveries of earlier research scientists, many diseases that plagued our ancestors have been eradicated. We stand as the beneficiaries of these efforts. Yet today, other diseases and pathogens continue to threaten our health and well being. Discovery's journey is long and costly. To realize success, contemporary researchers rely upon financial collaborations with individuals and organizations that share a similar vision – a better world for us and for generations to come. I invite you to partner with us. Together, you and The University of Texas at Austin College of Pharmacy can turn dreams to reality and realize a healthier world for all of us. What starts here changes the world.



M. Lynn Crismon
Dean

NEW INITIATIVES

Thinking outside the box may be a cliché, but it's a process that has led to remarkable discoveries. From finding useful applications for bacteria to turning the resilient cold virus into a useful transport for drug therapies, innovative solutions often are found when viewing old problems in new light. Faculty researchers at The University of Texas at Austin College of Pharmacy stand outside the traditional realms tapping their own unique perspective to see opportunity in challenge and potential in problems. Whether their field is cancer, substance addiction, hypertension or Ebola, these scientists stand poised at the cutting edge of discoveries that will turn elusive answers into effective treatments. I invite you to read about their initiatives and to join them in their work that holds new promise.



Carlton K. Erickson
Associate Dean
for Research and
Graduate Studies

MEDICINAL CHEMISTRY DIVISION

Kevin Dalby, Ph.D.

- Chemistry – anticancer drug development
- Biochemistry – mechanisms of regulation of signaling enzymes
- Cell biology – signaling pathways that promote cancer



OUTSMARTING MOTHER NATURE

It's not nice to fool Mother Nature, but Dr. Hung-Wen (Ben) Liu has been trying to do just that for more than 20 years. Shortly after drug companies started mass-producing penicillin in 1943, microbes that could resist it began surfacing. Finding an antibiotic that can fight these super bacteria has become so crucial to public health that the officials at national and world health centers are calling upon scientists and funding organizations to take the threat seriously.

In their medicinal chemistry laboratory, Liu and his team of graduate and postdoctoral students configure and replicate Mother Nature's models trying to develop weapons to use against antibiotic-resistant bacteria. The team is attempting to generate new antibiotics by genetically altering the original antibiotic-producing bacteria strain, thereby creating a library of novel chemical entities.

"Antibiotics save lives, but we have taken them for granted. Decades of misuse and overuse have led to many new strains of resistant bacteria – leaving the general population unprotected in some cases. If current medicine cannot kill bacteria – we're back to the Dark Ages," Liu said.

In their strategy to develop new antibiotics, Liu and his team try to modify the sugar component of existing antibiotics. The major thrust of the research lies at the crossroads of chemistry and biology—the interdisciplinary work involving areas of pharmacy as well as molecular biology, chemistry and biochemistry.

Liu is trying to develop methods for creating large numbers of active antibiotic derivatives quickly and easily in order to build an arsenal of new weapons against antibiotic resistant bacterial pathogens before they are actually needed.

Walter Fast, Ph.D.

- Enzyme mechanisms, anticancer and antibiotic drug discovery
- Studies of enzymes that regulate nitric oxide production
- Studies of enzymes that block bacterial quorum sensing
- Studies of enzymes that promote antibacterial resistance



Sean Kerwin, Ph.D.

- Design and synthesis of DNA- and protein-binding agents and molecular probes
- Synthetic and mechanistic studies of alkyne cyclization reactions
- Natural product synthesis and biological studies
- Anticancer drug discovery



Seongmin Lee, Ph.D.

- Molecular mechanisms underlying genome/epigenome management
- Design and development of novel epigenetic chemotherapeutics



Hung-wen (Ben) Liu, Ph.D.

- Mechanistic studies of novel enzyme reactions
- Biosynthesis of natural products
- Metabolic pathway engineering
- Design and synthesis of enzyme inhibitors
- Studies of ADP-ribosylation of proteins



Christian Whitman, Ph.D.

- Evolution of enzymes and enzymatic activities
- Biosynthesis of pyrrolo[1,4] benzodiazepine natural products



PHARMACEUTICS DIVISION

Maria Croyle, Ph.D.

- Methods to hide/mask recombinant viral vectors from the immune system
- How viral infections alter hepatic and renal drug metabolism
- Development of large-scale production methods of viral vectors for vaccines and gene therapy
- Formulations to enhance the stability of viral vectors
- In vitro/in vivo testing of novel formulations/delivery/methods to enhance gene expression



Zhengrong (Rong) Cui, Ph.D.

