OVERVIEW: CY2013 AND FUTURE PLANS

This document represents the third annual report of the newly formed Institute for Reproductive Health and Regenerative Medicine (IRHRM) at the University of Kansas Medical Center (KUMC). Executive Vice Chancellor Barbara Atkinson established the IRHRM during the fall of 2010 with the intent of coalescing the efforts of three smaller research units engaged in overlapping research missions. The Center for Reproductive Sciences, which had its origins in the 1960s under the leadership of Gilbert Greenwald, the research arm of the Department of Obstetrics and Gynecology, and the Institute of Maternal-Fetal Biology, a group with interests in developmental and regenerative biology, were brought under the umbrella of the IRHRM.

The IRHRM is organized into three centers:

i) Center for Epigenetics and Stem Cell Biology (CESCB)
ii) Center for Reproductive Sciences (CRS)
iii) Center for Developmental Origins of Health and Adult Disease (CDOHAD)

The goal of the IRHRM is to facilitate investigator and especially multi-investigator research initiatives in basic, translational, and clinical research directed toward reproductive health and regenerative medicine. The institute is committed to enriching the scientific and intellectual environment of its membership and enhancing the infrastructure and resources available to facilitate these endeavors. Programs in faculty development, postdoctoral training, and graduate education are integrated into the institute and will be further developed. Generation of intellectual property and community outreach will also be emphasized. Through these efforts, the institute will become the premier research unit in reproductive health and regenerative medicine. Success will be measured in terms of the profile and impact of research performed by its scientists.

The IRHRM currently consists of 89 researchers at KUMC (75), KU-Lawrence (9), Kansas State University (3), UMKC (1) and MU (1) representing 26 different academic departments. We anticipate growing through the addition of investigators from KUMC, KU-Lawrence, and other Kansas City area institutions. Members participate in IRHRM efforts by performing outstanding research related to the Institute’s mission, pursuing programmatic efforts with colleagues, recommending and hosting visiting scientists for our seminar series, and participating in chalk talks and scientific interactions sponsored by the Institute.

Activities

1) The IRHRM supports submission of grant applications from its membership. Our administrative staff facilitates interactions between the Investigator and the Research Institute/Sponsored Programs Administration staff, including all work in Cayuse (KUMC's online grant submission system). During CY2013, the IRHRM administrative staff has assisted our members with 15 grant submissions, including the submission of two multi-investigator NIH program project applications. The IRHRM distributes information about relevant grant opportunities and has established an effort to provide scientific peer review and feedback prior to grant application submissions.

2) The IRHRM facilitates programmatic research efforts. This is accomplished in several ways including our monthly center-based chalk talks (see below) and through organizing meetings for investigators with common research interests. Our leadership and administrative staff also are available to guide these focus groups through the preparation of multi-investigator grant applications. These efforts have resulted in the formation of some research focus groups:
These potential programmatic efforts have different trajectories. Some have submitted multi-investigator grant applications, while others are at earlier stages of the process.

3) The IRHRM is involved in organizing a number of different events that support its membership. These include:

Institute for Reproductive Health and Regenerative Medicine Seminar Series. The IRHRM supports interactions with 10-12 visiting scientist per semester. Each visiting scientist presents a lecture and meets with faculty and trainees during their visit.

Greenwald Symposium in Reproduction. This event is an annual day and a half symposium that was initiated in 2004 to honor Dr. Gilbert Greenwald. The symposium provides our faculty and trainees in the reproductive sciences with an opportunity to interact with outstanding scientists.

Special Lectures. The IRHRM organizes two annual lectures. The Donald C. Johnson Lecture is focused on reproduction, whereas the James L. Voogt Lecture is focused on neuroendocrinology. Each lecture brings an outstanding scientist to KUMC to lecture and visit with our faculty and trainees. A third special lecture focused on stem cell biology has been established in honor of Dr. Ivan Damjanov and is scheduled for the spring of 2014.

Monthly Center Chalk Talks. Our "Chalk Talks" consist of informal presentations and discussions of research ideas, preliminary data, and potential specific aims for future grant applications. All three of our Centers hold monthly Chalk Talks, and scheduling is flexible to meet the investigators’ needs.

4) Distribution of pilot funds to promote collaborative research efforts. Twelve pilot awards, each ranging from $5,000 to $10,000, were distributed in the fall of 2013. Awardees will present the outcomes of their research in the Chalk Talks and formal progress reports will be due in the spring of 2014.

5) The IRHRM oversees and maintains equipment that is located on the 3rd floor of the Hemenway Building. The equipment includes centrifuges, microscopes, film developer, etc.

6) The IRHRM manages a Reagent Store, which provides convenient and discounted laboratory reagents and supplies for members of the IRHRM and KUMC research community.

7) The IRHRM also contributes to the communication of the research accomplishments of our membership. These efforts include a website, newsletter, and interactions with the public relations unit of KUMC.
Objectives for the coming year

1) Grant submissions: Our administrative efforts in supporting the submission of grants will continue. We plan to increase the number of research proposals undergoing internal scientific review prior to submission.

2) Programmatic efforts: We will continue to facilitate multi-investigator research initiatives. As the programmatic research focus groups mature, we will help them identify seed funds to assist with their collaborative efforts and prepare them for eventual grant submission.

3) Our seminar series, faculty chalk talks, and scientific/social interactions will continue during the upcoming year.

4) Greenwald Symposium and special lectures: The 2014 Greenwald Symposium has been set for November 2014 and the speakers and venue determined. The Johnson, Voogt, and Damjanov Lectures have been set for the spring of 2015 and the speakers have been confirmed.


6) The IRHRM will continue to manage the Reagent Store and oversee and maintain shared equipment.

7) The IRHRM will also continue to communicate the research accomplishments of our membership through our website and newsletter.

8) Appointment of a Director for the Center for Reproductive Sciences.

9) Continued expansion of our membership.

10) Establishment of a dialog with KUMC Endowment and efforts in securing philanthropy to support the mission of the IRHRM.
The Center for Epigenetics and Stem Cell Biology (CESCB)

Center Director: Kenneth R. Peterson, PhD

CESCB Overview

Members of the Center for Epigenetics and Stem Cell Biology investigate how cells become specialized in their function. This process is referred to as cell differentiation. Cell differentiation is a hallmark of embryogenesis. During embryonic development, cells increase in number, become specialized, and organize into tissues. Some examples of cell specialization include the formation of red blood cells, which transport oxygen; muscle cells, which produce movement; and neurons, which allow us to reason. The developmental fate of an undifferentiated cell, also referred to as a stem cell, is dictated by the cell's genetic program and its interactions with its environment. Acquisition of a specific cell fate is associated with the systematic modulation of regulatory processes controlling the function of genes and proteins. Abnormalities in cell differentiation cause birth defects and lead to adult disease. Understanding molecular mechanisms controlling cell differentiation will result in the development of new strategies for the treatment of disease. These approaches will include the generation of unique drug- and cell-based therapies. The applications of these new therapeutic tools will be numerous and include potential treatments for infertility and a diverse range of debilitative diseases, such as, cancer, diabetes, liver fibrosis, stroke, heart disease, vascular and blood diseases, Alzheimer's and Parkinson's diseases, and spinal cord injury, in addition to many others.

