DEPARTMENT OF PATHOLOGY AND LABORATORY MEDICINE (GRAD)

Contact Information
Department of Pathology and Laboratory Medicine
Visit Program Website (http://www.med.unc.edu/pathology/)

Russell Broaddus, Chair
Herbert C. Whinna, Vice Chair for Clinical Services and Director of McLendon Clinical Laboratories
Joan M. Taylor, Vice Chair for Research

Graduate work in the Department of Pathology and Laboratory Medicine is offered through the Pathobiology and Translational Science graduate program to those interested in acquiring more extensive knowledge of disease pathogenesis. Major emphasis is given to the laboratory investigation of molecular and cellular mechanisms responsible for disease initiation, progression, and treatment. Students are given the opportunity to undertake candidacy for the doctor of philosophy degree. Participation in research activities leading to an original dissertation is required of all advanced degree candidates.

Prospective candidates must hold a bachelor’s degree from an accredited college or university. Admission to the program is through the Biologic and Biomedical Sciences program (http://bbsp.unc.edu/).

The department is located in the Brinkhous-Bullitt Building, and offers well-equipped, internationally recognized laboratories for research and advanced work in pathology.

Please visit the graduate program’s Web site (https://www.med.unc.edu/pathology/) for more graduate program information.

Professors
Frank C. Church, Thrombosis and Hemostasis, Macromolecular Protein Structure-Function, Molecular Pathology
Leslie G. Dodd, Surgical Pathology, Cytopathology
Claire Doerschuk, Diseases Affecting the Airways of the Lung
Ronald J. Falk, Glomerular Disease, Lupus, Vasculitis, Dialysis
Margaret L. Gulley, Molecular Diagnostics, Oncology, Epstein-Barr Virus
J. Charles Jennette, Renal Pathology, Immunopathology
David G. Kaufman, Human Origins of DNA Replication, Interactions between Human Endometrial Epithelial and Stromal Cells
Nigel Key, Thrombosis and Hemostasis
Christopher P. Mack, Transcriptional Regulation in the Cardiovascular System, Smooth Muscle Cell Biology
Nigel Mackman, Thrombosis and Hemostasis
Nobuyo Maeda, Molecular Genetics of Atherosclerosis, Transgenic Laboratory Animals as Model Systems, Molecular Evolution
Susan J. Maygarden, General Surgical Pathology, Cytopathology, Prostate Carcinogenesis
Melissa B. Miller, Molecular Diagnostics, Antimicrobial Resistance, Molecular Epidemiology of MRSA
Valerie Murrah, Oral, Head, and Neck Pathology
Timothy C. Nichols, General Cardiology, Cardiac Catheterization, Per-Cutaneous Transluminal Coronary Angioplasty

Volker Nickeleit, Renal Pathology, Fibroneccts
Charles M. Perou, Breast Cancer, Genomics, Microarrays, Tumor Classification, Drug Resistance
John L. Schmitz, Flow Cytometry, HIV, Diagnostic Immunology, Sexually Transmitted Diseases
Harsharan K. Singh, Cytopathology, Fine Needle Aspiration Biopsy, Renal Pathology
James A. Swenberg, Chemical Carcinogenesis, Toxicology, Mass Spectroscopy, DNA Damage and Repair, Endogenous DNA Damage
Joan M. Taylor, Adhesion Signaling, Cardiovascular Disease
Cyrus Vaziri, Regulation of DNA Replication, S-Phase Checkpoints, and Post-Replication DNA Repair on Mammalian Cells
Bernard E. Weissman, Tumor Suppressor Genes
Alisa S. Wolberg, Cellular and Molecular Mechanisms in Hemostasis and Thrombosis
John T. Woosley, Dermatopathology, Hepatobiliary and Gastrointestinal Pathology, Histopathologic Assessment of Prognosis

Associate Professors
Georgette A. Dent, Hematopathology, Medical Education
George Fedoriw, Hematopathology; Applications of Flow Cytometry
Mehmet Kesimer, Mucin Glycobiology and Airway Epithelial Pathobiology
Nicole L. Korpi-Steiner, Clinical Chemistry
Jiandong Liu, Cardiovascular Biology
Jason Merker, Molecular Pathology
Yara Park, Transfusion Medicine
Li Qian, Cardiovascular and Stem Cell Biology
Young E. Whang, Androgen Receptor, Prostate Cancer
David C. Williams Jr., Hematopathology, NMR Spectrophotometry and Structural Biology
Scott Williams, Stem Cell and Developmental Biology

