Pathology (Ph.D.)

Degree Offered: Ph.D.
Director: Rakesh Patel, Ph.D.
Phone: (205) 975-9225
E-mail: rakeshp@uab.edu
Web site: http://www.uab.edu/mcpgrad

Faculty

Peter G. Anderson, Professor (Pathology and Genomics & Pathobiology); Cardiovascular pathology; education

Scott Ballinger, Associate Professor (Pathology); Cardiovascular disease mediated by free radicals, mitochondrial damage, and dysfunction

William H. Benjamin, Jr., Associate Professor (Pathology) Epidemiology of tuberculosis

R. Pat Bucy, Professor (Pathology); Regulation of in vivo immune responses by T cells

Xu Cao, Professor (Pathology); Multipotent stem cells

Steven L. Carroll, Associate Professor (Pathology); Neuregulin-1 in PNS Regeneration and Neoplasia

Yabing Chen, Assistant Professor (Pathology); Oxidative stress-induced molecular signals in cardiovascular disease and bone disease.

Thomas L. Clemens, Professor and Division Director (Pathology); Anabolic signaling pathways in the skeleton.

William J. Cook, Professor (Pathology); Renal pathology, protein crystallography

Victor M. Darley-Usmar, Professor (Pathology); Mechanisms of redox signaling in cardiovascular disease

Joanne T. Douglas, Assistant Professor (Pathology); Gene therapy; adenoviral vectors; conditionally replicating adenoviruses

Isam-Eldin Eltoum, Professor (Pathology);

Maaike Everts, Assistant Professor (Pathology); Gene therapy and nanotechnology for imaging and therapy of cancer

Xu Feng, Associate Professor; Bone Metabolism in RRANKL/RANK signaling in osteoclast differentiation and function
Andra Frost, Associate Professor (Pathology); Effects of the microenvironment on breast carcinogenesis

Candece L. Gladson, Professor (Pathology); Malignant astrocytoma cell migration

William E. Grizzle, Professor (Pathology); Epithelial cancer

Robert W. Hardy, Associate Professor (Pathology); Insulin resistance; cancer cell proliferation

Zdenek Hel, Assistant Professor (Pathology); Insulin Development and testing of novel HIV/AIDS vaccine strategies

Kang-Jey Ho, Professor, cardiovascular pathology, pathogenesis of cholelithiasis, beta-glucuronidase

Shu T. Huang, Professor (Pathology);

Michael J. Klein, Professor (Pathology); Arthritis and collagen degradation diseases

Hiromi Kubagawa, Professor (Pathology); Immunoglobulin-like receptors

Dennis F. Kucik, Associate Professor (Pathology); Cell adhesion and motility

Aimee Landar, Assistant Professor (Pathology); Cellular effects of post-translational modification of protein thiols by reactive species in cancer and cardiovascular disease

Robin Lorenz, Professor (Pathology); Immune mediators of gastrointestinal disease

Upender Manne, Associate Professor (Pathology); Translational research in gastrointestinal malignancies

Jay M. McDonald, Professor (Pathology); Cell signaling in bone disease, AIDS and cancer

Joseph L. Messina, Professor (Pathology); Insulin and growth hormone action and resistance in trauma and infections

Stephen A. Moser, Professor (Pathology); Pulmonary mycotic infections

Joanne E. Murphy-Ullrich, Professor (Pathology); Regulation of cell death and motility by cell adhesion signaling and role of growth factor control in diabetic and fibrotic diseases

Moon H. Nahm, Professor (Pathology); Immune response to pneumococcal polysaccharide antigens

Rakesh Patel, Associate Professor (Pathology); Inflammation; free radicals; atherosclerosis; sepsis; nitric oxide; hemoglobin; antioxidants; endothelial cell biology

Larisa Pereboeva, Assistant Professor (Pathology);
Selvarangan Ponnazhagan, Professor (Pathology); Adeno-associated virus gene therapy

Richard E. Powers, Associate Professor (Pathology);

Vishnu V.B. Reddy, Professor, (Pathology);

Kevin A. Roth, Professor and Chair (Pathology); Molecular regulation of neuronal cell death

Ralph D. Sanderson, Professor (Pathology): Tumor microenvironment, cancer progression and metastasis, heparanase, heparan sulfate proteoglycans

John Shacka, Instructor (Pathology); Regulation of autophagic neuron death in models of neuronal injury and neurodegenerative disease

Gene P. Siegal, Professor (Pathology); Gene therapy of solid tumors

John A. Smith, Professor (Pathology);

Ken Waites, Professor (Pathology); Diagnostic microbiology, epidemiology and mechanisms of antimicrobial resistance

Mei Wan, Assistant Professor (Pathology), TGF-beta signaling in pancreatic cancer development and in bone diseases

Casey T. Weaver, Professor (Pathology); CD4 T cells

Danny Welch, Professor (Pathology); Biology and genetics of cancer metastasis

Tom Winokur, Associate Professor (Pathology); Molecular diagnostics, growth factors in cancer.