CESCB Chalk Talks: January to December, 2013

“Notch vs. Ikaros – T Cell Development or Leukemogenesis”, Thomas M. Yankee, PharmD, Ph.D., Microbiology, Molecular Genetics, and Immunology, January 16, 2013

“Epigenetic Regulation of NFAT1 Expression in Articular Chondrocytes and its Implication in Osteoarthritis”, Jinxi Wang, M.D., Ph.D., Orthopedic Surgery, February 20, 2013

“The Regulation of Growth and Development by O-G1cNAc”, Chad Slawson, Ph.D., Biochemistry & Molecular Biology, March 20, 2013

“Ncb5or-dependent Iron Hematostasis in Beta-Cell Function and Survival”, Hao Zhu, Ph.D., Clinical Laboratory Services, May 15, 2013

“Reprogramming of Human Somatic Cells into Cardiac Progenitor Cells”, Rajasingh Johnson MPhil, Ph.D., HCLD, Cardiology, May 22, 2013

“Discovering Novel Anti-Cancer Survivin Inhibitors Through Protein Dynamics Analysis”, Jed Lampe, Ph.D., Pharmacology, Toxicology & Therapeutics, July 31, 2013

“Regulation of Osteosarcoma Malignancy by Adenosine A3 Receptor”, Tomoo lwakuma, Ph.D., Cancer Biology, August 21, 2013

“SPECC1L Modulation of Neural Crest Cell Delamination and Migration”, Irfan Saadi, Ph.D., Anatomy & Cell Biology, November 13, 2013

“Genome Editing in Pluripotent Stem Cells and Beyond”, Jay Vivian, Ph.D., Pathology & Laboratory Medicine, November 15, 2013
The Center for Reproductive Sciences (CRS)

Interim Center Director: Michael J. Soares, PhD

CRS Overview

In seeking new avenues for translational research, the Center for Reproductive Sciences retains a dual focus on the issues of population control and treatment of human infertility. Active basic and applied programs melding experts in the areas of molecular genetics, developmental and cellular biology synergize the use of various animal models with state-of-the-art technology resources to address human reproductive health problems. Amongst these, basic research programs in gonadal physiology, gamete maturation, fertilization, pre and peri-implantation development, reproductive tract disorders, and endocrine disruptors are collaboratively integrated to investigate disease states that impact humans. Genetic and epigenetic causes of birth defects, human ARTs, ovarian cancer, paternal and maternal forms of infertility, endometriosis and uterine fibroids all represent thematic focus groups upon which the Center is designed.

CRS Chalk Talks: January to December, 2013

“The Prolactin Family, Reproductive Adaptions, and Big Testes”, Michael J. Soares, Ph.D., Pathology & Laboratory Medicine, January 23, 2013

“Neuroplasticity of the Female Reproductive Tract”, Neuroplasticity of the Female Reproductive Tract, Peter G. Smith, Ph.D., Molecular & Integrative Medicine, February 6, 2013

“The Testis Specific Na, K-ATPase Alpha4 Isoform is Essential for Male Fertility”, V. Gustavo Blanco, M.D., Ph.D., Molecular and Integrative Physiology, March 5, 2013

Targeted Esr1 Knockout in Rats Using Zinc Finger Nuclease-mediated Genome Editing”, M.A. Karim Rumi, MBBS, M.S., Ph.D., Pathology & Laboratory Medicine, April 3, 2013

“Challenges of Cancer Prevention”, Brian K. Petroff, DVM, Ph.D., Internal Medicine, May 1, 2013

“Sex Matters (in migraine)”, Nancy Berman, Ph.D., Anatomy & Cell Biology, October 2, 2013

“Impact of Pregnancy on Cancer Risk: is a Role of the Immune System?”, Peggy Petroff, Ph.D., Anatomy & Cell Biology, November 6, 2013

“Ovarian Tissue Cryopreservation for Fertility Preservation and Primordial Follicle Activation in the Rhesus Macaque”, Alison Ting, Ph.D., Oregon Health & Science University, December 2, 2013
The Center for the Developmental Origins of Health and Adult Disease (CDOHAD)

Center Director: Carl P. Weiner, MD

CDOHAD Overview

The quality of postnatal life has its origins in the womb. Scientists in the Center for the Developmental Origins of Health and Adult Disease seek to understand how maternal physiology and pathology impact fetal development and program postnatal health and disease. Pregnancy is a well conserved process and designed to ensure the survival of the species. A specialized and highly adaptive organ derived from the embryo called the placenta orchestrates pregnancy and creates the milieu in which the fetus develops. Failures in placental adaptations to the maternal environment lead to diseases of pregnancy, such as preeclampsia, intrauterine growth restriction, and pre-term birth. In utero insults have fundamental organizational effects on the developing fetus, which affect postnatal health and susceptibility to adult disease. Cardiovascular disease, obesity, and many cancers have their origins during fetal life. Consequently, the efforts of our researchers are key to improving the health and quality of life of our species.

CDOHAD Chalk Talks: January to December, 2013

“Regulation of Placental Drug Transporters in Normal and Pathological Pregnancies”, Clifford W. Mason, Ph.D., Obstetrics and Gynecology, January 9, 2013

“Novel Methods to Prevent Excessive Gestational Weight Gain in Overweight Women”, Holly Hull, Ph.D., Dietetics and Nutrition, February 13, 2013

“Cognition in Cardiometabolic Disease”, Kelly Bosak, Ph.D., APRN, Nursing, March 13, 2013


“Folate in Pregnancy: What More Needs to be Done?”, Devika Maulik, M.D., Maternal Fetal Medicine, June 13, 2013

“Purkinje Cell Protein 4 and Human Myometrial Contractility”, Clifford W. Mason, Ph.D., Obstetrics and Gynecology, September 25, 2013

“Fetal Growth Restriction and Abnormal Fetoplacental Angiogenesis”, Dev Maulik, M.D., Ph.D., UMKC, October 30, 2013


“Regulation of Metastatic Mechanisms in Ovarian Cancer by a Histone Demethylase”, Adam J. Krieg, Ph.D., Obstetrics & Gynecology, December 18, 2013
EVENTS

SEMINAR PROGRAM

The Institute for Reproductive Health and Regenerative Medicine Seminar Series

Established in Spring 2005 as the Research Seminar Series in Cancer and Developmental Biology, this seminar program's research emphasis and focus has evolved over time into developmental and regenerative biology. Distinguished scientists from across the nation present their work at KUMC and meet with faculty and trainees. The seminars are held at 8:30 am on Thursdays and are sponsored in part by the Peter T. Bohan Fund at the University of Kansas Medical Center. Below we have provided a full list of seminars held January to December, 2013.

