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The Division of Research

The Department of Surgery at the University of Cincinnati has a long and distinguished history of surgical research that is recognized nationally and internationally. Premier surgeon-scientists and postdoctoral researchers are drawn to the UC Department of Surgery to pursue innovative and exciting research in state-of-the-art laboratories, with a focus on applying the discoveries made in the laboratory directly to the bedside for the advancement of patient care. Clinical trials not available elsewhere are also offered for a variety of surgical diseases, giving hope to patients with critical illness who were once considered untreatable.

The research mission is to generate new knowledge of the scientific basis of surgically-related disease and to provide outstanding scientific training for the surgeons and surgeon-scientists of the future. The primary objectives are: 1) To be on the cutting edge of surgical research; 2) To help develop new applications to clinical care; and 3) To provide outstanding research training for surgical residents and surgeon-scientists.

The Department of Surgery occupies 15,000 square feet of state-of-the-art research laboratories in the Surgical Research Unit, the Cardiovascular Center, the Genome Research Institute, and the Medical Sciences Building. Additional research space is utilized at the Cincinnati Children's Hospital and Shriners Burns Hospital Cincinnati.

The Department enjoys several areas of research strength organized around surgeons and scientists with common interests. These programs yield high-quality research and, importantly, serve as a breeding ground for both young surgeons with a sophisticated background in modern science as well as basic investigators with an enhanced appreciation for surgical disease. Current research areas are:

Trauma, Sepsis & Inflammation. A multidisciplinary research team has been assembled that investigates the molecular and cellular mechanisms by which insults such as trauma and infection can lead to multiple organ failure and death. The organization of this research group provides a "bedside to the bench and back" approach where the clinical experience and expertise of the surgical faculty, in close collaboration with basic scientists, initiates hypothesis-driven bench science investiga-

tions whose results can ultimately be applied back in the clinical arena. These investigators have multiple federally-funded research projects involving signal transduction pathways responsible for phagocyte priming and activation, assembly of neutrophil NADPH oxidase, function of growth factors, immunomodulation of lymphocyte function, and transcriptional activation and regulation of proinflammatory gene expression in the settings of trauma and shock.

Cancer Biology. Integrated with the Department of Cancer and Cell Biology, our investigators study the molecular alterations leading to tumor growth. Projects are hypothesis-driven and are primarily funded by federal research grants including the National Cancer Institute and the Department of Defense. Current research in this area focuses on the significance of signaling transduction pathways, mechanisms of apoptotic resistance, and genetic programs critical to drive tumorigenesis.

Peptide Hormones. Research in this area is focused on the role of peptide hormones in various diseases, and the development of modified peptides for therapeutic use. The major focus of this research is directed towards understanding the intracellular mechanisms of hormone action to direct the biochemical design of peptide therapeutics for a number of diseases including feeding disorders, seizures, intestinal dysfunction, and diabetes.

Skin Substitutes and Tissue Engineering. In close collaboration with the Shriners Hospital for Children, a process has been developed to formulate hypothesis-driven studies based on clinical needs of patients with life-threatening burns or other skin wounds that require grafting. This process stimulates preclinical studies to model the anatomy and physiology of skin to generate cultured skin substitutes from patient cells and degradable biopolymers. These studies investigate the essential properties of skin that are required for wound closure. Among these properties are epidermal barrier, basement membrane, and vascular supply. In addition, active studies have demonstrated the restoration of skin color by addition of pigment cells (melanocytes) to cultured skin substitutes, and genetic modifications of transplanted cells to enhance wound healing.

Institute of Molecular Pharmacology and Biophysics. This institute provides a unique, integrated unit for detailed research and education in the area of molecular pharmacology and biophysics, with a strong focus on the cardiovascular system. The institute is supported by grants from the National Institutes of Health (NIH) and the American Heart Association, as well as an NIH Training Program in Molecular and Cellular Cardiovascular Biology.



Research Training

An important part of the research mission of the Department of Surgery is the training of surgical residents and medical students from the University of Cincinnati College of Medicine, as well as visiting students and fellows from other universities nationally and internationally. Many of our surgical residents pursue a mentored 2-3 year research elective in the laboratory of one of our investigators or surgeon-scientists. These research fellowships are supported by two T32 training grants from the National Institutes of Health as well as by individual grants from the NIH, Shriners Burns Hospital for Children, and various prestigious surgical organizations including the American College of Surgeons, the Society of University Surgeons, the Shock Society, Surgical Infection Society, and others. Surgical research conducted by surgical residents and other research fellows is highlighted by many platform and poster presentations at annual national meetings of the American College of Surgeons, the Association for Academic Surgery, the Society of University Surgeons, the Society for Surgical Oncology, the Society for Surgery of the Alimentary Tract, the American Heart Association, American Association for Cancer Research and the American Gastroenterology Association, among others, as well as numerous prestigious basic science conferences such as the Federation of American Societies of Experimental Biology.