Assistant Professors
Nathan Montgomery, Hematopathology and Molecular Genetic Pathology
Eric T. Weimer, Histocompatibility, Flow Cytometry and Clinical Microbiology/Immunology
Sara E. Wobker, Genitourinary Pathology

Clinical Professors
Michelle Aurelius, Forensic Pathology
Peter Banks
Thomas W. Bouldin, Neuropathology, Ocular Pathology, Neurotoxicology
Paul Googe, Dermatopathology
Pamela M. Groben, Dermatopathology
Katherine A. Kaiser-Rogers, Clinical Cytogenetics
Deborah L. Radisch, Forensic Pathology
Scott V. Smith, Surgical Pathology, Cardiovascular Pathology, Pediatric Pathology
Leigh B. Thorne, Molecular Pathology, Autopsy Pathology
Karen E. Weck, Molecular Genetic Pathology

Clinical Associate Professors
Jessica K. Booker, Genetics, Breast Cancer
Benjamin Calhoun, Breast Pathology
Kevin Greene, Surgical Pathology of the Liver and Gastrointestinal Tract
Nabila Haikal, Forensic Pathology
Jonathon W. Homeister, Leukocyte Trafficking, Inflammatory Vascular Disease, Thrombosis and Hemostasis, Cardiovascular Pathology, Autopsy Pathology
Siobhan M. O’Connor, Breast Pathology, GYN Pathology, Cytopathology
Eizaburo Sasatomi, Gastrointestinal and Liver Pathology
Lori R. Scanga, Surgical Pathology, Cytopathology
Dimitri G. Trembath, Surgical Pathology and Neuropathology
Herbert C. Whinna, Mechanisms of Hemostasis and Thrombosis, Biochemistry and Vascular Biology of Blood Coagulation, Protein Structure-Function

**Clinical Assistant Professors**

Sue Ann Berend, Cytogenetics
Sandra Bishop-Freeman, Forensic Toxicology
Christine Bookhout, Surgical Pathology
Justin Brower, Forensic Toxicology
Steven Cotten, Clinical Chemistry
Johann D. Hertel, Cytopathology
Julie Hull, Forensic Pathology
Kimberly Janssen, Forensic Pathology
Stephanie P. Mathews, Hematopathology
Jayson Miedema, Dermatopathology
Vincent J. Moylan Jr., Cardiac Pathology and Autopsy Pathology
Craig Nelson, Forensic Pathology; Water-Related Deaths, Including Drowning of All Kinds and Particularly Scuba, Rebreather, and Freeding Deaths
T. Danielle Samulski, Gynecologic Pathology, ENT Pathology, and Cytopathology
Lauren Scott, Forensic Pathology; Preventive Health, Especially Suicide and Accident Prevention; the Value of Autopsy in Medical Education
R. Chad Siniard, Transfusion Medicine, Molecular Pathology, and Bioinformatics
Susan Venuti, Forensic Pathology

**Clinical Instructors**

Steve Holmes, Examination of Simple and Complex Specimens, Surgical Pathology
April E. Kemper, Autopsy Pathology, Surgical Pathology
Tracie W. Massey, Tissue Procurement; Surgical Pathology
Andre Phelan, Pathologists’ Assistant: Surgical Pathology Training for Residents and Students

**Research Instructor**

Diane Armao, Neuropathology

**Research Professors**

Rosann A. Farber, Genetic Instability in Cancer, Human Molecular Genetics, Microsatellite Instability
Craig A. Fletcher, Vascular Biology
Virginia L. Godfrey, Veterinary Pathology, Animal Models of Genetic Disease, Autoimmunity
Tracy M. Heenan, Laboratory-, Exotic- and Companion-Animal Medicine
Shanmugam Nagarajan, Immunologic and Inflammatory Mechanisms of Diseases in Atherosclerosis, Vasilitis, and Glomerulonephritis
Melissa Troester, Molecular Studies with Human Populations
Maimoona A. Zariwala, Genetic Analysis of Patients with Primary Ciliary Dyskinesia (PCD)