“Mitochondria as Signaling Organelles,” Navdeep S. Chandel, Ph.D., Northwestern University, January 10, 2013

“Emerging Roles of Tcfap2c and Brg1 During Early Embryogenesis in the Mouse,” Jason G. Knott, Ph.D., Michigan State University, March 7, 2013


“Basal Cells and Growth Control in the Breast,” Lindsay Hinck, Ph.D., University of California, April 18, 2013

“Maternal Matrices in Fertilization and Early Development,” Jurrien Dean, M.D., NIDDK, NIH, May 2, 2013

“Pharmacoperones: A New Therapeutic Approach Un-Folding,” Annual James L. Voogt Lecture in Neuroendocrinology, P. Michael Conn, Ph.D., Oregon Health & Science University, May 9, 2013

“The Endometrial Stromal Cell: The Molecular Evolution of a Major Evolutionary Novelty,” Annual Donald C. Johnson Lecture in Reproduction, Günter P. Wagner, PhD, Yale University, May 16, 2013

“Liver Cell Transplantation,” Markus Grompe, M.D., Oregon Health & Science University, May 30, 2013


“What Does Our Genome Encode?” John A. Stamatoyannopoulos, M.D., University of Washington, September 19, 2013

“Evolution of the Placenta and the Emergence of Human Obstetrical Syndromes,” Derek E. Wildman, Ph.D., Wayne State University, October 3, 2013

“Pathogenic Basis of Excess Bone Formation in Pediatric Disorders,” Maurizio Pacifici, Ph.D., University of Pennsylvania, October 31, 2013
“Mutant p53 Regulates Nucleotide Metabolism,” Luis A. Martinez, Ph.D., University of Mississippi, November 21, 2013

“Transitional Zones, Stem Cells, and Cancer,” Alexander Yu. Nikitin, M.D., Ph.D., Cornell University, December 5, 2013

“Genome Transfer in Human Oocytes,” Dieter Egli, Ph.D., New York Stem Cell Foundation, December 12, 2013

SPECIAL LECTURES

Annual Donald C. Johnson Lecture in Reproduction

In honor of Dr. Johnson's research career, the reproductive biology group at the University of Kansas Medical Center hosts an annual lecture in the Spring, the Donald C. Johnson Lecture in Reproduction.

2013 Donald C. Johnson Lecture in Reproduction
Günter P. Wagner, PhD
Alison Richard Professor of Ecology and Evolutionary Biology
Yale Systems Biology Institute
Yale University
“The Endometrial Stromal Cell: The Molecular Evolution of a Major Evolutionary Novelty”
May 16, 2013

2014 Donald C. Johnson Lecture in Reproduction
Richard L. Stouffer, Ph.D.
Senior Scientist & Chief
Division of Reproductive & Developmental Sciences
Oregon National Primate Research Center
Oregon Health & Science University
“The Primate Ovary as a Model for Understanding and Treating Infertility”
April 3, 2014

2015 Donald C. Johnson Lecture in Reproduction
Teresa K. Woodruff, PhD
Thomas J. Watkins Professor of Obstetrics and Gynecology
Feinberg School of Medicine
Northwestern University
April 16, 2015

Annual James L. Voogt Lecture in Neuroendocrinology

In honor of Dr. Voogt's research career, the IRHRM at the University of Kansas Medical Center hosts an annual lecture in the Spring, the James L. Voogt Lecture in Neuroendocrinology.
2013 James L. Voogt Lecture in Neuroendocrinology
P. Michael Conn, PhD
Director of the Office of Research Advocacy
Senior Scientist in Reproductive Sciences & Neuroscience
Oregon National Primate Research Center
Professor of Physiology and Pharmacology, Cell Biology and Development, and OB/GYN
Oregon Health & Science University
“Pharmacoperones: A New Therapeutic Approach Un-Folding”
May 9, 2013

2014 James L. Voogt Lecture in Neuroendocrinology
Andrea C. Gore, Ph.D.
Gustavus & Louise Pfeiffer Professor of Pharmacology & Toxicology
Professor of Neuroscience, Cellular & Molecular Biology, and Behavioral Neuroscience
The University of Texas at Austin
“Are Environmental Endocrine Disruptors Impairing Reproduction, Brain, and Behavior?”
February 27, 2014

2015 James L. Voogt Lecture in Neuroendocrinology
Jon Levine, PhD
Director, Wisconsin National Primate Research Center
Endocrinology & Reproductive Physiology Program
University of Wisconsin-Madison
May 28, 2015

Annual Ivan Damjanov Lecture in Stem Cell Research

2014 Inaugural Ivan Damjanov Lecture in Stem Cell Biology
Peter W. Andrews, PhD
The Arthur Jackson Professor of Biomedical Science, Centre for Stem Cell Biology, Department of Biomedical Science, University of Sheffield, Sheffield, Great Britain
“Did Embryonic Stem Cells Come From Mars?”
March 27, 2014

2015 Ivan Damjanov Lecture in Stem Cell Biology
Barbara Knowles, PhD
Emeritus and Adjunct Professor, The Jackson Laboratory, Emeritus Research Director, Institute of Medical Biology, A*STAR, Singapore
SYMPOSIUM

Annual Gilbert S. Greenwald Symposium on Reproduction

The reproductive biology group at the University of Kansas Medical Center hosts the annual Gilbert S. Greenwald Symposium on Reproduction in honor and as a memorial to the life and research career of Gilbert S. Greenwald, Ph.D. Professor Greenwald had an illustrious career as a Distinguished Professor at the Medical Center and as an internationally recognized reproductive biologist.

10th Annual Gilbert S. Greenwald Symposium on Reproduction
October 17-18, 2013
Katherine F. Roby, PhD, Chair, Organizing Committee

Martin M. Matzuk, MD, PhD, Keynote Lecturer
Stuart A. Wallace Chair and Professor of Pathology and Immunology
Baylor College of Medicine, Director of Clinical Chemistry
Ben Taub General Hospital
“Genetic Manipulation of the Mouse for Translational Studies in Reproductive Medicine”

Frederick vom Saal, PhD, (Plenary)
Curator’s Professor, Division of Biological Sciences, University of Missouri-Columbia
“Fetal Exposure to Bisphenol A: Adverse Effects on Reproductive and Metabolic Systems and Why the FDA is Ignoring These Findings”

Mary Hunzicker-Dunn, PhD (Plenary)
Edward R. Meyer Distinguished Professor
School of Molecular Biosciences, Washington State University
“Tale of How FSH Hijacks Unexpected Signaling Pathways to Regulate Gene Expression in Granulosa Cells”

Louis J. Muglia, MD, PhD (Plenary)
Professor of Pediatrics, Obstetrics & Gynecology
University of Cincinnati College of Medicine, Cincinnati Children’s Hospital Medical Center
“Preventing Prematurity: Human Evolution, Genetics, and Birth Timing”

Kartik Shankar, PhD
Assistant Professor, Arkansas Children’s Nutrition Center
Dept. of Pediatrics, University of Arkansas Medical Sciences
“Maternal Obesity and Developmental Programming: A Translational Perspective”

Derek Boerboom, DVM, PhD (Plenary)
Associate Professor, Centre de Recherche en Reproduction Animale
Département de Biomédecine Vétérinaire, Faculté de Médecine Vétérinaire
Université de Montréal
“WNT Signaling in Ovarian Follicle Development and Function”

Aileen Keating, PhD
Assistant Professor, Department of Animal Science, Iowa State University
“Phosphatidylinositol-3 Kinase Signaling Involvement in Ovarian Xenobiotic Metabolism”

Shoukhrat Mitalipov, PhD (Plenary)
Senior Scientist, Division of Reproductive & Developmental Sciences
Oregon National Primate Research Center
Oregon Health & Science University

“Reproductive and Reprogramming Strategies for Treatment of mtDNA Disease”

