

## Summary of Research Interests of Participating Faculty

### **John Arthur, MD, PhD, Medicine/Nephrology**

John M. Arthur, MD, PhD is Associate Professor of Medicine and Director of the Nephrology Proteomics Facility, which is closely linked to the MUSC NHLBI Proteomics Center of Excellence. He is Director of Dialysis at the Ralph H. Johnson VA Medical Center. Dr. Arthur has developed a biomarkers program that combines clinical research with high-end mass spectroscopy and other protein separation and detection methods. His special clinical interests include the diagnosis and treatment of acute renal failure and diagnosis and management of electrolyte and acid-base abnormalities. His research interests focus primarily on biomarker discovery, mechanisms of injury in acute kidney injury and technology development in Proteomics. Dr. Arthur recently obtained a new R01 grant and a VA Merit Award, and spearheaded the development of a SC COEE in Renal Biomarkers approved for \$5 MM of state matching funds with an official award date of June 9, 2008.

### **Prabhakar Baliga, MD, Surgery/Transplant**

Prabhakar Baliga, MD, is Professor and Chief of the Division of Transplant Surgery at MUSC. Dr. Baliga's interests focus on liver, kidney, and small bowel transplantation; hepatobiliary surgery; and, general surgery in renal failure patients.

### **Lauren Ball, PhD, Cell and Molecular Pharmacology**

Dr. Ball is Assistant Professor of Cell and Molecular Pharmacology. Her research interests include the role of O-GlcNAc Glycosylation in the Regulation of Insulin/IGF-1 Receptor Signal Transduction Pathways. Used in her laboratory is the tandem mass spectrometry to identify the exact sites of protein O-GlcNAc modification and phosphorylation. Mass spectrometry provides a powerful tool for the identification and quantification of posttranslational modifications and the discovery of unanticipated protein-protein interactions. Her lab is interested in developing proteomic methods to facilitate the isolation and identification of O-GlcNAcylated proteins to further examine the role of this modification in the regulation of protein function and its contribution to the development or progression of human disease. Elucidation of the mechanisms by which O-GlcNAc modification regulates signal transduction pathways may reveal novel targets of therapeutic intervention applicable to many human diseases

### **Craig Beeson, PhD, Pharmaceutical Sciences**

Dr. Beeson is Associate Professor in the Department of Pharmaceutical and Biomedical Sciences. Dr. Beeson's research interests include a fusion of chemistry and cell biology. Assays for cell metabolism are being combined with proteomic, NMR and mass spectrometric techniques to develop quantitative descriptions of biochemical networks. Analyses of these networks identify key molecular species that are potential targets for therapeutic agents. A primary focus is the biochemical network responsible for the regulation of energy metabolism and cellular proliferation. Specific projects include studies of T-cell activation and myocardial glucose utilization. The results of the T-cell studies are being used to develop possible treatments for autoimmune diseases such as Multiple Sclerosis. A byproduct of these studies has been the development novel peptide mimetics and library based synthesis and screening techniques, which are also being used to develop inhibitors of the M. tuberculosis iron dependent repressor and Topoisomerase I. These studies of myocardial glucose utilization have defined critical roles for lipoproteins in the regulation of mitochondrial respiration and glycolysis. These results are being used to evaluate the mechanisms of tissue injury due to ischemia-reperfusion.

### **Phillip Darwin Bell, PhD, Medicine/Nephrology**

Dr. P. Darwin Bell joined the MUSC Division of Nephrology in 2006 as DCI Professor of Medicine and Director of Research after serving on the faculty at UAB for 25 years. Dr. Bell has run a highly successful renal cell biology laboratory for decades, and brings expertise in biophysics, microscopy and electrophysiology to the Division. His research interests are in polycystic kidney disease and renal hemodynamics.

### **Maria Buse, MD, PhD, Medicine/Endocrinology**

Dr. Buse joined the faculty at MUSC in 1957. Her career has been marked by sustained excellence in research, teaching and mentorship. Dr. Buse has had continuous funding from the National Institutes of Health for nearly fifty years. She has made substantial and sustaining contributions toward understanding basic mechanisms through which diabetes mellitus alters cellular function, ultimately resulting in micro- and macro-vascular disease, and organ failure. Dr. Buse is widely acknowledged as the founder of the field of nuclear medicine in South Carolina, and of the field of endocrinology (along with her late husband, John) in South Carolina. Her clinical interests include diabetes, mechanisms of insulin resistance, insulin receptor regulation and signaling, amino acid metabolism and protein turnover, nuclear medicine, and endocrinology.

### **Rickey E. Carter, PhD, DBBE**

Dr. Carter is Assistant Professor in the Department of Biostatistics, Bioinformatics, and Epidemiology. His expertise includes clinical trials, pilot study design and analysis, longitudinal data and hierarchical linear models, and statistical methods in substance abuse research.