**Research Associate Professors**

Brian Cooley, Thrombosis, Vascular Injury, Microsurgery
Ajay Gulati, Pediatric Gastroenterology
Peiqi Hu, Immune-Mediated Kidney Disease
Masao Kakoki, Prevention of Cardiovascular Diseases

Steven Shipley, Laboratory Animal Medicine; Infectious Disease
Julia W. Whitaker, Laboratory Animal Medicine
Hong Xiao, Immune-Mediated Glomerular Disease and Vasculitis

**Research Assistant Professors**

Silvio Antoniak, Protease-Activated Receptors in Cardiovascular Diseases, Myocarditis, and Heart Failure Animal Models
Pablo Ariel, Director of the Microscopy Services Laboratory
J. Todd Auman, Pharmacogenomics, Cancer Pharmacology
Xue Bai, Molecular and Functional Roles of RhoGaps in Hypertension and Metabolism Regulation
Victoria Baxter, Pathogenesis of and Host Immune Response to Infectious Disease, Particularly Encephalomyelitic Arboviruses; Animal Model Development
Yanzhe Gao, DNA Replication, Damage, and Repair
Feng Li, Cardiovascular Biology
C. Tyler Long, Laboratory Animal Medicine
Stephanie A. Montgomery, Comparative Pathology and Animal Histopathology
Allison Rogala, Laboratory Animal Medicine Services, Comparative Medicine, and Host-Microbial Interactions
Jonathan Schisler, Translational Research in Patients with Myocardial Infarcts
Lauren Wimsey Laboratory Animal Medicine Services, Comparative Medicine
Yang Yang, DNA Damage and Repair

**Adjunct Professors**

Albert Baldwin, Biology
Mark E. Brecher, Blood Component Processing and Storage, Transfusion Strategies, Transfusion Transmitted Diseases
Jared Block, Hematology and Hematopathology
William B. Coleman, Breast Cancer Epigenetics, Biology of Liver Stem Cells, Hepatocarcinogenesis, Cancer Molecular Diagnostics
M. Peter H. Gilligan, Diagnostic Bacteriology, Pulmonary Disease in Cystic Fibrosis, Toxin Mediated Diarrheal Disease
David Goodman, Medical Education and Autopsy Pathology
H. Michael Jones, Medical Education at Medical Student and Resident Level, Medical History, Autopsy Pathology, Research Support
Joe N. Kornegay, Duchenne Muscular Dystrophy, Canine Model, Translational Studies, Muscle Hypertrophy
Myla Lai-Goldman, Personalized Molecular Diagnostics
Chad A. Livasy, Surgical Pathology
Roger Lundblad, Consultant
Judith N. Nielsen, Animal Health Maintenance, Diagnosis and Eradication
Niral M. Patel, Molecular Pathology Anatomic and Clinical Pathology
Howard M. Reisner, Immunogenetics of Blood Coagulation, Immunology
Marian Rollins-Raval, Hematopathology, Flow Cytometry and Coagulation
Gary J. Smith, Prostate Cancer, Cancer Cell-Tissue Microenvironmental Interaction, Angiogenesis
Carol Weida, Cytopathology and Anatomic Pathology
Richard Tidwell

**Adjunct Associate Professors**

David A. Eberhard, Pathology, Scientific and Business Support for Clinical Trials
Delores Grant, Cancer Research
W. Carl Jacobs, General Pathology
Daniel J. Kenan, Nephrology
Thomas Lightfoot, American Red Cross Blood Services
Ruth A. Lininger, Surgical Pathology, Breast Pathology
Christopher McKinney, General Pathology
Keith Nance, General Pathology
Jay S. Raval, Transfusion Medicine
William Sanders, Medical Information Technology
Nobuyuki Takahashi, Animal Models of Hypertension, Pre-eclampsia, Diabetic Nephropathy and Obesity

Adjunct Assistant Professors
Araba N. Afenyi-Annan, Transfusion Medicine
Edward Bahnson, Vascular Biology, Diabetes and Metabolic Syndrome
Paul Chastain, Patient Care, Experience, and Clinical Outcomes
Bal Dhungel, Lymphoproliferative Disorders
Aaron Hartman, Genitourinary and Nephropathology
Wendell Jones, Genomic Bioinformatics
Michal Kamionek, General Pathology
Grace Lee, Hematology
Emily Maambo, General Pathology
William Oliver, Forensic Pathology
Avani Pendse, Surgical Pathology
Ashley Rivera, Cancer Biology
Tamiwe Tomoka, General Pathology
Ruth Walters, Dermatopathology