Ryan A. Cabot, PhD
Associate Professor, Department of Animal Sciences, Purdue

“Histone Methylation and Embryo Development”

11th Annual Gilbert S. Greenwald Symposium on Reproduction
November 6-7, 2014

W. Lee Kraus, PhD, Keynote Lecturer
Cecil H. and Ida Green Distinguished Chair in Reproductive Biology Sciences
Professor and Vice Chair for Basic Sciences
Department of Obstetrics and Gynecology
UT Southwestern

“Characterization of the Estrogen-regulated Transcriptome in Breast Cancer Cells”

Marisa S. Bartolomei, PhD
Professor, Department of Cell and Developmental Biology
University of Pennsylvania
"Genomic Imprinting: ART and Science"

Amander Clark, PhD
Associate Professor, Department of Molecular, Cell and Developmental Biology
UCLA Broad Stem Cell Research Center
University of California, Los Angeles

"Arginine Methylation is Critical for Ground State Pluripotency and Germ Line Formation"

Kathy Sharpe-Timms, PhD
Professor and Director, Division of Reproductive and Perinatal Research
Director, MU Assisted Reproduction Labs
University of Missouri-Columbia
TBD

Jae-Wook Jeong, PhD
Associate Professor, Department of Obstetrics, Gynecology and Reproductive Biology
Michigan State University
TBD

David Zarkower, PhD
Professor, Department of Genetics, Cell Biology, and Development
Director, Developmental Biology Center
University of Minnesota

TBD
"Keeping Sex Signaling Safe: DMRT1 and Gonadal Transdifferentiation"

Suzanne Moenter, PhD
Professor, Departments of Molecular and Integrative Physiology, Obstetrics and Gynecology and Internal Medicine
University of Michigan

"New Insights into Reproductive Neuroendocrine Development"

Melinda E. Wilson, PhD
Associate Professor, Department of Physiology
University of Kentucky
TBD

Sundeep Kalantry, PhD
Assistant Professor, Department of Human Genetics
University of Michigan

"Novel Mechanisms of X-chromosome Inactivation"
Our laboratory employs genetic, molecular and imaging strategies to study basic aspects of the process of reproduction that bear on human disease and its clinical management by stem cell therapy. The overall emphasis is on Women's Health in relation to causes of human infertility, ovarian cancer, and the deployment of Assisted Reproductive Technologies (ARTS) for improving egg and embryo quality in human and animal models. Three project areas are actively under study:

1. **Fertility Preservation**—ameliorating the loss of fertility experienced by women undergoing radiation or chemotherapy is the goal of this research. Using our long standing interest in signaling between the somatic and germ cell components of the ovarian follicle, we have initiated projects that focus on (1) understanding the mechanisms that underlie DNA damage and repair in oocytes following chemotherapy or radiation induced damage; and (2) implementation of cryopreservation strategies for oocytes and ovarian tissues that could subsequently be used for embryo production.

2. **Cell Cycle Regulation In Oocytes and Embryos**—how modifications in cell cycle checkpoint control ensure chromosome balance during meiosis in oocytes and mitosis in embryos is investigated by biochemical, live cell imaging, and pharmacological approaches that permit assessment of genomic integrity during cell cycle progression. This strategy is used to understand the effects of maternal aging and/or environmental chemicals (endocrine disruptors) on oocytes or embryos produced by ARTs (in vitro maturation, in vitro fertilization).

3. **Stem Cell Biology**—stem cells derived from adult, embryonic, or iPSC sources hold great promise for providing new insights into the origins of human disease and strategies for treatments. Improvements in derivation and maintenance of stem cell lines are needed for the utility of genetically stable cells capable of realizing these promises. Our lab studies human and rat embryonic stem cells by focusing on culture conditions that assure genetic stability during proliferation and differentiation into neural progenitors. We are exploring the role of the Notch signaling pathway in an effort to understand regulation of apoptotic, autophagic, and necrotic pathways mediated by the microtubule cytoskeleton.

**Editorial and Grant Reviews**

Editor-in Chief, *Journal of Assisted Reproduction and Genetics*

Editorial Board, *Zygote*

Ad hoc reviewer, *Reviews 2-3 manuscripts per week from approximately 20 different journals*

Grant reviewer, NIH

**Seminars Presented**

2013 - “Mechanisms of DNA Damage and Repair,” Fertility Preservation and Cancer Symposium, Hong Kong

2013 – “Advances in Human Oocyte In Vitro Maturation,” Fertility Preservation and Cancer Symposium, Hong Kong

2013 – “Linking Oocyte and Embryo Quality in the Practice of Human ARTs,” Fertility Society of Mumbai, Mumbai, India

2013 – “How Advances in Reproductive Physiology are Making a Difference in Human ARTs,” 3rd Symposium of the International Society for Mild Approaches in Assisted Reproduction, Nanjing, China

2013 – “In Vitro Oocyte Maturation in the Treatment of Human Infertility,” Dept. of Reproductive Medicine of Renji Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China

2013 – “Maintaining Genetic Integrity in the Female Germ Line,” Animal Research and Biotechnology Institute, Colorado State University, Fort Collins, CO


2013 – “Do Ovarian Germ Line Stem Cells Exist in Mammals?” Session Chair and Lecturer, Gordon Research Conference on Germinal Stem Cell Biology, Chinese University of Hong Kong, Hong Kong

2013 – “Newborn Health and Oocyte Legacy,” and “Cell Cycle Control in Human Embryos: Why All the Aneuploidy?” ESHRE Capri Workshop on Birth Defects Revisited: Causes and Consequences

2013 – “How Basic Science Advances are Optimizing Human ARTs,” ObGyn Grand Rounds, UMASS Memorial Hospital, Worcester, MA

2013 – “Mechanisms Underlying Surveillance and Maintenance of Genomic Integrity in the Female Germ Line of Mammals,” Dept. of Cell Biology, UMASS Medical Center, Worcester, MA

2013 – “Effects of Chemotherapy and Radiotherapy on Female Gonadal Function and Germ Cells,” “Human Oocyte in Vitro Maturation-Where Do We Stand for Clinical Application?” “Stem Cells and Neo-Oogenesis in Mammals,” Oncofertility Symposium, Center for Genetics and Reproduction, CEGYR, Buenos Aires, Argentina

2013 – “The Magical Mystery Tour from Primordial to Antral Follicle-Role of the Ovarian Stroma,” Ovarian Club III, Paris, France

2013 – “DNA Damage in Oocytes as They Age,” Science Translational Medicine-Media Interview (Jennifer Couzin-Fraenkel)

**Academic Awards**

2013 Beacon Award, Frontiers of Reproduction, MBL (shared with Teresa Woodruff)

**Omar Aljitawi, M.D.**

Assistant Professor  
Department of Internal Medicine, Division of Hematology/Oncology  
Blood and Marrow Transplantation  
Member, Center for Epigenetics and Stem Cell Biology

Dr. Aljitawi is interested in exploring the interaction of stem cells with their microenvironment and in utilizing this interaction in expanding umbilical cord blood stem cells, in improving umbilical cord blood homing post-transplant, and in developing a three dimensional leukemia and myeloma in vitro models for chemotherapy testing. Dr. Aljitawi also has been studying Wharton's jelly matrix as a scaffolding material for tissue regenerative applications like bone and cartilage regeneration.
Meetings Attended

2013 – BMT Tandem Meetings, Salt Lake City, UT
2013 – HOPA Annual Conference, Los Angeles, CA

Committees

KUMC

Member, Cancer Center data and safety monitoring board (DSMB), Cancer Center protocol development and monitoring committee (PRMC)

Chair, Hematology/BMT Disease Working Group

Shrikant Anant, Ph.D.
Professor
Kansas Mason Professor for Cancer Research
Associate Director for Prevention and Cancer Control
Associate Dean for Research
The Tom and Teresa Walsh Professorship in Cancer Prevention and Survivorship
Department of Molecular & Integrative Physiology
Member, Center for Reproductive Sciences

Research Focus
Posttranscriptional gene regulation in inflammation and cancer, cancer stem cells and chemoprevention

Research Overview
Research in the laboratory is focused on various aspects of cancer biology at the molecular level. Specific research areas include: (a) Regulation of gene expression at the levels of mRNA stability and translation, (b) Cancer Stem Cells, and (c) mechanism(s) of chemoprevention by dietary factors and its novel derivatives.