Research within the Department and related disciplines is showcased at the weekly Surgical Research Seminar Series, as well as at Surgical Grand Rounds and an annual Research Retreat.



Residents in the Laboratory 2007-2008

- Alexander Bondoc, MD (mentor – Gregory Tiao, MD)
- Michael Goodman, MD (mentor – Karyn Butler, MD)
- Nathan Huber, MD (mentor – Timothy Pritts, MD, PhD)
- Karen Huezo, MD (mentor – Joseph Solomkin, MD)
- Sha-Ron Jackson, MD (University of California)
- Jaime Lewis, MD (mentor – Michael Reed, MD)
- Jocelyn Logan-Collins, MD (mentor – Susan Waltz, PhD)
- Colin Martin, MD (mentor – Brad Warner, MD)
- Rebecca McClaine, MD (mentor – Susan Waltz, PhD)
- Rajalakshmi Nair, MD (mentor – Brad Warner, MD)
- Thomas Shin, MD (mentor – Alex Lentsch, PhD)

Resident's Research Competition

Since 1990, residents are invited to submit research abstracts for an annual Resident's Research Competition. Four finalists are elected by a faculty committee. The four finalists present their papers at a Surgical Grand Rounds in June and the winner is selected based upon scientific content and presentation. The four finalists in 2008 were as follows:

Alex Bondoc, MD: "Prevention of rotavirus induced biliary atresia in a murine model using live rotavirus vaccine" (Bondoc A, Jafri M, Donnelly B, McNeal M, Ward R, Tiao G).

Michael Goodman, MD (Winner): "Regulating risk: A role for JAK-STAT signaling in postconditioning?" (Goodman M, Koch S, Butler K).

Jocelyn Logan-Collins, MD: "Silencing of the Ron tyrosine kinase receptor results in apoptosis, necrosis, & increased sensitivity to gemcitabine *in vivo*" (Logan-Collins J, Stuart W, McClaine R, Waltz S, Lowy A).

Rebecca McClaine, MD: "Ron receptor overexpression leads to ERa positive mammary tumors and modulates response to tamoxifen" (McClaine R, Waltz S).

Other resident research awards:

Jocelyn Marie Collins, MD

Society of Surgical Oncology Best Poster Award, March 2008. "shRNA silencing of the Ron receptor tyrosine kinase results in apoptosis and necrosis of pancreatic cancer xenografts."

Ohio Chapter of American College of Surgeons Oncology First-Place Award, May 2008. "Silencing of the RON tyrosine kinase receptor results in decreased cell survival and increased sensitivity of pancreatic tumors to gemcitabine *in vivo*."

Cincinnati Surgical Society Resident Research Competition, May 2008. "Silencing of the RON tyrosine kinase receptor results in decreased cell survival and increased sensitivity of pancreatic tumors to gemcitabine *in vivo*."

Michael Goodman, MD

First Place, Basic Science Category, Ohio Chapter of American College of Surgeons, May 2008: "Cardiac performance is preserved following pressure-overload stress in STAT-3 KO mice."

Rebecca McClaine, MD

First Place, Clinical Research Category, Ohio Chapter of American College of Surgeons, May 2008: "A comparison of pancreaticoduodenectomy and duodenum preserving head resection for the treatment of chronic pancreatitis."



Full-Time Research Faculty

Alex Lentsch, PhD

Professor
Vice Chairman for Research
Director, Division of Research
Director, Trauma, Sepsis & Inflammation Research Group

BS - Biological Sciences, Northern Kentucky University
PhD - Physiology and Biophysics, University of Louisville
Postdoctoral Training - Immunopathology, University of Michigan
Research Interests - Inflammation, ischemia/reperfusion injury, hemorrhagic shock, sepsis



George F. Babcock, PhD

Associate Professor
Adjunct Associate Professor of Cell Biology, Neurobiology and Anatomy
Assistant Director of Research, Shriners Burns Hospital Cincinnati

PhD - University of Nebraska Medical Center, Omaha
Postdoctoral Training - Department of Microbiology and Immunology, University of North Carolina, Chapel Hill
Research Associate - Department of Microbiology and Immunology, University of North Carolina, Chapel Hill
Research Interests - Immunology as it relates to burns, trauma and infectious disease