- Nanoparticles for vaccine and anti-cancer drug delivery
- Non-invasive immunization onto the skin
- Cancer chemo-immunotherapy



Jason McConville, Ph.D.

- Nanotechnology for diabetes management
- Controlled release antibiotics for inhalation
- Gastric retentive dosage delivery
- Oral delivery of vaccines
- Performance verification testing for inhaled pharmaceuticals



James McGinity, Ph.D.

- Physical and chemical properties of drugs and other adjuvants used in pharmaceutical dosage forms
- Controlled release technologies
- Polymeric drug delivery systems



Hugh Smyth, Ph.D.

- Pulmonary drug delivery
- Biomedical devices
- Nanoparticle drug delivery
- Lung cancer, cystic fibrosis, asthma, COPD, RNAi
- Drug delivery in infectious disease, biofilms



Salomon A. Stavchansky, Ph.D.

- Principles of biopharmaceutics, pharmacokinetics and drug metabolism to evaluate and design drug delivery system to ensure the safety and efficacy of drug products
- Bioequivalence of generic drug products and follow-on protein pharmaceuticals
- Bioequivalence of highly variable drugs and complex drug products
- Delivery of drugs through nanostructures platforms
- Permeability, solubility and molecular descriptors to predict drug absorption
- Reduction of ischemia/reperfusion injury by caffeic acid phenethyl amide derivatives
- Implication of heme oxygenase-1 and transcriptional changes.



Janet C. Walkow, Ph.D.

- Drug development
- Preclinical studies
- Good Laboratory Practices (GLP)
- Bioscience education tools
- Wet lab incubators



Robert O. Williams III, Ph.D.

- Formulation, development, optimization and delivery of small organic compounds, peptides and proteins by a variety of technologies including depot drug delivery, oral drug delivery and pulmonary/nasal drug delivery
- Developing nanoparticle technology for aerosol inhaler, oral and parenteral drug delivery



PHARMACOLOGY/TOXICOLOGY DIVISION

Shawn Bratton, Ph.D.

- Mechanisms of apoptosis, also known as programmed cell death or cell suicide



John DiGiovanni, Ph.D.

- Cancer development
- Identifying novel cancer targets, mechanisms and strategies for cancer prevention
- Gene-environmental interactions regarding cancer
- Obesity and cancer, particularly childhood cancers



MERIT Award

Dr. Rueben Gonzales, professor of pharmacology and toxicology, has been awarded a \$2.8 million Method to Extend Research in Time (MERIT) grant from the National Institute on Alcohol Abuse and Alcoholism.

Gonzales' research investigates the chemical changes in the brain that underlie alcohol drinking. Of particular interest is the role of dopamine, a chemical produced in the brain that relays, amplifies or modulates signals between a neuron and another cell. The research entails a combination of behavioral and chemical techniques.

Dopamine is known to be associated with behaviors that bring pleasure such as those triggered by drinking. His lab works to determine exactly when and where in the brain the dopamine response occurs. This data will help determine the role of dopamine in the development of addictive behaviors. Current studies include the role of the mu opiate receptor and the dopamine D2 receptor in the regulation of dopamine release by ethanol. Basic knowledge of how brain chemicals change in response to alcohol may help to develop treatments.

"We know that dopamine does play a role in the urge to drink," he said. "What we're trying to determine in our lab is exactly when the dopamine response occurs. That will help answer the basic question of how the dopamine response may guide the individual to select drinking over other behaviors."

Christine Duvauchelle, Ph.D.

- Behavioral and neurochemical approaches to the study of the brain's reward circuitry and how this pathway relates to drug addiction
- Cocaine-induced enhancement of environmental learning, particularly in relation to drug relapse processes
- Neurochemical, physiological and behavioral effects of Ecstasy



Rueben Gonzales, Ph.D.

- Neurochemical basis for ethanol drinking behavior
- Effects of ethanol on basic dopaminergic neuronal activity in vivo
- Involvement of dopamine and glutamate in ethanol self-administration behavior



Andrea Gore, Ph.D.

- Reproductive neuroendocrinology
- Mechanisms by which the brain controls reproductive function including mating behaviors
- How the brain may play a role in controlling the timing of menopause



Edward Mills, Ph.D.

- Regulation of normal mitochondrial metabolism and metabolic physiology
- Signaling mechanisms linking mitochondrial dysfunction to age-related metabolic diseases
- Development of mitochondrially-targeted therapies for the prevention and treatment of obesity, type II diabetes, and cancer



Richard Morrisett, Ph.D.