Regulation of Gene Expression: A major focus of the laboratory has been in the role of RNA binding proteins in posttranscriptional control of gene expression. We have identified two specific RNA binding proteins, CUGBP2 and RBM3. Both protein interact with AU-rich sequences in the 3'untranslated region of rapidly degraded RNAs. While CUGBP2 is a translation suppressor, RBM3 is a translation enhancer. We are currently characterizing the mechanisms by which these proteins interact with the mRNA to regulate its stability and translation. We are currently also determining the effect of these RNA binding proteins in induced pluripotency.

Cancer Stem Cells: Stem cell research provides a foundation for therapeutic advancement in oncology. Currently, identification and characterization of reliable stem cell markers is the top priority in this field. We have characterized multiple markers and have also identified protooncogene-induced cancer stem cells (PICSCs), a unique resource to study the biology and therapeutic targeting of specific cancer-initiating cells within the tumor. We are currently determining the microRNA profiles and the signaling mechanisms that regulate their expression in these cells.

Dietary Chemoprevention and Novel Therapeutics: Another focus of the laboratory is to determine mechanisms by which progression of a normal cell to a cancer cell can be prevented. We are particularly interested in determining mechanisms by which dietary phytochemicals such as curcumin and marmelin regulate gene expression in colorectal, breast and pancreatic tumors. In addition, we have developed novel therapeutic agents based natural dietary compounds and are testing them for efficacy against various cancer cells. We are currently testing them in in vitro and in vivo models to determine their efficacy in inhibiting growth
of tumor cell by themselves and to sensitize the cancer cells to radiation and chemotherapy. Our current research includes the molecular analysis of cancer cells following treatment with these agents.

Meetings Attended

2013 – AACR, Washington, D.C.

Committees

KUMC

Member, Faculty Council Research Committee, Faculty and Staff Task Force, Driving Discovery and Innovation Work Group

Other

Member, APS International Committee

Chair, AGA Abstract Review Committee Cell Growth, Apoptosis and Development

Editorial and Grant Reviews


Ad hoc reviewer for 23 journals

Permanent Member, Gastroenterology VA Merit Review Subcommittee

Charter Member, NIH; Chemo/Dietary Prevention Study Section

Chair, NIH/NCCAM Basic Science Review Panel; NCI Provocative Questions Review Panel on Cancer Therapy; NCI R21/R03 Omnibus Review; NIH/NCCAM Study Section (PK26); NIH/CDP Study Section; Center of Excellence for Research on CAM (CERC) Review Meeting NCCAM Review Study Section

Member, NIH Director’s Expert Panel Meeting on Botanical Research; PK23 Review NCCAM

Seminars Presented

2013 – University of Arizona Comprehensive Cancer Center

2013 – Amrita Bioquest 2013

2013 – NIH Office of Dietary Supplements (ODS)

2013 – Center for Advanced Professional Studies (CAPS)

2013 – Centre of Advanced Research in Indian System of Medicine

2013 – Texas A & M University

2013 – 32nd Annual Convention of Indian Association for Cancer

2013 – University of Connecticut Health Center
Trainees

Naveen Neradugomma – Graduate Student
Jessica Johnson – Graduate Student
Anand Venugopal – Graduate Student
Fnu Guarav – Postdoctoral
Deep Kwatra - Postdoctoral

Udayan Apte, Ph.D.
Associate Professor
Department of Pharmacology, Toxicology and Therapeutics
Member, Center for Epigenetics and Stem Cell Biology

Dr. Udayan Apte’s research is focused on understanding the basic mechanisms of hepatocyte proliferation and applying them to develop novel therapies for acute liver failure and hepatocellular cancer.

Liver is exposed to a number of drugs and toxic chemicals due to its anatomical and physiological role and is prone to drug-induced acute liver failure (ALF). ALF is a common and growing clinical problem, with liver transplantation as the only viable treatment option. Recent studies indicate that stimulating regeneration in the ALF patients may have immense therapeutic potential. However, the detailed mechanisms of liver regeneration following acute liver failure are unknown. Similarly, currently there are no reliable biomarkers to detect innate liver regeneration in ALF patients. Dr. Apte’s laboratory is investigating the mechanisms of liver regeneration and exploring novel biomarkers of liver regeneration following acute liver failure using acetaminophen overdose, the most common cause of ALF in the US, as a model system.

Another aspect of liver regeneration that we understand very little about is the mechanisms of termination of liver regeneration. It is known that liver regrowth following surgical resection is tightly regulated and liver size is precisely maintained. However, the pathways that terminate liver regeneration and regulate liver size are not completely clear. Dr. Apte’s laboratory is exploring novel pathways involved in termination of liver regeneration. Dr. Apte is also testing the hypothesis that signaling pathways that terminate liver regeneration following PHX are dysfunctional during pathogenesis of hepatocellular carcinoma (HCC), the most common hepatic malignancy.

The specific pathways under investigation in Dr. Apte’s laboratory include hepatocyte nuclear factor-4alpha (HNF-4α), Wnt/β-catenin signaling and the Hippo Kinase signaling pathway. They are also interested in identifying the role of epigenetic changes regulated by these pathways associated with hepatocyte proliferation.

Seminars Presented

2013 - “Mechanisms of Liver regeneration after Chemical Induced Liver Injury,” 2013 Experimental Biology (APS section) Meeting, Boston, MA

Trainees

Chad Walesky – Graduate Student
Bharat Bhushan – Graduate Student
Steven McGreal – Graduate Student
Prachi Borude – Graduate Student
Lina Sun – Postdoctoral
Ren Li – Summer Medical Student
Fariba Behbod, PharmD., Ph.D.
Associate Professor
Department of Pathology and Laboratory Medicine
Member, Center for Epigenetics and Stem Cell Biology

The research in our laboratory is focused on the understanding of molecular mechanism underlying human ductal carcinoma in situ progression to invasive disease.