Professors Emeriti
Nadia Malouf Anderson
C. Robert Bagnell Jr.
Dwight Bellinger
Stuart Bentley
Debra A. Budwit
John D. Butts
John F. Chapman Jr.
Myra L. Collins
Marila Cordeiro-Stone
Robert E. Cross
Frederic G. Dalldorf
Cora-Jean S. Edgell
James D. Folds
Donald T. Forman
Joe W. Grisham
Catherine A. Hammett-Stabler
John E. Hammond
Susan T. Lord
William W. McLendon
James R. Pick
Marjorie S. Read
Harold Roberts
Kinuko I. Suzuki
Michael Topal

PATH
Advanced Undergraduate and Graduate-level Courses
PATH 426. Biology of Blood Diseases. 3 Credits.
An introduction to the biology and pathophysiology of blood and the molecular mechanisms of some human diseases: anemias; leukemias; hemorrhagic, thrombotic, and vascular disorders; and HIV disease/AIDS. Honors version available
Requisites: Prerequisite, BIOL 205; Permission of the instructor for students lacking the prerequisite.
Grading status: Letter grade
Same as: BIOL 426.

PATH 426H. Biology of Blood Diseases. 3 Credits.
An introduction to the biology and pathophysiology of blood and the molecular mechanisms of some human diseases: anemias; leukemias; hemorrhagic, thrombotic, and vascular disorders; and HIV disease/AIDS.
Requisites: Prerequisite, BIOL 205; permission of the instructor for students lacking the prerequisite.
Grading status: Letter grade
Same as: BIOL 426H.

PATH 462. Experimental Pathology. 1-9 Credits.
Hands-on research experience in a predetermined instructor's laboratory. Students learn and apply specific techniques and participate in investigations of molecular mechanisms responsible for disease processes (pathobiology). Contact the director of graduate studies in pathology for information. May be repeated.
Grading status: Letter grade.

PATH 464. Light Microscopy. 3 Credits.
Permission of the instructor. Course focuses on practical fundamentals of light microscopy including optics, contrast mechanisms, fluorescence, laser scanning confocal microscopy, photography, and digital imaging.

Graduate-level Courses
PATH 713. Molecular and Cellular Pathophysiological Basis of Disease: Mechanisms of Disease. 3 Credits.
A graduate course on cell injury and pathogenesis of disease with emphasis on basic mechanisms at the molecular, cellular, and organismal levels. Three lecture hours with a complementary two-and-a-half-hour laboratory each week.
Requisites: Co-requisite, PATH 714L.
Grading status: Letter grade.

PATH 714L. Molecular and Cellular Pathophysiological Basis of Disease: Laboratory I. 2 Credits.
A graduate-level laboratory course on basic mechanisms of disease pathogenesis, emphasizing cell and tissue-based examples of major disease mechanisms.
Requisites: Pre- or corequisite, PATH 713.
Grading status: Letter grade.

PATH 715. Molecular and Cellular Pathophysiological Basis of Disease: Systemic Pathology. 3 Credits.
A graduate-level laboratory course on systemic pathology, emphasizing diseases of major organ systems. A follow-up to PATH 713/714L. Three lecture hours (three credits) with a complementary two-and-a-half-hour laboratory (two credits) each week.
Requisites: Co-requisite, PATH 716L.
Grading status: Letter grade.
PATH 716L. Molecular and Cellular Pathophysiological Basis of Disease: Laboratory II. 2 Credits.
A graduate-level laboratory course on mechanisms of systemic disease pathogenesis, emphasizing cell and tissue-based examples of diseases of the major organ systems.
Requisites: Pre- or corequisite, PATH 715.
Grading status: Letter grade.

PATH 723. Practical Considerations for Translational Research. 2 Credits.
Permission of the instructor. A multi-disciplinary course providing students principles involved in translating basic science into clinically applicable diagnostics and therapies to improve human disease outcomes. The course is focused on bioinformatics, bioethics, trial design, FDA approval, and commercialization of laboratory diagnostics.
Grading status: Letter grade.