Ambikaipakan Balasubramaniam, PhD

Professor
PhD - University of Exeter, England
Postdoctoral Research Associate, Departments of Surgery and Pharmacology & Cell Biophysics - University of Cincinnati Medical Center
Postdoctoral Research Associate - University of Illinois, Chicago
Postdoctoral Research Associate - University of Iowa
Research Interests - Pharmacology of neurogastrointestinal hormones in feeding and GI disorders



Steven T. Boyce, PhD

Professor
Director, Skin Substitute Laboratories, Shriners Burns Hospital Cincinnati

BA and PhD - University of Colorado in Boulder
Post-doctoral - University of California San Diego Medical Center
Research Interests - Tissue engineering and cell biology

Charles C. Caldwell, PhD

Assistant Professor
Lymphocyte Section, Trauma, Sepsis and Inflammation Research Group

BA - University of California, San Diego
PhD - San Diego State University
Research Interests - Immunomodulation of lymphocyte function by the hypoxia inducible factor and adenosine receptors

William T. Chance, PhD

Research Associate Professor
BS - Purdue University
MA - Psychology, Northern Illinois University
PhD - Biopsychology, Northern Illinois University
Postdoctoral Fellow in Pharmacology - Medical College of Virginia
Postdoctoral Fellow in Clinical Psychology - Veterans Administration Hospital, Richmond, VA
Research Interests - Central nervous system mechanisms of feeding and drinking; cancer anorexia and cachexia; behavioral effects of neuropeptides; nutrition

J. Howard James, PhD

Research Associate Professor

BS - University of Pittsburgh

PhD (Physiology) - University of Cincinnati

Research Interests - Altered carbohydrate and muscle protein metabolism after trauma, sepsis or burn injury; relationship of Na,K-ATPase activity to control of muscle energy metabolism

Cora K. Ogle, PhD

Research Professor

BA - Trinity College, Washington, DC

PhD - University of Cincinnati

Research Interests - Immunology in burns, infectious disease, and transplantation, including the roles of neutrophils and macrophage adhesions in host defense

Sulaiman Sheriff, PhD

Research Assistant Professor

BS and MS - University of Madras, India

PhD - All India Institute of Medical Sciences

Postdoctoral Research Associate, Peptide Biochemistry - University of Cincinnati

Postdoctoral Research Associate, Signal Transduction - Cincinnati Children's Hospital Medical Center

Research Interests - Peptide hormones in obesity, diabetes and anorexia

Susan E. Waltz, PhD

Associate Professor

BS - Biology, Youngstown State University

PhD - Biomedical Science, Wright State University

Research Interests - Regulation of growth factors and receptor tyrosine kinases in human disease

Shao-Chun Wang, PhD

Assistant Professor

BS - Taipei Medical University

PhD - University of Minnesota

Research Interests - The molecular mechanisms regulating receptor tyrosine kinases as well as the proteins involved in cell cycle progression and chromosomal integrity.

Roger T. Worrell, PhD

Research Assistant Professor

BS - Rhodes College, Memphis

MS - University of Alabama at Birmingham

PhD - University of Alabama at Birmingham

Research Interests - Epithelial ion transport

Xaoting Zhang, PhD

Assistant Professor

BS - Hangzhou University, P.R. China

PhD - University of Iowa

Research Interests - The molecular mechanisms governing transcriptional and epigenetic regulation of gene expression and their de-regulation in cancer

Glendon Zinser, PhD

Research Assistant Professor

BS - Ball State University

PhD - University of Notre Dame

Research Interests - The process by which Vitamin D3, bound to the Vitamin D3 Receptor, participates in regulating normal mammary gland development and growth, and inhibits transformed mammary epithelial cells

Adjunct Research Faculty

Alice N. Neely, PhD

Adjunct Professor

Director of Infection Control, Shriners Burns Hospital Cincinnati

BS - University of Massachusetts, Amherst

PhD - Pennsylvania State University College of Medicine, Hershey, PA

Research Interests - Infection control, microbial virulence, and antimicrobial therapies in burned hosts

Dorothy M. Supp, PhD

Adjunct Research Assistant Professor

Research Scientist, Shriners Burns Hospital Cincinnati

BS - Cornell University College of Agriculture and Life Sciences

PhD - University of Cincinnati College of Medicine

Postdoctoral Fellowship - Cincinnati Children's Hospital Research Foundation

Research Fellowship - Shriners Burns Hospital Cincinnati

Research Interests - Genetic engineering of cultured skin substitutes

Further information on the Division of Research can be viewed on our website <http://surgery.uc.edu>.