### **Kenneth Chavin, MD, PhD, Surgery/Transplant**

Dr. Chavin is a physician-scientist and Professor of Surgery at MUSC whose clinical work as a surgeon focuses on liver transplantation. His bench research focuses on mechanisms of liver injury, especially injury mediated by steatosis, which is a key detrimental condition for successful liver transplantation. His work has contributed significantly to the understanding of these mechanisms, with 7 published studies, including the cover of the American Journal of Transplantation. In particular, he has identified a key role for fatty acid synthase in the pathogenesis of steatosis, and commenced studies on the therapeutic use of FAS blockade in reversing steatosis. Dr. Chavin's work represents an ideal synthesis of basic and clinical medicine. Dr. Chavin has projects on steatosis (R01 DK069369, Protection of Steatotic Livers from Primary Nonfunction Livers), alcohol-induced steatosis, ischemia/reperfusion, and Vitamin E+/-C protection of steatotic livers exposed to ischemia/reperfusion. Dr. Chavin works extensively with the Lipid COBRE group at MUSC in the study of fatty acid synthase (his role on this project was completed 06/30/07). He has become a key leader in the pathobiology and translational efforts with focus on liver and metabolic diseases.

#### **Sonya Coaxum, PhD, Medicine/Nephrology**

Dr. Coaxum is an Assistant Professor of Medicine in the Division of Nephrology. Her research focuses on the structural aspects of the G protein-coupled 5-HT1A receptor and how it relates to the function of the receptor. Her research also focuses on signaling pathways in podocyte.

#### **Peter Cotton, MD, FRCP, Medicine/Gastroenterology**

Dr. Cotton is Medical Director of the Digestive Disease Center, Professor of Medicine, and Assistant Dean for International Activities at the Medical University of South Carolina in Charleston. His clinical interests focus on multidisciplinary care of patients with digestive problems and gastrointestinal endoscopy innovation.

#### **Rosalie Crouch, MD, Ophthalmology and Biochemistry**

Dr. Crouch is a Distinguished University Professor of Ophthalmology and Biochemistry. She is recognized internationally as an expert in the area of the roles of retinoids in the eye. Trained as a chemist, Dr. Crouch is a skilled retinoid synthetic chemist and has perfected the art of using retinoids as a means of probing the structure and function of retinoid binding proteins. Her findings have ranged from the very basic studies of retinoid interactions with specific amino acids in various retinoid binding proteins, particularly the opsins, to treatment of animal models with retinoids to prevent or alleviate retinal degenerative disorders. More specifically, she recently discovered that a vitamin A metabolite found in the retina, 11-cis retinol, is toxic to the dim-light photoreceptors (the rods). This retinol binds to the key protein in the photoreceptors used for normal daylight vision (the cones), which she is using to understand the interaction of retinoids with the photosensitive proteins of rods and cones. Recent progress in identification of components involved in recycling of retinoids has been unprecedented. Her research has focused on the rod and cone visual pigments and enzymes such as RPE65, retinyl ester hydrolases and retinol reductases that have critical roles in the retinoid cycle. She is active in investigating diabetic eye diseases, researching the implications of current studies on signal transduction and human disease to neoproliferative blood vessels in diabetic retinopathy. Dr. Crouch collaborates with top laboratories throughout the world, using a variety of sophisticated biophysical methodologies, from electron spin resonance to single cell electrophysiology, for the studies ranging from protein structure to whole animal models.

#### **Mark DeLegge, MD, Medicine/Gastroenterology**

Dr. DeLegge is a Professor of Medicine in the Digestive Disease Center, Director of the Digestive Disease Service Line, and the Medical Director of Nutrition. Dr. DeLegge is also the Chairman of the Nutrition Committee, the Pharmacy and Therapeutics Committee, and the Dietetic Internship Program. He manages patients with complex medical problems such as malabsorption and short bowel syndrome and is the specialist for placement of feeding tubes in the gastrointestinal tract and the subsequent management of those patients. His nutrition research focuses on nutritional assessment, parenteral nutrition and enteral nutrition, and he is very active in gastroenterology. In addition to the diagnostic and therapeutic endoscopic procedures, he focuses on hemorrhoid treatment, gastrointestinal fistula treatment, gastrointestinal stenting, endoscopic treatment of GERD and Barrett's esophagus, and stricture/achalasia dilation. He is very active in the development of new endoscopic techniques, especially in the field of the endoscopic management of obesity.

#### **Vanessa Diaz, MD, MS, Family Medicine**

Dr. Diaz is currently the Women's Health Coordinator in the Department of Family Medicine. She joined MUSC's research division as a faculty member in 2004. Dr. Diaz's research interests include Latino health, obesity, cardiovascular disease and women's health issues.