Meetings Attended

2013 – Dan Medina Symposium (Organizer), Galveston, TX
2013 – Mammary Gland Gordon Conference, Snowflake, VT
2013 – Advances in Breast Cancer, San Diego, CA
2013 – San Antonio Breast Cancer Conference, San Antonio, TX

Editorial and Grant Reviews

Scientific Review Panel Member, NIH/NCI/ZCA1 GRB-1, Dept. of Defense

Seminars Presented

2013 – “The Identification of cellular and molecular basis for the invasive phenotype in human carcinoma in situ,” Northwestern University, Chicago, IL

Trainees

Kelli Valdez – Senior Scientist
Hanan Elsarraj – Graduate Student

V. Gustavo Blanco, M.D., Ph.D.
Professor
Department of Molecular and Integrative Physiology
Member, Center for Reproductive Sciences

Our laboratory studies the role of ion-transport proteins of the plasma membrane in cell function. Research is focused on the Na, K-ATPase, a plasma membrane enzyme system that uses the energy from ATP to establish and maintain the high internal K⁺ and low internal Na⁺ concentrations characteristic of most animal cells. The transporter comprises a group of isozymes, each characterized by unique enzymatic properties and a cell-dependent and developmentally regulated pattern of expression. We are interested in the function of alpha4, a particular isoform of the catalytic subunit of the Na,K-ATPase that is selectively expressed in spermatozoa. A variety of molecular and cellular biology methods are used to study the regulation, activity and mechanisms of action of alpha4, as well as the role of this Na,K-ATPase in the physiology of the male gametes. These studies will help understand the importance of ion transport in male germ cell fertility and contraception.

In addition, we are studying the role of the Na,K-ATPase in autosomal dominant polycystic kidney disease (ADPKD). We are currently investigating how ouabain affects cyst formation and progression in the disease.
Committees

KUMC

Member, Thesis and dissertation committees for 7 students, Wescoe Academic Society-mentor for medical students, Admission Committee for the MD/PhD program, University Biotechnology Sequencing Facility Committee

Editorial and grant reviews


Ad hoc reviewer, 18 journals

Permanent panel member for NIH, CMIR Study Section

Reviewer, Cariplo Foundation, Italy

External Advisor, Program Project Grant 5P01 HL03657 at University of Toledo, OH

Seminars Presented

2013 – “Ouabain induction of epithelial to mesenchymal transition (EMT) in autosomal dominant polycystic kidney disease,” Kidney Institute, KUMC

2013 – “The sperm Na,K-ATPase is essential for male fertility and an attractive target for male contraception,” KUMC

Academic Honors

Students Voice Award for Excellence in Teaching, University of Kansas

Trainees

Tamara Jimenez – Postdoctoral
Madhulika Sharma – Postdoctoral
Aramadhaka Lavakumar – Postdoctoral
Alex Harbin – MD/PhD Graduate Student
Kyle Jansson – MD/PhD Graduate Student
Joshua Curry – MD/PhD Graduate Student
Gladis Sanchez – Research Associate
Jacqueline Huff – Research Associates
Jeffrey McDermott – Research Associates

Justin P. Blumenstiel, Ph.D.
Assistant Professor
Department of Ecology & Evolutionary Biology-Univ. of Kansas
Member, Center for Epigenetics and Stem Cell Biology

Genome Evolution, Transposable Elements, RNA silencing, Epigenetics, and Molecular Evolution
My research is focused on understanding how genetic conflict shapes the evolution of systems of inheritance. Meiosis and sexual reproduction are prevalent across the tree of life, but they can be exploited by genetic parasites in ways that harm the host. I am particularly interested in understanding how this genetic conflict shapes the evolution of genetic and epigenetic systems. We are especially interested in answers to the following questions: How do RNA silencing mechanisms evolve in the face of varying transposable element content across species? How does the persistence of genetic conflict shape mechanisms of epigenetic gene control by small RNAs? What are the mechanisms underlying changes in the rate of recombination? Are these changes driven by natural selection or drift? How has conflict shaped the machinery of meiosis? To answer these questions, we work with different species within the Drosophila genus, including Drosophila melanogaster and Drosophila virilis. The lab uses a wide variety of approaches including cytogenetics, bioinformatics, molecular genetics and population genetics. We are especially interested in the evolutionary dynamics of transposable element control and gene regulation by piwi-interacting RNAs (piRNAs). Overall, we hope to integrate the experimental approach within a broader theoretical framework.

Meetings Attended

October 2013 – “Host-TE dynamics in Drosophila: Harm, benefit and the evolutionary response by the piRNA machinery,” Mobile Genetic Elements, Cold Spring Harbor, NY

Committees

KU- Lawrence

Chair, EEB Seminar Committee

Editorial and grant reviews

Ad hoc reviewer, Heredity, PLoS Genetics, Genome Biology and Evolution, Molecular Biology and Evolution, Genetica

Ad hoc reviewer, NSF, Austrian Science Fund

Trainees

Mauricio Galdos – Graduate Student
Xi Chen - Graduate Student
Alex Erwin – Graduate Student
Lucas Hemmer – Graduate Student
Kendra Marr – Undergraduate Student
Emily Grantham – Undergraduate Student
Jennifer Kaberline – Undergraduate Student
Fiona Wood – Undergraduate Student

Marco Bortolato, M.D., Ph.D.
Assistant Professor
Department of Pharmacology & Toxicology - University of Kansas, Lawrence
Member, Center for Reproductive Sciences

My research is primarily focused on the characterization of the biological bases of neurodevelopmental disorders through the employment of behavioral tests in animal models. In particular, my key scientific interest is the identification of the mechanisms of interaction between lipid mediators (including neuroactive steroids and endocannabinoids) and key brain neurotransmitters, such as dopamine and serotonin. To this end, we
employ a broad array of behavioral techniques, as well as electroencephalography, stereotactic surgery and HPLC.

The long-term goal of this research is the development of novel therapeutic agents for the treatment of pathological aggression, autism-spectrum disorder, Tourette syndrome, schizophrenia and impulse-control disorders (such as pathological gambling).

My laboratory is currently involved in two major translational research projects. The first target of our investigations is the characterization of the molecular substrates of gene x environment interactions in impulsive aggression. The second aim of our research is the development of novel steroid- and cannabinoid-based tools for the therapy of impulse-control disorders, Tourette syndrome and schizophrenia. In particular, we have discovered the antipsychotic efficacy of neurosteroid-based therapies in patients affected by schizophrenia, Tourette syndrome and impulse-control disorders. Both projects involve multiple collaborations with several basic and clinical scientists in US, Canada, Italy, Germany, Croatia and Malta.

