COMPARATIVE BIOMEDICAL SCIENCES

PROGRAM OVERVIEW

The graduate program in comparative biomedical sciences offers an interdisciplinary approach to conduct biomedical research as it applies to humans and animals. The goal of the program is to educate and prepare students for successful careers in academic, private industry, or government environments. Degrees granted include a PhD or MS degree in veterinary medical sciences with concentrations in cell and molecular biology, environmental health sciences, anatomy, physiology, pharmacology, or toxicology. The school also has a DVM/PhD track for students accepted into the veterinary medicine program.

ADMINISTRATION

Gary E. Wise, Head
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DEGREE PROGRAMS

Master of Science in Veterinary Medical Sciences

The individualized program of study for each student will be developed in consultation with and approved by the student's graduate advisory committee. The committee will include the student's major advisor and at least two additional members of the graduate faculty such that the LSU Graduate School's requirements for graduate committees are satisfied.

The degree involves course work in the student's area of specialty and completion of an original research project resulting in an acceptable thesis. Thirty hours of credit beyond the baccalaureate or professional degree at the graduate level (in courses numbered 4000 or above) must be earned. The curricular requirements include:

- at least 6 hours in thesis research (VMED 8000)
- at least 24 hours at the 7000 level or above in courses other than thesis research (VMED 8000), including
    - 3 hours of CBS 7104 *Biomedical Cell and Molecular Biology*
    - 3 hours of CBS 7108 *Critical Analysis in Molecular Biology/Medicine*
    - 2 hours of VMED7004 *Introduction to Research*
    - at least 3 hours of experimental statistics at the 7000 level

The student must pass a final comprehensive oral exam. At the discretion of the student's advisory committee, a written exam may be required. Few students are admitted to this degree program. An MS degree is not a requisite for admission to the PhD program.

Doctor of Philosophy in Veterinary Medical Sciences

The individualized program of study for each student will be developed in consultation with and approved by the student's graduate advisory committee. The committee will include the student's major advisor and at least two additional members of the graduate faculty such that the LSU Graduate School's requirements of the LSU Graduate School for graduate committees are satisfied.

The degree involves course work in the student's area of specialty and completion of an original research project resulting in an acceptable dissertation. The dissertation must demonstrate a contribution to the student's

major field of study and a mastery of research techniques. Sixty hours of credit beyond the baccalaureate or professional degree at the graduate level (in courses numbered 4000 or above) must be earned. The curricular requirements include:

- at least 24 hours at the 7000 level or above in courses other than dissertation research (VMED 8900/9000), including
  - 3 hours of CBS 7104 *Biomedical Cell and Molecular Biology*
  - 3 hours of CBS 7108 *Critical Analysis in Molecular Biology/Medicine*
  - 2 hours of VMED 7004 *Introduction to Research*
  - at least 3 hours of experimental statistics at the 7000 level
  - at least 6 hours in professional curriculum courses selected from:
    - CBS 7109 (3) Advanced Macroscopic Anatomy
    - CBS 7112 (3) Advanced Microscopic Anatomy
    - CBS 7603 (3) Clinical Toxicology
    - CBS 7628 (3) Biomedical Physiology I
    - CBS 7629 (3) Biomedical Physiology II
    - CBS 7631 (3) Biomedical Neuroscience
    - CBS 7634 (4) Biomedical Pharmacology

All candidates for the PhD degree must present a seminar a total of two times, including the final dissertation defense. Students are strongly encouraged to submit the results of their research for publication in peer-reviewed scientific journals.

The student must pass a general exam consisting of written and oral portions and a comprehensive final oral exam.

ADMISSION

Applications for admission are received and evaluated by the department at any time, but applicants are not evaluated for admission or financial assistance until completed application materials have been received, including test scores, official transcripts, and letters of recommendation. Application should be initiated at least six months prior to anticipated entry. Applicants must adhere to the application deadlines established by the Graduate School.

Students seeking admission must submit satisfactory credentials from previous study, acceptable GRE test scores, and three letters of recommendation. Minimum criteria for admission include ≥3.0 gpa out of 4.0 on the US system scale and a combined verbal and quantitative GRE score of ≥1100. International students whose native language is not English must also submit an acceptable TOEFL score (≥213 computer version or ≥79 internet version or ≥550 paper version) or IELTS score (≥6.5). One of the department graduate faculty members must agree in advance to accept the applicant as a student in his/her laboratory.

When all admission requirements are met, full admission will be granted. If a student does not meet all requirements, he or she may be admitted provisionally at the discretion of the Graduate Student Affairs Committee.

FINANCIAL ASSISTANCE

Financial assistance is available to some students. Financial aid consists of research assistantship stipends or fellowships. The amount of the award depends on prior educational performance and awards are made on a competitive basis; financial aid is rarely awarded to MS students. Special fellowships and tuition exemption may also be available. A student should contact his/her home department for more information on available assistantship positions. To ensure consideration for financial aid, all application materials should be submitted in accordance with deadlines established by the LSU Graduate School and preferably six months prior to anticipated entry.