#### **Jennifer Donovan, PhD, Psychiatry & Behavioral Sciences**

Dr. Donovan is an Assistant Professor in the Clinical Neuroscience Division of the Department of Psychiatry and Behavioral Sciences. Dr. Donovan's main research interest is to better understand how naturally occurring chemicals present in foods and supplements affect human health and disease. The biological effects of phytochemicals are dependent upon numerous processes, including absorption, transport, metabolism, and differential effects on cellular targets and signaling pathways. Recognition of specific metabolic pathways, as well as the genetic and environmental factors that affect their regulation, is essential to elucidate the mechanisms of action of phytochemicals in the context of specific diseases.

**Valerie Durkalski, MPH, PhD, DBBE**

Dr. Durkalski is a Research Associate Professor in the Department of Biostatistics, Bioinformatics, and Epidemiology. Her interests include design and conduct of clinical trials, non-inferiority designs and methods, analysis of clustered categorical data, digestive diseases and neuroscience.

**Brent Egan, MD, Medicine/Internal Medicine**

Dr. Egan is a Professor of Medicine and Pharmacology. He has been very active in patient care, research and training for more than two decades and has become very visible in health services research during the past decade. In the last several years, his priorities have turned to translating research into practice and making a significant impact on the disproportionate rates of cardiovascular disease and complications among South Carolinians (especially African Americans in the state). This strong interest in health services research led to Dr. Egan's spearheading the development of the statewide Hypertension Initiative, whose goal is to reduce cardiovascular and end-stage renal disease by improving high blood pressure control rates in South Carolina from 25 percent to 50 percent. Dr. Egan's clinical and basic research examine mechanisms of cardiovascular risk in obesity and suggest that fatty acids participate in the pathophysiology of the metabolic syndrome through oxidative stress-sensitive pathways. His group is currently examining the effects of the DASH Eating Plan on oxidative stress in metabolic syndrome patients.

**Leonard Egede, MD, MS, Medicine/Internal Medicine**

Dr. Egede is a Professor of Medicine in the Division of General of Internal Medicine and Geriatrics. He is the Director of the MUSC Center for Health Disparities Research and the Director of the Charleston VA TREP – Understanding Health Disparities in Chronic Diseases. Dr. Egede has participated in and led research projects designed to understand racial/ethnic variations in health care. His expertise is in the interplay among psychosocial factors, race/ethnicity, and health outcomes for chronic diseases.

**Maria N. Garnovskaya, PhD, Medicine/Nephrology**

Dr. Garnovskaya is a classically trained biochemist with extensive experience in signal transduction pathways of G protein-coupled receptors and receptor tyrosine kinases. She is Associate Professor of Medicine in the Nephrology Division. She has established her own research program with consistent VA Merit Award funding. She has developed an interest in the regulation of mitogenic proteins in kidney mesangial, tubule and podocyte cells and vascular smooth muscle cells. Her program has focused on three primary targets involved in mitogenic pathways: sodium-proton exchanger type I, the retinoblastoma gene product pRb, and extracellular signal regulated protein kinase. She is also an expert in various biophysical methods, including surface plasmon resonance (BIAcore®), redox and proton microphysiometry and the FLIPR® laser fluorescence plate reader system. She has integrated those methods, along with biochemistry methods and confocal microscopy, into a complete signal transduction program.

**Gary Gilkeson, MD, Medicine/Rheumatology (Microbiology & Immunology)**

Gary Gilkeson, MD, is Professor of Medicine in the Division of Rheumatology and Vice Chair for Research in the Department of Medicine. His laboratory has had longstanding interest in systemic lupus erythematosus (SLE), particularly in factors associated with lupus nephritis. His translational research program ranges from molecules to populations, incorporating clinical trials, analyses of polymorphisms in well-defined pools of patients, animal models of lupus nephritis and biochemical studies. The major thrust of his laboratory is the study of inflammatory mediators of chronic renal diseases such as cytokines, nitric oxide, oxygen free radicals, environmental triggers and growth factors. Recent projects have focused on the regulation of various classes of nitric oxide synthase, PPAR-g, histone deacetylase and other targets in lupus nephritis.