Majd Zayzafoon, Assistant Professor (Pathology); The Role of Calcium Signaling in the Genetic and Epigenetic Pathogenesis of Disease

Jianhua Zhang, Assistant Professor (Pathology), apoptotic and autophagic mechanisms of neuron cell death, inactivating, clearing and recycling of used, unwanted, excessive or damaged proteins and organelles by proteasomes, endosomes, autophagosomes and lysosomes through proteinophagy and mitophagy

Program Information and Objectives

A graduate program in molecular and cellular pathology, leading to the Ph.D. degree, is offered by the Department of Pathology. The program is administered by a committee composed of members of the graduate faculty and two Pathology Ph.D. candidates:

Rakesh Patel, Ph.D.- Program Director

Thomas Clemens, Ph.D.- Director, Division of Molecular and Cellular Pathology
Admissions/Steering Committee (student members do not participate in admissions, individual student, or disciplinary issues):

Scott W. Ballinger, Ph.D – Chair
Rakesh Patel, Ph.D. – Co-Chair
Xu Cao, Ph.D.
Xu Feng, Ph.D.
Upender Manne, Ph.D.
Selvarangan Ponnazhagan, Ph.D.
Ralph Sanderson, Ph.D.
Danny R. Welch, Ph.D.

Thomas Bodenstine – Student member and President of the MCP Student Association
Jason Ashley – Student member and Vice-President of the MCP Student Association

Students demonstrating superior scholarship who desire careers in academic and investigative pathology are encouraged to apply. Acceptance of students is based on Graduate School admission criteria, letters of recommendation, assessment of motivation, and a personal interview by the Pathology Graduate Committee.

Admission is open to highly motivated students with strong backgrounds in the biological sciences. It is recommended that students with B.Sc. degrees have completed undergraduate courses in physics, calculus, chemistry, organic chemistry, biology, or zoology and at least one advanced course in areas such as comparative anatomy, embryology, genetics, histology, or physiology.

The objective of the program is to train individuals for academic and investigative careers in disease mechanisms and processes. A combination of didactic and laboratory experience will be provided to achieve the following specific goals for each student: (1) understanding of basic disease mechanisms, (2) appreciation of modern techniques in cellular and molecular biology, (3) integration of molecular mechanisms of disease with pathophysiology, (4) application of the scientific method to problems in disease mechanisms through discerning experimentation, and (5) effective communication of information through teaching and writing skills.

Although the program is designed to acquaint the student with all major facets of experimental pathology and genomic research, specialization is encouraged. At present, students may choose to concentrate their efforts in any of the following areas: cardiovascular biology, immunopathology, oncology, comparative pathophysiology, metabolic and bone diseases, genetics of disease, animal models of disease, nutritional pathology, oral pathology, and pathology of various organ systems.
Ph.D. Program

This degree is granted on the basis of scholarly proficiency, distinctive achievement, and original research. Additional course requirements are not rigidly fixed but are planned to meet the needs and interests of individual students. All students are expected to gain competence in cognate fields (e.g., scientific method, computer applications, cellular and molecular biology) and become independent investigators in experimental pathology. Students are given opportunities to study modern techniques of teaching and to participate in teaching under the supervision of experienced instructors. Preparation and defense of an acceptable dissertation is the final requirement for award of this degree. The core curriculum includes Integrative Biomedical Sciences (IBS 700, 701, 702) and Graduate Pathology (PAT 700, 701).

Additional Information

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<tr>
<th>Deadline for Entry Term(s):</th>
<th>Semester</th>
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<tr>
<td>Deadline for All Application Materials to be in the Graduate School Office:</td>
<td>March 1</td>
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<td>Number of Evaluation Forms Required:</td>
<td>Three</td>
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<td>Entrance Tests</td>
<td>GRE (TOEFL and TWE also required for international applicants whose native language is not English.)</td>
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For detailed information, contact Nicole Newton, Volker Hall G019, 1530 3rd Avenue South, Birmingham, AL, 35294-0019.

Telephone: (205) 934-2445;

E-mail: nicolen@uab.edu

Web: www.uab.edu/mcpgrad

Course Descriptions

**PAT 703 - Introduction to Pathology Research:** This seminar series is designed to introduce you to faculty and their research to better help you choose your laboratory rotations.

**PAT 704 - Pathology Research Data Analysis and Presentation:** In the second and subsequent years you will attend an informal weekly gathering in which students present and discuss their work with fellow students and faculty.

**IBS 700 - Biological Chemistry and Cellular Physiology:** Comprehensive and rigorous background in the principles of biochemistry, molecular biology, and cellular physiology.
**IBS 701 - Pathophysiology and Pharmacology of Disease:** Physiology, pathophysiology, and therapeutic approaches to diseases.

**IBS 702 - Molecular Basis of Genetic Disease and Functional Genomics:** Genetics, genetic basis of disease and molecular medicine.

**Lab Rotations:** You will spend 10-12 weeks in three different labs. By the summer you will have chosen your mentor and lab in which to do your thesis.

**Seminar:** In the first and subsequent years you will attend a weekly departmental seminar in which faculty from our department, other UAB faculty or faculty from other institutions discuss their research.

**PAT 700 - Biology of Disease:** Basic mechanisms of acute and chronic cell injury, inflammation, immune injury, neoplasia, hemostasis, and developmental disease.

**PAT 701 - Molecular Basis of Disease:** Alterations in molecular and cellular mechanisms of cells and tissues resulting in disease.

**PAT 704 - Pathology Research Data Analysis and Presentation:** In the second and subsequent years you will attend an informal weekly gathering in which students present and discuss their work with fellow students and faculty.

**Journal Clubs:** You will need to take a minimum of four journal clubs during your Ph.D. training, where various scientific papers are presented and discussed.

**Committee choice and first meeting:** By the end of your second year you should have chosen and met with a self-chosen committee of at least five faculty members