- Role of neurotransmitter systems and synaptic transmission in alterations that underlie a variety of neural functioning and pathologies
- Alcohol-related disorders
- Learning and memory
- Neuronal development
- Development of epilepsy



John Richburg, Ph.D.

- Molecular and cellular mechanisms that initiate testicular germ cells to undergo apoptosis after injury by environmental or chemotherapeutic agents



Carla Van Den Berg, Pharm.D.

- Growth factor signaling in breast cancer
- Intracellular kinases in breast cancer metastasis using mouse models
- Normal mouse mammary gland development
- Mouse models for anti-cancer drug development



Karen Vasquez, Ph.D.

- Mechanisms of genomic instability
- DNA damage and mechanisms of repair
- Role of DNA structure in human disease, focused on cancer-relevant chromosomal translocations
- Development of novel therapeutic strategies for treating cancer



Casey Wright, Ph.D.

- Inflammatory signaling pathways in cancers of the immune system with emphasis on the activity of the pleiotropic transcription factor nuclear factor- κ B
- Identification of the complex molecular mechanisms regulating the NF- κ B signaling module, providing insights for the development of therapeutics to treat NF- κ B-related disease
- Role of NF- κ B in immune disease development and/or progression arising from environmental toxin exposure



Cures for Kids

A multi-disciplinary group of university researchers from the Colleges of Pharmacy and Natural Sciences is joining forces to tackle health challenges specific to children. The researchers, located at the Dell Pediatric Institute (DPRI) work to address childhood obesity, cancer, diabetes, birth defects, brain injury, epilepsy and autism.

Research at DPRI is directly linked to treatment. University researchers collaborate with doctors and other practitioners from Dell Children's Medical Center to translate study findings into medical products, prevention programs and treatments for children.

One of the greatest childhood health problems is the high prevalence of obesity and obesity-related diseases, including coronary heart disease, diabetes, stroke, hypertension, gallbladder disease, chronic respiratory disease and many cancers. Drs. John DiGiovanni and Stephen Hursting study the impact of obesity on cancer development and progression, including obesity that occurs early in life.

Over the past 25 years, the number of Texas children and adolescents who are overweight or obese has more than quadrupled, with nearly 25 percent of elementary, middle school and high school students overweight, and

another 20 percent at high risk of becoming overweight.

The epidemic is occurring in girls and boys, across all socioeconomic lines and among all racial and ethnic groups.

"Obesity in children has risen dramatically in recent years, and the growing epidemic is alarming," said DiGiovanni. "Obesity in both adults and children increases the risk of cancer as well as severity of the disease for a number of important cancers."

Cancer is a disease involving gene-environmental interactions and, therefore, understanding environmental influences as well as genetic factors is key to developing the most effective strategies for preventing cancer, said the researchers.

"Understanding the early cellular, biochemical and molecular changes that transform normal cells into cancer cells is essential if we are to eventually eradicate cancer as a major human disease," DiGiovanni said.

"Our goal is to identify targets for breaking the obesity-cancer connection," he said. "We recognize that not everyone can run five miles a day or have a drastic change in diet. But if we can identify those molecular targets that are important we can use that information to disrupt the link between cancer and obesity."

PHARMACOTHERAPY DIVISION

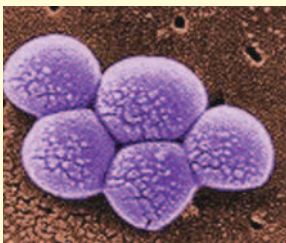
David Burgess, Pharm.D.

- Pharmacokinetics, pharmacodynamics and pharmacogenomics of antibacterial agents
- Epidemiology, resistance, treatment and outcomes of multidrug resistant gram-negative bacteria
- Antimicrobial stewardship and healthcare associated infections



DOING BATTLE WITH SUPER BUGS

Overuse of antibiotics has led to the emergence of new generations of bacteria that are resilient to traditional treatments.



Known as “super bugs” these new strains are upping the stakes in the battle against germs. The most common of these antibiotic-resistant germs is methicillin-resistant *Staphylococcus aureus* (MRSA) or “Staph.” The presence of MRSA can turn a scratch or scap into a potentially fatal condition, and public media reports of these stories have parents and physicians rethinking how to protect against these infections.