**Monika Goz, MD, PhD, Medicine/Nephrology**

Dr. Goz is Assistant Professor of Medicine in the Division of Nephrology. She is a classically trained physiologist who has become well versed in cellular and molecular methods, including the use of ShRNA delivered via lentiviral vectors. Dr. Goz's current research focus is Inter-receptor crosstalk in proliferative diseases with special emphasis on kidney diseases and gastric cancer. Current research interests also focus on analyzing (1) role of integrins and matrix metalloenzymes (including the disintegrin and metalloenzyme ADAM group) in crosstalk between G-protein coupled receptors and receptor tyrosine kinases; (2) role of integrins in ADAM17 activation in gastric carcinogenesis during H. pylori infection. In vivo studies involve characterization of adult bone marrow cells in the development and/or attenuation of kidney fibrosis. Previous research focused on the effect of glucocorticoids on pulsatile growth hormone secretion; regulation of endogenous ouabain-like factor production in the adrenal gland and in volume expanded physiological and pathophysiological states; and Helicobacter pylori pathophysiology. Clinical research has involved studying methods and possibilities of cochlear implantation; characterizing blood level of endogenous ouabain-like factor (OLF) in preterm versus mature newborns at birth and characterizing blood OLF level in diabetic pregnant women.

**Kathie Hermayer, MD, Medicine/Endocrinology**

Dr. Hermayer is Associate Professor of Medicine and Endocrinology in the Division of Endocrinology, Diabetes, and Medical Genetics. Her research interests include treatment of diabetes, thyroid disease, adrenal disorders, osteoporosis, endocrinology, and hospital diabetes management.

**Yan Huang, MD, PhD, Medicine/Endocrinology**

Dr. Huang is Assistant Professor of Medicine and Endocrinology. His research interests include pathogenesis of cardiovascular complications of diabetes including the roles of matrix metalloproteinase, macrophage Fc gamma receptor, peroxisome proliferator-activated receptors (PPARs), and oxidation/glycation of lipoproteins; matrix metalloproteinase expression in cardiovascular and periodontal diseases in diabetes; and, the role of dietary flavonoids in plaque stability.

**Kelly Hunt, PhD, DBBE**

Dr. Hunt is Assistant Professor in the Department of Biostatistics, Bioinformatics, and Epidemiology. Her expertise is in cardiovascular disease, diabetes, gestational diabetes, and genetic epidemiology.

**Michael G. Janech, PhD, Medicine/Nephrology**

Dr. Janech is Assistant Professor of Medicine in MUSC's Nephrology Division and Research Scientist with the Ralph H. Johnson VA Medical Center. Dr. Janech serves as Associate Director of Nephrology Proteomics Laboratory and a faculty member for the graduate program at the Grice Marine Laboratory at the College of Charleston. Dr. Janech is actively involved in mentoring students through the NIH/NIDDK STEP-UP program for underrepresented minorities. He recently was awarded a Veteran's Affairs Career Development Award-2 to investigate urine biomarkers of glomerular disease and a grant through the US Navy to investigate biomarkers of domoic acid toxicosis in sea lions in collaboration with NOAA and The Marine Mammal Center in Sausalito, CA. His current research focus includes discovery of urine biomarkers for glomerular disease; discovery of serum biomarkers for domoic acid toxicosis in CA sea lions; proteomic analysis of biogenic sulfur production in sea-ice diatoms; analysis of ice binding proteins in sea-ice algae; and, biology of urea transporters in elasmobranchs.

**Carolyn Jenkins, RN, PhD, DrPH, RD, CDE, APRN-BC-ADM, FAAN, Nursing**

Dr. Jenkins is the Ann Darlington Edwards Endowed Chair and Professor in the College of Nursing. She has a joint appointment with the College of Health Professions and the College of Graduate Studies. Two major initiatives for Dr. Jenkins are the statewide South Carolina Diabetes Initiative where she served as the Director of Outreach and Charleston's Enterprise/MUSC Neighborhood Health Program that she founded in 1995. Currently, Dr. Jenkins is the Principal Investigator on the CDC funded REACH (Racial and Ethnic Approaches to Community Health) grant that focuses on reducing disparities and improving care for African Americans with diabetes. There is an emphasis on translating research into practices related to improving quality of health care, health care access and use. Dr. Jenkins has also set up registries for tracking diabetes care and control in several community health agencies with focus on improving outcomes related to diabetes in African Americans. Additionally she is PI on a NIH NINR grant which explores African American's use of the emergency department for non-emergent care for diabetes. Current and future research efforts are focused on further improvements in diabetes care and control, and identifying the contributions of each of the multifactorial interventions in eliminating disparities for diabetes care and control.

**Theresa Kelechi, RN, PhD, GNCS-BC, CWCN, Nursing**

Dr. Kelechi is an Associate Professor of Nursing. Dr. Kelechi's research interests include the use of infrared thermometry to detect the potential for stasis ulcer development in individuals with chronic venous disorders. She is also pursuing a clinical intervention for the prevention of leg ulcers related to chronic venous disorders. Clinically, she has an active foot and wound care practice at MUSC. She is the past recipient of grant awards from the National Institutes of Health, National Institute of Nursing Research, and the American Nurses Foundation.