PATH 725. Cancer Pathobiology. 3 Credits.
Permission of the instructor. This course examines pathobiological features of cancer. An interdisciplinary approach draws from epidemiology, genetics, molecular biology, and clinical medicine to investigate cancer etiology, pathogenesis, prevention, and treatment.
Grading status: Letter grade.

PATH 726. Human Environmental Disease. 1-3 Credits.
This course will study human disease processes that are induced or exacerbated by our environment. Environmental disease stressors include solar radiation, air and water pollution, bioreactive substances in foods, pesticides, metals, dusts, particles, and allergens. Lectures will emphasize epidemiology, mechanisms of toxicity, and human disease pathogenesis.
Grading status: Letter grade.

PATH 766. Current Topics in Cardiovascular Biology. 3 Credits.
Permission of the instructor. Second-year graduate students only. This manuscript-based course will emphasize recent advances in heart and blood vessel development, the molecular mechanisms that regulate cardiovascular cell function, and current methodologies in the cardiovascular field. It will be team taught by members of UNC's McAllister Heart Institute.
Grading status: Letter grade.

PATH 767. Molecular and Cellular Biology of Cardiovascular Diseases. 3 Credits.
Second year graduate students or permission of the instructor. Course reviews the molecular, cellular, and organismal pathogenesis of cardiovascular disease. It is team-taught by faculty with topic expertise and stresses primary literature and current methodologies. May be taken as a companion to PATH 766 or on its own.
Grading status: Letter grade.

PATH 772. Seminar in Carcinogenesis. 2 Credits.
Permission of the instructor. Survey of classical and current literature on selected critical issues in carcinogenesis. Students discuss experimental methods and observations as well as theories and generalizations. Two seminar hours a week.
Grading status: Letter grade
Same as: TOXC 792.

PATH 801. Cell Cycle Regulation and Cancer. 3 Credits.
This journal club-style discussion course will focus on molecular events that regulate normal cell cycle progression, and on how deregulation of the cell cycle leads to cancer. Classes will follow the development of the cell cycle field chronologically, learning how current concepts and paradigms have evolved through scientific inquiry.
Grading status: Letter grade
Same as: GNET 801.

PATH 850. Scientific Writing in Pathobiology and Translational Science. 1 Credit.
The students will develop a research plan based on their thesis project and write a 6-page grant in the style of a NRSA F31 application. Students will learn to edit and critique their fellow student’s proposals which will help prepare the students for writing and editing their preliminary exam and future grant applications. Restricted to students currently earning a degree in a Biological & Biomedical Sciences Program (BBSP) with preference given to students in the Pathobiology and Translational Science Graduate Program.
Grading status: Letter grade.

PATH 890. Special Topics in Pathology. 1-3 Credits.
A study in special fields under the direction of the faculty. Offered as needed for presenting material not normally available.
Repeat rules: May be repeated for credit. 6 total credits. 3 total completions.
Grading status: Letter grade.

PATH 900. Research in Pathology. 2-12 Credits.
Permission of the department. This is a research course in which advanced students in pathology carry on investigations on mechanisms of disease. Six or more laboratory hours a week, to be arranged. May be repeated.
Repeat rules: May be repeated for credit.
Grading status: Letter grade.

PATH 920. Seminar in Interdisciplinary Vascular Biology. 1 Credit.
Permission of the instructor. Participants in the Interdisciplinary Vascular Biology Training Program only. Students will be required to present their thesis work as a formal seminar, give an introductory lecture to introduce their project (in cooperation with their thesis advisor), and to attend and discuss the seminars of other students.
Repeat rules: May be repeated for credit. 6 total credits. 6 total completions.
Grading status: Letter grade.

PATH 940. Pathobiology and Translational Science Seminar. 1 Credit.
A series of scientific seminars by graduate students, Post-doctoral Fellows, research faculty, and others in the Department of Pathology and Laboratory Medicine. Students will develop the skills necessary to deliver an effective and engaging oral scientific presentation of their research. They will become proficient in understanding the pathogenesis of the wide range of diseases being studied in the department, and the methodologies employed to determine the pathogenesis of those diseases.
Repeat rules: May be repeated for credit. 7 total credits. 7 total completions.
Grading status: Letter grade.

PATH 993. Master's Research and Thesis. 3 Credits.
May be repeated.
Repeat rules: May be repeated for credit.

PATH 994. Doctoral Research and Dissertation. 3 Credits.