RESEARCH FACILITIES

Research facilities include laboratories, instrument rooms, walk-in cold rooms, and rooms for radiolabel materials use, animal treatment, cell culture, photography, and storage. The department operates the Respiratory Research

Facility, the Analytical Systems Laboratory, the Aquatic Research Facility, the Equine Medication Surveillance Laboratory, and the SVM Microscopy Center. The School of Veterinary Medicine also houses the Gene Probes & Expressions Systems Laboratory, LSU Flow Cytometry Core Facility, Veterinary Computer Resources, Veterinary Medicine Library, Division of Laboratory Animal Medicine, Louisiana Animal Disease Diagnostic Laboratory, a Biomedical Communications Unit, and the facilities of the Veterinary Teaching Hospital & Clinics.

GRADUATE FACULTY

Steven A. Barker (M) • Analytical toxicology and the neurochemistry of hallucinogens
Hermann H. Bragulla (6A) • Development of skin and skin appendages in normal and diseased states
Henrique Cheng (6A) • Signal transduction pathways regulating insulin secretion and their impact on diabetes
Ji-Ming Feng (7M) • Pathogenesis of autoimmune-mediated demyelinating diseases
Marxa Figueiredo (6A) • Development of cancer gene therapy using viral vectors
Joseph Francis (7M) • Pulmonary and cardiovascular pathophysiology
David W. Horohov (7M) • Immunology
Kevin M. Kleinow ((M) • Aquatic animal pharmacology and toxicology, zebrafish as genomic models for disease
Shisheng Li (6A) • DNA repair and mutagenesis
Shulin Li (7M) • Electroinjection, tumor-targeted gene therapy
Arthur Penn (M) • Inhalation toxicology, cardio/pulmonary responses to air pollutants
Inder Sehgal (7M) • Prostate cancer metastasis
George M. Strain (M) • Deafness, clinical neurophysiology and neurology
Gary E. Wise (M) • Cell and molecular biology of tooth eruption
Shaomian Yao (6A) • Dental stem cells, molecular biology of stem cells, and their roles in osteogenesis and osteoclastogenesis
Masami Yoshimura (6A) • Molecular and cellular biological aspects of cyclic AMP signal transduction regulation

RECENT FACULTY PUBLICATIONS

The following is a representative sample of recent faculty publications:

D. Agarwal, M. Haque, S. Sriramula, N. Mariappan, R. Pariaut, J. Francis (2009). Role of proinflammatory cytokines and redox homeostasis in exercise-induced delayed progression of hypertension in spontaneously hypertensive rats. Hypertension 54: 1393-1400.

H.H. Bragulla, D.G. Homberger (2009). Structure and functions of keratin proteins in simple, stratified, keratinized and cornified epithelia. J Anat 214: 516-559.

X. Chen, B. Ding, D. LeJeune, C. Ruggiero, Shisheng Li (2009). Rpb1 sumoylation in response to UV radiation or transcriptional impairment in yeast. PLoS ONE. 2009; 4(4): e5267.

J.M. Feng, Y.K. Hu, L.H. Xie, C.S. Colwell, X.M. Shao, X.P. Sun, B. Chen, H. Tang, A.T. Campagnoni (2006). Golli protein negatively regulates store depletion-induced calcium influx in T cells. Immunity 24: 717-727.

J. Kou, M. Yoshimura (2007). Isoform-specific enhancement of adenylyl cyclase activity by n-alkanols. Alcohol Clin Exp Res 31: 1467-1472.

Shulin Li, ed. (2008). Electroporation Protocols: Experimental and Clinical Gene Medicine. Humana Press.

V. Marigo, K. Courville, W.H. Hsu, J.M. Feng, H. Cheng (2009). TRPM4 impacts Ca^{2+} signals during agonist-induced insulin secretion in pancreatic β-cells. Mol Cell Endocrinol 299: 194-203.

E.H. McIlhenny, K.E. Pipkin, L.J. Standish, H.A. Wechkin, R. Strassman, S.A. Barker (2009). Direct analysis of psychoactive tryptamine and harmala alkaloids in the Amazonian botanical medicine Ayahuasca by liquid chromatography-electrospray ionization-tandem mass spectrometry. J. Chromatography A 1216: 8960-8968.

B.A. Nyagode, M.O. James, K.M. Kleinow (2009). Influence of dietary coexposure to benzo(a)pyrene on the biotransformation and distribution of ^{14}C-methoxychlor in the channel catfish (*Ictalurus punctatus*). Toxicol Sci

108: 320-329.
R. Rouse, G. Murphy, M.J. Boudreaux, D.B. Paulsen, A.L. Penn (2008). Soot nanoparticles promote biotransformation, oxidative stress and inflammation in murine lungs. Am J Resp Cell Molec Biol 39: 198-207.
I. Sehgal, M. Sibrian-Vazquez, M.G.H. Vicente (2008). Photo-induced cytotoxicity and biodistribution of prostate cancer cell-targeted porphyrins. J Med Chem 51:6014-20.
G.M. Strain, L.A. Clark, J.M. Wahl, A.E. Turner, K.E. Murphy (2009). Prevalence of deafness in dogs heterozygous and homozygous for the merle allele. J Vet Intern Med 23:282-286.
G.E. Wise (2009). Cellular and molecular basis of tooth eruption. Orthodontics Craniofac Res 12: 67-73.
S. Yao, F. Pan, V. Prpic, G.E. Wise (2008). Differentiation of stem cells in the dental follicle. J Dent Res 87:767-771.
O. Zolochevska, M.L. Figueiredo (2009). Cell cycle regulator cdk2ap1 inhibits prostate cancer cell growth and modifies androgen-responsive pathway function. Prostate 69: 1586-97.