**Keith Kirkwood, DDS, PhD, Oral Biology/Dental Medicine**

Dr. Kirkwood is an Associate Professor and Associate Dean for Research of the Department of Stomatology in the College of Dental Medicine at MUSC. Dr. Kirkwood's translational research explores the role of post-transcriptional cytokine regulation in periodontal inflammation and bone loss and the possibilities for new treatments in periodontal disease and other chronic inflammatory diseases. He has set three research priorities that relate to inflammation, cell signaling, cancer biology, tissue engineering and drug discovery. These priorities are improving head and neck cancer research, strengthening bioengineering research between MUSC and the state's top research universities and utilizing stem cell biology. Currently, he is the program director of the South Carolina COBRE for Oral Health Research that provides academic leadership in the continued development to targeted investigators of the College of Dental Medicine's oral and craniofacial health research program at MUSC.

**Robert J. Kolb, PhD, Pediatrics**

Robert Kolb, PhD is Assistant Professor of Pediatrics in the College of Medicine. Dr. Kolb is interested in renal tubular function and has begun to study the roles of cilia and specific ciliary proteins in polycystic kidney disease. He will focus his research on primary cilia and their role in glomerular podocyte cells, the major cell type affected at the onset of such diseases as minimal change disease, focal segmental glomerulosclerosis, lupus nephritis and diabetic nephropathy. The long-term goal is to understand the functional significance of the podocyte cilium as it relates to glomerular filtration. He will combine microscopy, physiology, molecular biology and electrophysiological techniques in his work. He was recently awarded a prestigious NIH-funded K award to further his research.

**Sergey Krupenko, PhD, Biochemistry and Molecular Biology**

Dr. Krupenko is an Associate Professor in the Department of Biochemistry and Molecular Biology. His research interests focus in the area of protein structure and function, enzyme mechanisms and enzyme regulation. Currently, his lab is focused on studies of one of the major enzymes of folate metabolism. The mainstream project in his lab is directed to explore FDH structure and mechanism. This includes characterization of the folate binding site of FDH activation; study of FDH oligomerization; resolution of the crystal structure of FDH and its domains expressed as separate proteins; and, study of the role of the flexibility of FDH domains in the protein structure and enzyme regulation. Recently discovered in his lab is that overexpression of FDH suppresses growth of several types of cancer cells. A new project has recently been initiated in his lab to investigate the role of FDH as a tumor suppressor, to explore the mechanisms of inhibitory effects of FDH on cancer cells and to elucidate the role of the enzyme in carcinogenesis. These studies apply cell culture models, human tumor xenografts in nude mice and apoptosis-related techniques to address the above questions. FDH will be further evaluated as a potential target for gene therapy.

**Daniel T. Lackland, DrPH, DBBE**

Dr. Lackland is a Professor and DBBE Graduate Training Director. The past president of the Mid-Atlantic Affiliate of the American Heart Association, he also serves on the AHA Stroke Council Leadership Committee, Epidemiology and Prevention Council Leadership Committee, High Blood Pressure Research Committee Leadership Committee, and recently completed service on the AHA National Research Committee. Dr. Lackland was appointed in 2008 to the NHLBI Global Risk Assessment Workgroup. Much of his research interest involves the population risk assessment of cardiovascular disease, stroke and hypertension. In particular, his work focuses on the factors associated with the racial disparity in disease, and the geographic patterns of disease through the assessment of the data and tissue samples from the Charleston Heart Study and Evans County Heart Study. He is currently collaborating on a study of the fetal origin of hypertension-related diseases and endothelial function. He is the principal investigator for the NIH-funded Black Pooling Project that is assessing the disparities in cardiovascular diseases and hypertension. In addition to these epidemiological investigations, Professor Lackland is involved in population high blood pressure control efforts. He is also involved with an assessment of the quality of hypertension treatment and control in the SC Medicaid population.

**Renata Leite, DDS, MS, Oral Biology/Dental Medicine**

Dr. Leite is an Assistant Professor in the College of Dental Medicine's Department of Stomatology, Division of Oral and Community Health Sciences, Oral Biology. Dr. Leite's research interests include studying the relationship between periodontal diseases and Type 2 diabetes mellitus in the Gullah population and the effects of mechanical periodontal therapy and systemic antibiotics on the glycemic control and the active matrix metalloproteinase-8 (aMMP-8) level in the gingival crevicular fluid (GCF) of these patients. The overall hypothesis for this particular research effort is that treatment of periodontal disease will produce better diabetes glycemic control and reduced levels of the catalytically active form of MMP-8 in the Gullah African American diabetes patients living on the Sea Islands of South Carolina's coast.