The number of MRSA skin infections has continued to rise, particularly among children. Dr. Christopher Frei is working to understand why. Traditional MRSA risk factors include long-term hospital stays, previous antibiotic exposure, surgical procedures, underlying chronic disease, and installation of devices such as catheters, heart valves, shunts and artificial joints.

The new “community-acquired” MRSA can infect patients who lack these traditional risk factors. Frei recently led an investigation of approximately 5,900 patients younger than age 18 who had been discharged from U.S. hospitals with a skin infection diagnosis between 1996 and 2005. Researchers observed that almost one in five were diagnosed with Staph infections while 7% were diagnosed with MRSA. A dramatic increase in the number of infections was seen over the study period, with a 20% increase in Staph diagnosis and a 17% increase in MRSA.

Henry Bussey, Pharm.D.

- Outpatient cardiovascular therapeutics with emphasis on anticoagulation management including INR self-testing with automated online monitoring and management.
- Other recently completed studies include outpatient treatment of hyperlipidemia, diabetes, hypertension, and acute coronary syndrome.
- Quality of care, reducing health care costs, improving efficiency of management of chronic diseases.



Christopher Frei, Pharm.D.

- Epidemiology
- Health outcomes
- Community-based research
- Infectious diseases



Jim Koeller, M.S.

- Economic analysis of cancer care
- Cancer pathway development and economic assessment
- Cancer outcome measures creation and evaluation



Robert Talbert, Pharm.D.

- Clinical trial research in stroke prevention
- Application of nanoparticle technology to improve the absorption of poorly water soluble drugs for a variety of conditions



Nathan Wiederhold, Pharm.D.

- Medical mycology including the study of different fungal pathogens and response pathways to better understand how these organisms adapt to antifungal exposure
- Evaluation of different diagnostic and treatment strategies to minimize the toxicity and maximize the effectiveness of antifungal therapy
- In vitro and in vivo assessment of investigational antifungal agents



PHARMACY ADMINISTRATION DIVISION

Jamie Barner, Ph.D.

- Economics of pharmacy services and health care services
- Medication adherence
- Social behavioral aspects of patients and health care providers as related to health care utilization



Carolyn Brown, Ph.D.

- Cultural and social elements that impact both quality of care and outcomes
- Consumer/patient decision-making related to medication adherence and use of complementary and alternative medicine



Kenneth Lawson, Ph.D.

- Economics of pharmacy and other health care services
- Health care systems



Karen Rascati, Ph.D.

- Economics of pharmacy services
- Outcomes evaluation for disease states
- Pharmacoeconomics



Marvin Shepherd, Ph.D.

- Importation of pharmaceuticals
- Pharmaceutical marketing
- Managed care pharmacy
- Economics of pharmacy services
- Pharmacoeconomics
- Counterfeit medications and prescription drug diversion and theft



She Wrote the Textbook

Dr. Karen Rascati, professor of pharmacy administration, has been named a runner-up in the Robert W. Hamilton Book Award competition sponsored by the University Co-operative Society.

Rascati's book, "Essentials of Pharmacoeconomics," provides a straightforward explanation of the essential factors of the economics of pharmacy practice. It defines terminology used in research and covers the application of economic-based evaluation methods to pharmaceutical products and services. The book, published by Lippincott Williams and Wilkins, was recently translated into Portuguese.

Rascati's book was selected from more than 100 books nominated for this award. The awards program honors Robert W. Hamilton, a retired professor of law at The University of Texas at Austin and a former chairperson of the Co-op. The Co-op joined with UT Austin to establish the awards program in 1997 to recognize leading authors and researchers at the university. The program is considered one of the most prestigious author awards at the university.

The term "pharmacoeconomics" first appeared in the literature in the mid-1980's. It incorporates methods from more established disciplines to help estimate the value of pharmacy products and services by comparing costs and outcomes. The book covers the application of economic-based evaluation methods to pharmaceutical products and services and includes examples of how pharmacoeconomic evaluations relate to decisions that affect patient care. It also examines how health-related quality of life is assessed and valued.

PHARMACY PRACTICE DIVISION

James Wilson, Ph.D.

- Pharmacoepidemiology
- Pharmacoeconomics
- Management of clinical programs



Debra Lopez, Pharm.D., CDE

- Pharmacist interventions
- Chronic disease states such as diabetes, hypertension and dyslipidemia



Rosa Schnyer, D.A.O.M.

- Complementary medical practices, especially Chinese medicine in the development of an integrated model of care to treat chronic, complex and stress-related disorders



Scott Strassels, Ph.D.