Committees

KU-Lawrence

Member, Committee for the Selection of Clinical Veterinarian, Curriculum Committee

Editorial and grant reviews


Ad hoc reviewer for 55 journals

Expert Grant Reviewer, Ministry of Education and Research, Italy

Seminars Presented

2013 – Symposium Chairman, Dopamine Meeting, Alghero, Italy

2013 - 7th International Meeting on Steroids and Nervous System, Turin, Italy

2013 – Department of Neuroscience, University of Siena, Italy

2013 – International Congress of Schizophrenia Research, Orlando, FL

Kelly A. Bosak, Ph.D, APRN
Associate Professor
School of Nursing
Member, Center for the Developmental Origins of Health and Adult Disease

Dr. Bosak's research interests include the neurophysiology and epigenetics of health behaviors, and patient-oriented research methods, including meta-analysis and comparative effectiveness research. Dr. Bosak's career goals are to support physical activity and other health behaviors to reduce cardiometabolic risk and prevent cardiovascular disease and diabetes, and associated chronic conditions. The ultimate goal of her research is translation of effective health behavior interventions to clinical practice.
Committees

KUMC

Member, Council on Collegiate Nursing Education (CCNE) Review, Research Committee, Strategic Planning Implementation, Mentoring Task Force, Curriculum Committee

Other

Member, Midwest Nursing Research Society (MNRS), Research Section Advisory Committee

Editorial and Grant Reviews

Reviewer, *Western Journal of Nursing Research*

Merlin G. Butler, M.D., Ph.D., F.F.A.C.M.G.
Director, Division of Research
Professor of Psychiatry, Behavioral Sciences and Pediatrics
Departments of Psychiatry & Behavioral Sciences and Pediatrics
Member, Center for Epigenetics and Stem Cell Biology

**Genetics of obesity, autism, alcoholism and developmental disabilities including Prader-Willi syndrome.** Under the direction of Dr. Butler, the primary focus of the research program is understanding the cause and diagnosis of Prader-Willi syndrome (PWS), as the clinical genetic model of obesity and genomic imprinting, and for genotype-phenotype correlations by utilizing an NIH funded rare disease center for genetics and natural history studies in PWS and early onset morbid obesity. PWS is the most commonly recognized cause of life-threatening obesity in children generally due to errors in genomic imprinting usually a 15q11-q13 chromosome deletion of paternal origin. The 15q11-q13 region involves important genes for development of obesity, behavioral problems and autism. This research has led to the discovery of genomic imprinting and clinical differences in PWS subjects having either the larger typical type I or smaller type II chromosome 15q11-q13 deletion. Greater maladaptive and abnormal behavioral scores are seen in those PWS subjects with the larger type I deletion and candidate genes identified. Other obesity-related measures under study include body composition, energy balance, regional fat distribution, neuroimaging patterns and neuropeptides regulating eating behavior and comparison with PWS genetic subtypes. Furthermore, DNA, coding and non-coding RNA (microRNAs) studies are underway with targeted messenger RNAs from structural and regulatory genes involved in the pathogenesis of obesity, autism and neurodevelopment and more recently in the study of alcoholism, aggression and impulsivity. Analyzing and comparing coding and non-coding RNA patterns in individuals with Prader-Willi syndrome and another rare obesity-related disorder (Alström syndrome) in relationship to those with simple obesity to allow for identification of disturbed obesity-related gene network pathways leading to potential treatment modalities applicable to the general population. In collaboration with others, functional MRI scans, startle modulation responses and transcranial direct current stimulation studies in PWS and matched obese subjects using food picture stimulation paradigms during pre- and post-meal assessments are underway to better understand specific brain regions involved in eating behavior and satiation. More recently, studies are underway to examine induced pluripotent stem cells in PWS and to characterize their cell biology which is required to learn more about pathophysiology and to develop potential therapeutic interventions; exome sequencing in female with autism; neuropeptide and cytokine disturbances and global methylation studies in PWS and obesity along with RNA sequencing in alcoholism, obesity, Alström syndrome and schizophrenia.

Meetings Attended

2013 – 61st Nebraska Symposium on Motivation: Genes and the Motivation to Use Substances, Lincoln, Nebraska
2013 – “Principles and Applications of Medical Genetics and Genetic Testing,” Midwest Medical Director’s Association (MMDA) Meeting, Kansas City, Missouri

2013 – “Genetics of Obesity and Obesity-related Disorders,” 7th Alström Syndrome International Family Conference, Research Clinic, and Scientific Symposium, Plymouth, Massachusetts

2013 – 63rd Annual Meeting of American Society of Human Genetics, Boston, Massachusetts

2013 – 27th Annual Prader-Willi Syndrome Association (USA) Scientific Conference, Orlando, Florida

Committees

KUMC

Member, IRHRM Executive Research Board

Advisory Committee Member, Kansas University Medical Center Genomics Core

Other

Member, Foundation for Prader-Willi Research, One Small Step for Prader-Willi Syndrome Research Initiative

Governor Appointed Member, State of Kansas Newborn Genetics Screening Committee

Scientific Organizer and Chairperson, 27th Annual Prader-Willi Syndrome Association (PWSA) Scientific Day Conference, November 7-8, 2013, Orlando, Florida

Editorial and grant reviews


Grant Reviewer, Frontiers Clinical Pilot and Collaborative Studies Funding Program, Institute of Reproductive Health and Regenerative Medicine (IRHRM) pilot grant funding, American Association for the Advancement of Science (AAAS)

Seminars Presented

2013 - “Principles and Applications of Medical Genetics and Genetic Testing,” Midwest Medical Director’s Association (MMDA) Meeting, Kansas City, MO

2013 – “Probing the Genes for Hyperphagia in Obesity-related Disorders,” 7th Alström Syndrome International Family Conference, Research Clinic, and Scientific Symposium, Plymouth, MA

2013 - “Genetics of Obesity and Obesity-related Disorders,” 7th Alström Syndrome International Family Conference, Research Clinic, and Scientific Symposium, Plymouth, MA


Academic Honors


Selected as a Charter Member for “Peer Reviewed Physicians”, 2013

Selected by “Consumers’ Research Council of America, Guide to America’s Top Physicians”, 2013

A recent review in the journal Pediatrics (Official Journal of the American Academy of Pediatrics), identified and analyzed the top 100 most frequently cited articles of 497,240 published in 191 journals dedicated to pediatrics between 1945 and 2010 and an article by Dr. Merlin G. Butler was cited as #53 on the list (Holm VA, Cassidy SB, Butler MG, Hanchett JM, Greenswag LR, Whitman BY, Greenberg F. Prader-Willi syndrome—consensus diagnostic-criteria. Pediatrics. 1993;91(2):398–402)


Trainees

Ann Manzardo – Junior Faculty Member
Albert Poje – Junior Faculty Member
K. Adma – Psychiatric Resident
R. Negi – Psychiatric Resident

Susan E. Carlson, Ph.D.
AJ Rice Professor of Nutrition and Director
Director, PhD Program in Medical Nutrition Science
Director, KUMC Biomedical Interdisciplinary Research Careers in Women’s Health (BIRCWH)
President, International Society for the Study of Fatty Acids and Lipids (ISSFAL)
Department of Dietetics and Nutrition
Member, Center for the Developmental Origins of Health and Adult Disease

We do intervention studies using docosahexaenoic acid (DHA) and arachidonic acid (AA) supplementation in pregnant women, infants and children that focus largely on pregnancy outcomes and infant/child developmental outcomes. My collaboration is with Dr. John Colombo at the University of Kansas, who is the current director of the Lifespan Institute (KU and KUMC). Our current NICHD funding is to evaluate children from 2 to 6 years of age who were born to pregnant women provided 600 mg/day of docosahexaenoic acid (DHA), a nutritional source of long chain omega-3 fatty acids in a Phase III trial. The specific developmental outcomes we target are autonomic nervous system development, cognitive development and visual acuity development. In addition, we monitor infant/child growth, illness and food intake.