**John Lemasters, MD, PhD, Pharmaceutical Sciences (Biochemistry & Molecular Biology)**

Dr. Lemasters is the COEE Endowed Chair and Director of the Center for Cell Death, Injury and Regeneration at MUSC. He is a world-renowned pioneer in laser scanning confocal microscopy, a powerful research tool allowing the visualization of the functioning of single cells with an unprecedented degree of clarity. His major research interests are in understanding how the liver becomes damaged during chronic alcohol use and in understanding aberrant mitochondrial signals associated with cell injury, repair and death. His work is particularly relevant to liver and renal cell biology. Dr. Lemasters is an expert in confocal and multiphoton microscopy methods.

**Maria Lopes-Virella, MD, PhD, Medicine/Endocrinology**

Maria Lopes-Virella, MD, PhD, is a Professor of Medicine, Division of Endocrinology, Metabolism and Medical Genetics, and Co-Director, Cholesterol Clinic. Dr. Lopes-Virella's major areas of research include glycation/oxidation of lipoproteins and lipoprotein metabolism in diabetes, macrophage activation and immune-mediated mechanisms of arteriosclerosis, LDL receptor gene regulation and mechanisms of endothelial dysfunction and plaque rupture. Dr. Lopes-Virella served on several Research Review Boards, including the Nutrition Study Section, NIH, the Endocrinology Merit Review Board, Department of Veterans Affairs and the National Review Committees of the ADA and AHA. She has also served as Chair of the Council on Complications for the American Diabetes Association. She is presently serving in the Medical Science Review Committee of the JDRFI.

**Louis Luttrell, MD, PhD, Medicine/Endocrinology (Biochemistry & Molecular Biology)**

Dr. Luttrell is a Professor of Medicine and Director of the Division of Endocrinology, Diabetes & Medical Genetics and fellowship program. His research focuses on atypical signaling pathways that emanate from G protein-coupled receptors and growth factor receptors. He was one of the first to pioneer the concept of signaling platforms or "signalsomes" for G protein-coupled receptors, and demonstrate that heptahelical receptors generate meaningful signals through non-G protein-dependent pathways. In particular, he has proved that arrestins generate key signals from type A and type B heptahelical receptors. His laboratory is interested in dissecting critical signaling pathways in vascular smooth muscle, bone, renal cells and parathyroid cells. Dr. Luttrell was named MUSC Eminent Scholar in Molecular and Cellular Endocrinology in 2007, one of the first three faculty members to receive Eminent Scholar designation at MUSC.

**Arch Mainous, PhD, Family Medicine**

Dr. Mainous is a Professor of Family Medicine and Biometry & Epidemiology and serves as Director of Research in the Department of Family Medicine at MUSC. His research interests focus on treatment of respiratory infections, continuity of care, diabetes, improving predictions of health risk, Latino health and culture, and antibiotic use and resistance. He recently served as principal investigator in a study on the relationship of continuity of care and stage of cancer at diagnosis.

**Tamara Nowling, PhD, Medicine/Rheumatology**

Dr. Tamara Nowling is an Assistant Professor of Medicine in the Division of Rheumatology and Immunology. Her research focuses on the transcriptional regulation of gene expression during development with the goal of understanding the underlying mechanisms involved in gene activation and repression. Her research has included identification of cis-regulatory elements, transcription factors, and co-factors involved in the regulation of spatial and temporal gene expression. Furthermore, Dr. Nowling's studies have examined the mechanisms involved in the regulation of transcription by distal enhancers and in the repression of gene expression during differentiation. Studies of the transcriptional regulation of genes identified as playing a role in inflammatory diseases could eventually aid in the treatment of disease. Deciphering how genes involved in inflammatory diseases are regulated in normal tissue and diseased tissue may lead to treatments that allow up-regulation of disease preventing genes and down-regulation of disease promoting genes.

**Janardan Pandey, PhD, Micro & Immunology**

Dr. Pandey is a Professor in the Department of Microbiology and Immunology. The primary focus of his research is directed towards understanding the mechanisms underlying the involvement of immunoglobulin allotypes in spontaneous and treatment-induced clearance of infection with hepatitis C virus. Genetics of immunity to malaria is also being investigated. The genetic control of humoral immunity to the tumor-associated antigen MUC1 has recently been added to his lab's investigations. These studies are supported in part by grants and contracts from the National Institutes of Health and the Centers for Disease Control and Prevention.