- Epidemiology, economics, patient-reported outcomes, and health policy related to acute and cancer-related pain, and palliative care.



RELIEF FOR DEPRESSION DURING PREGNANCY

Acupuncture holds promise for depression in pregnant women, according to a study co-authored by Dr. Rosa Schnyer. The findings, published in *Obstetrics & Gynecology*, show that 12 acupuncture treatments over eight weeks might help reduce the severity of depression symptoms.

The Stanford University study on depression and pregnant women followed 150 pregnant women with major depression. Dr. Schnyer was one of the leading investigators in the study. Researchers found that women who received depression-specific acupuncture were more likely to have a treatment response – meaning the severity of their symptoms fell by at least half and they no longer met all of the criteria for diagnosing major depression. It's estimated that 3 to 5 percent of pregnant women are diagnosed with depression.

UTech Dorm

Drug Dynamics Institute Austin, Texas

The University of Texas at Austin College of Pharmacy, the Austin Technology Incubator (ATI) and the City of Austin have partnered to create the UTech Dorm Room, a cooperative research laboratory designed to provide laboratory space for entrepreneurs to develop life-sciences technologies and evaluate their commercialization potential.

The UTech Dorm Room lab facility is located in the College of Pharmacy. While most labs at the university are devoted to the research of a particular faculty member, the UTech Dorm Room is designed to provide bioscience entrepreneurs outside the university community to contractually reserve wet lab space for a period of time as they test and develop their technologies and potential products.

The City of Austin has committed \$35,000 of economic development funds to assist in the purchase of equipment and preparation of the lab space, and will pay \$20,000 toward the salary of a lab manager dedicated to the new partnership.

Individuals who have an idea for a life science technology may apply to the program through the college's Drug Dynamics Institute (DDI), which will oversee the lab. The companies who use the lab will retain their intellectual property rights. Dr. Janet Walkow is director of the DDI.

Wet labs have the facilities such as water, ventilation and built-in safety features needed to test chemicals, drugs or other material or biological matter. They can be expensive to outfit and maintain.

The UTech Dorm Room's goals are to encourage interaction between life-sciences start-up companies and the university faculty, to reduce barriers to commercialization and to accelerate local and economic development by opening up the university to life-sciences entrepreneurs.

Inquiries regarding the UTech Dorm Room should be directed to: UTechDR@austin.utexas.edu

RESEARCH CENTERS

Addiction Science Research and Education Center

University researchers within this center are dedicated to communicating to treatment professionals and the general public the latest breakthroughs in addiction research.

Director: Carlton Erickson, Ph.D.

Center for Advancement of Research and Education in Infectious Diseases

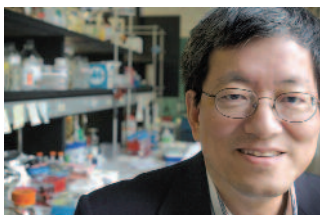
Faculty conduct collaborative and interdisciplinary laboratory-based, translational and clinical research, foster clinical and graduate research training, and build upon the knowledge of infectious diseases.

Director: David Burgess, Pharm.D.

Center for Molecular and Cellular Toxicology

This center focuses on environmental health sciences education and research. It provides opportunities for interdisciplinary graduate training programs as well as student and research infrastructure support.

Director: John Richburg, Ph.D.



Center for Pharmacoeconomic Studies

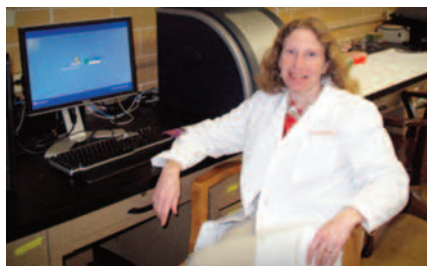
With a focus on clinical, humanistic and economic outcomes research, center faculty compare the value of one drug or drug therapy to another, assist others researchers in similar studies and provide educational programs regarding the results of particular health care practices and interventions.

Director: Marvin Shepherd, Ph.D.

Drug Dynamics Institute

The institute is a multi-disciplinary research center where scientists, educators, businesses and regulatory agencies collaborate to find solutions to a wide range of biomedical, pharmaceutical and public health issues.

Director: Janet Walkow, Ph.D.



COLLEGE OF PHARMACY DEVELOPMENT

Assistant Dean for Development and Alumni Affairs

Susan Brown475-9758

Assistant Director of Development

Jessica Campos232-2381





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