**John Raymond, MD, Medicine/Nephrology**

Dr. Raymond is DCI Professor of Medicine and Vice President of Academic Affairs and Provost of MUSC. His research interests focus on signaling cascades that are initiated by G protein-coupled receptors and receptor tyrosine kinases, which regulate mitogenic cascades and relevant target proteins such as pRb, ERK, and NHE-1. The laboratory has developed an interest in mesangial and podocyte cell signaling that regulates mitogenesis, oxidant production and fibrotic markers. Dr. Raymond has studied the overlapping roles of hormones that activate mesangial cell growth, generation of reactive oxygen species, regulation of various kinases, and upregulation of genes and proteins involved in glomerular matrix deposition and metabolism. He has begun to use proteomic methods to identify and characterize protein-protein interactions and signaling cassettes involved in those cascades, with particular emphasis on proteins that associate with G protein-coupled receptors, EGF receptors and type I sodium-proton exchangers. All these molecules are involved in regulating mitogenesis and/or matrix metabolism.

#### **Titus Reaves, PhD, Cell Biology & Anatomy**

Dr. Reaves is Assistant Professor in the Department of Cell Biology and Anatomy. His research interests involve epithelial cell biology and neutrophil (PMN) migration. PMN migration is the immune systems first line of defense against infection serving as a major component of the acute innate inflammatory response. PMN transmigration is also common in a number of inflammatory diseases of the gastrointestinal system (ulcerative colitis, Crohn's disease, bacterial enterocolitis), hepatobiliary system (cholangitis, acute cholecystitis), urinary tract (pyelonephritis, cystitis), respiratory tract (bronchial pneumonia, bronchitis, cystic fibrosis) and others. The primary goal of his research is to understand the molecular events that regulate PMN migration and how the epithelium interacts with PMN to facilitate such migration.

#### **Jospeh Romagnuolo, MD, MSc, FRCPC, FASGE, FACC, Medicine/Gastroenterology**

Dr. Romagnuolo is an Associate Professor of Medicine in the Division of Gastroenterology and Hepatology and is cross-appointed to the Department of Biometry, Bioinformatics and Epidemiology. He is also Director of Clinical Research for Gastroenterology and Hepatology. Dr. Romagnuolo's research interests are in clinical trials, economic analysis, and outcomes research in endoscopy, especially ERCP and EUS, biliopancreatic diseases, gastrointestinal malignancy and NOTES.

#### **Rick Schnellmann, PhD, Pharmaceutical Sciences (Biochemistry & Molecular Biology)**

Dr. Schnellmann is a Professor and Chair of the Department of Pharmaceutical and Biomedical Sciences. He is a renal toxicologist with a strong commitment to renal investigation. He has a longstanding interest in the cellular effects of renal toxicants on apoptosis, repair and regeneration. Much of his previous and current research has been focused on proteases (calpains, etc.), but he is an expert on many common cellular signaling pathways that involve second messengers, enzymes and phosphorylation cascades. He has recently characterized nontraditional pathways of apoptosis in the kidney and is exploring their linkages to toxicant-induced renal injury.

#### **Joseph Schoepf, MD, Radiology**

Dr. Schoepf is Associate Professor of Radiology and Cardiology Director, CT Research and Development. Dr. Schoepf is a pioneer in cardiac CT applications and has performed this test for the last decade, witnessing the evolution of this technology from humble beginnings to its current state-of-the-art. His main scientific interest is cardio-thoracic imaging, especially the use of multi detector-row CT for diagnosing coronary artery disease.

#### **Elizabeth Slate, PhD, Biostatistics, Bioinformatics, and Epidemiology**

Dr. Slate is a Professor and Director of the Biostatistics Division in the Department of Biostatistics, Bioinformatics, and Epidemiology at MUSC. She has two major areas of research interest. The first area is modeling and inference for longitudinal biomarkers of disease, in which statistical models are developed that characterize the association between the biomarker and disease process to better predict disease initiation and progression. Recent work in this area addresses contexts such as recurrent cancer and an associated biological marker that conveys information about the risk for subsequent cancers, and recurrent cardiovascular disease events and markers such as stress, cholesterol or blood pressure levels. This project develops modeling and prediction methods that allow for the effects, on both the marker and event processes, of interventions following event occurrences. A second area is the development and application of statistical methods for oral health research, which emphasizes the importance of accommodating dependence among outcomes obtained from the same subject (e.g. measurement from multiple sites within a patient's mouth). Work within the Biostatistics Core for the South Carolina COBRE for Oral Health has demonstrated the impact of this clustering on summaries of oral outcomes, associations between oral and systemic outcomes, and agreement among oral examiners. Other aspects of this work include statistical methods for the identification of protein biomarkers for periodontal disease; modeling censored, clustered outcomes and predictors; and measurement error models. Through the MUSC Proteomics Center, Dr. Slate is also extending her work to include methods for identification of protein biomarkers from mass spectrometry experiments.

#### **Alison Smith, DVM, Comparative Medicine**

Dr. Smith has 15 years of experience developing and refining surgical models with swine in research. She has extensive experience with anesthetic regimens and perioperative support. Her experience with cardiovascular surgical models includes pacing-induced dilated cardiomyopathy, pressure and volume overload models of cardiac hypertrophy, pacemaker lead testing, hypertension, and fetal surgical models. She has collaborated in fetal surgeries for stem cell

injections. Many of the surgical models have involved maintenance of chronic cannulas for long-term sampling or drug administration.

**Adam Smolka, PhD, Medicine/Gastroenterology**

Dr. Smolka is a Professor of Medicine in the Division of Gastroenterology and Hepatology. His current research interests include molecular structure-function relationships in the gastric proton pump, pathophysiology of *Helicobacter pylori* infection of the gastric mucosa, and proteomic analysis of esophageal cancers. Previous research at NASA Marshall Space Flight Center, Huntsville, Alabama, focused on bioseparations technology, including microgravity cell electrophoresis, and modification of cell electrophoretic mobility using synthetic polymeric microspheres.

**Jeremy Soule, MD, Medicine/Endocrinology**

Dr. Soule is Assistant Professor in the Division of Endocrinology, Diabetes, and Medical Genetics. His interests are in intensive diabetes therapy, insulin pumps and general endocrinology, including thyroid and bone disease.

**Stephen Tomlinson, PhD, Microbiology and Immunology**

Dr. Tomlinson is a Professor of Microbiology & Immunology at MUSC. His research activities focus on the biology of the complement system with an emphasis on membrane-bound complement inhibitory proteins. Complement is a group of more than 30 soluble and cell surface proteins that represent a crucial component of immune system. The Tomlinson laboratory is involved in developing inhibitors of complement for the treatment of autoimmune and inflammatory disease and for disease states associated with bioincompatibility (eg. transplantation). Systemic inhibition of complement in rodent models has shown promise for treatment of various inflammatory conditions, but there remain serious questions concerning the clinical use of systemic complement inhibitors. Therefore, the Tomlinson group is working in close collaboration with Drs. Gilkeson and Silver et al. to develop target inhibitors that could act as "smart drugs" to act on specific parts of the immune system involved in diseases like juvenile arthritis, lupus, and multiple sclerosis. They are currently testing target inhibitors in a mouse model of arthritis. The Tomlinson lab is also investigating the molecular interaction between the complement inhibitor CD59 and its complement ligand, the membrane attack complex. Defining functional regions of CD59 may lead to the development of effective complement inhibitors for therapeutic intervention in inflammatory disease. In addition, understanding the mechanisms of complement inhibition may allow the design of efficient inhibitors of CD59 that may enhance immunotherapies involving anti-tumor complement activating antibodies. Studies involve mutagenesis, molecular modeling and direct structural determinations (crystallography and NMR).

**Marcelo Vela Aquino, MD, MS, Medicine/Gastroenterology**

Dr. Vela is an Associate Professor of Medicine in the Division of Gastroenterology and Hepatology. Dr. Vela's research interests are in esophageal disease and swallowing disorders. His research efforts have been concentrated in the use of multichannel intraluminal impedance monitoring, alone and in combination with manometry and pHmetry, for gastroesophageal reflux detection and esophageal function measurement. He is also currently funded to study the use of electron microscopy for assessment of esophageal epithelium in GERD patients.

**Juan Carlos Q. Velez, MD, Medicine/Nephrology**

Dr. Velez is an Assistant Professor of Medicine and Associate Investigator of the Department of Veterans Affairs. Dr. Velez's laboratory investigates the local generation of angiotensin II and other biologically active angiotensin-derived peptides in resident glomerular cells under normal or high ambient glucose, with emphasis on non-ACE pathways for angiotensin II generation by podocytes. He is working on the development of a sensitive and highly specific technique for angiotensin peptide determination from conditioned cell culture media using matrix-assisted laser/desorption/ionization (MALDI) time of flight (TOF) mass spectrometry. Dr. Velez is also interested in investigating the effects of aldosterone and angiotensin-derived peptides on fibrogenic proteins in glomerular cells.

**Carol Wagner, Professor, Pediatrics**

Dr. Wagner is a Professor in the Department of Pediatrics in the Division of Neonatology and Associate Director of MUSC's General Clinical Research Center (GCRC). Under SCTR she will continue as the Associate Director of the PCIR Program for pediatric studies. Dr. Wagner's current investigations focus on vitamin D metabolism and requirements during pregnancy, lactation and early childhood, as well as the potential role of vitamin D in prevention of long-latency conditions such as type 1 and 2 diabetes, multiple sclerosis, rheumatoid arthritis, and lupus. She has recently initiated a population-based study of vitamin D requirements of pregnant women and their children in rural South Carolina as a model for community health centers across the nation.