Committees

President, International Society for the Study of Fatty Acids and Lipids

Seminars Presented

2013 – “Infant formula with DHA reduces incidence of allergy-related illnesses during the first year of life,” Pediatric Academic Societies annual meeting, Washington, DC
2013 – “Is DHA an essential nutrient for brain?” National Lipid Association annual meeting, Las Vegas, NV
2013 - Pediatric Society of Australia and New Zealand
2013 – “A randomized trial of DHA supplementation and pregnancy outcome,” 8th Asia Pacific Conference on Clinical Nutrition
2013 – “Early and Late Effects of Dietary DHA for Mothers and Newborns,” Department of Kinesiology, University of Waterloo, Waterloo, Canada
2013 – “DHA and child health,” Hong Kong
2013 – Three talks based on references 81, 82 and 83. Wyeth, Hong Kong
2013 – “DHA and child health,” Buenos Aires, Argentina
2013 – Two talks on DHA in child health and pregnancy. Warsaw, Poland

Trainees

Erin Plumberg – Graduate Student
Elizabeth Rogg - Graduate Student
Loran Park - Graduate Student
Marlies Ozias – Graduate Student
Shengqi Li – Graduate Student

Director, KUMC BIRCWH Program: Role in mentoring the following faculty scholars (Kelly Bosak, Holly Hull, Jennifer Klemp, Lisa VanHoose, Harsh Pathak)

Vargheese M. Chennathukuzhi, Ph.D.
Assistant Professor
Department of Molecular & Integrative Physiology
Member, Center for Reproductive Sciences

Uterine fibroids are the most common tumors of the female reproductive tract, clinically relevant in 20-40% of reproductive aged women, occurring in up to 70% of white and 80% of black women by the age of 50 years. Uterine fibroids account for over 200,000 hysterectomies annually in the United States alone. Currently there is no approved drug for the long-term medical therapy of fibroids. One of our research interests is to understand the biology of an aberrantly expressed G protein-coupled receptor that contributes to the fibroids tumor growth. We utilize genetically modified animal models as well as primary human fibroids cells to study the etiology of uterine leiomyomas. Our goal is to develop small molecule and peptidomimetic drugs for the treatment of uterine fibroids.

My laboratory also studies the biology of a sperm-specific sodium-proton exchanger that regulates intracellular pH and motility of the sperm. In addition we are interested in novel cancer testis antigens and development of targeted cancer therapies.

Editorial and Grant Reviews

Ad hoc member, CMIR (Cellular Molecular and Integrative Reproduction) Study Section
Member, Special Emphasis Panel/Scientific Review Group 2014/01 ZTG1 EMNR-P (02)
Trainees

Michelle McWilliams – Graduate Student
Faezeh Koohestani – Postdoctoral

Jeremy Chien, Ph.D.
Assistant Professor
Assistant Director, Translational Genomics, Department of Cancer Biology
Member, Center for Reproductive Sciences

The primary objective of my research program is to understand the genetic basis of ovarian cancer and to translate this knowledge into clinical applications in the early detection and the treatment of ovarian cancer. To support this objective, my current research focuses on three areas:

(1) Genomics of ovarian cancer: Although genetic alterations are considered as a hallmark of cancer, specific genetic alterations serve as “drivers” in cancer progression while others are considered “passenger” mutations. Advances in the identification of “driver” genetic alterations in cancer will lead to the development of novel therapeutic targets to effectively treat cancer, and it is a prerequisite in the era of “Personalized Medicine” or “Precision Cancer Medicine.” My research focuses on the characterization of genetic mutations from cancer genomes to identify driver mutations in ovarian cancer.

(2) Development of genome-based biomarkers for early detection of ovarian cancer. Recent studies by the Cancer Genome Atlas identifies TP53 mutations in 95% of high-grade serous ovarian cancer. Almost universal nature of TP53 mutations in this disease inspires us to test whether these mutations serve as biomarkers for diagnosis and detection of high-grade serous ovarian cancer. We are applying emerging PCR methods and next-generation sequencing technologies to identify low-level TP53 mutations in patient samples so that these genomics assays may later be translated as clinical assays in the diagnosis of early-stage ovarian cancer.

(3) Development of targeted therapies for advanced-stage ovarian cancer. The Cancer Genome Atlas studies also identifies FoxM1 as a candidate gene that is overexpressed in 84% of high-grade serous ovarian cancer. High levels of FoxM1 expression in this disease suggest it may serve as a therapeutic target, analogous to Her2 in breast cancer, Abl in leukemia, and Braf in melanoma serving as therapeutic targets in respective diseases. We are evaluating two antibiotics and an experimental therapeutic agent to characterize their cytotoxic activity in ovarian cancer cells and to understand how these agents are affecting FoxM1 expression and inducing cytotoxic effects in cancer cells.

Meetings Attended

2013 – The Joint Symposium of the Dana-Farber/Harvard Cancer Center Programs in Breast and Gynecologic Cancer

Editorial and Grant Reviews

Editorial, Journal of Cancer Biology & Research

Review Editor, Frontiers in Cell and Developmental Biology

Grant reviewer, Ovarian Cancer Research Fund
Seminars Presented

March 2013 – *Genome-wide ovarian tumor-derived cDNA library screen identifies a rare isoform of RABL3 as a modulator of paclitaxel resistance in ovarian cancer* The Joint Symposium of the Dana-Farber/Harvard Cancer Center Programs in Breast and Gynecologic Cancer

Trainees
Zeha Nil - Graduate Rotation Student
Pingping Fang - Undergraduate Rotation Student
Stefan Graw – Graduate Student
Richard Meier – Graduate Student
Kay Minn – Graduate Student
Maggie Waggoner – Graduate Student
Bernard Hermann – Graduate Student

Julie A. Carlsten Christianson, Ph.D.
Assistant Professor
Department of Anatomy and Cell Biology
Member, Center for the Developmental Origins of Health and Adult Disease

Chronic pelvic pain encompasses a number of debilitating syndromes and is the most common indication for referral to women’s health specialists. A history of early adverse events including injury, infection, neglect or abuse is prevalent among chronic pelvic pain patients and up to 80% present with symptoms of more than one syndrome. Our long-term goal is to determine how the nervous system is manipulated by early adverse events to produce long-term pain in directly affected and adjacent pelvic organs. We have developed pre-clinical models of colonic and vaginal hypersensitivity through neonatal maternal separation or neonatal organ irritation in mice. Mice that received intracolonic mustard oil as neonates have an increase in the percentage of colon-specific sensory neurons that express the transient receptor potential channel ankyrin 1 (TRPA1), which is required for normal viscerosensory function. We are currently investigating whether neonatal vaginal irritation or stress caused from maternal separation will produce a similar effect, as well as the signaling cascades involved, with the ultimate goal of identifying and validating potential targets for therapeutic intervention in the treatment of chronic pelvic pain.

Meetings Attended

2013 – Society for Neuroscience, San Diego, CA

Committees

KUMC

Member, Graduate studies committee, Anatomy and Cell Biology; Executive committee, Women in Medicine and Science

Co-Chair, Program committee, Women in Medicine and Science

Editorial and grant reviews

Seminars Presented

2013 – “Painful consequences of early life stress and injury,” Emporia State University, Emporia, KS

2013 – “Early life stress in female mice as a model of chronic pelvic pain,” 2013 Central Region IDeA Conference, Kansas City, MO


Trainees

Angela Pierce – Graduate Student
Isabella Fuentes – IGPBS Rotating Student and Neuroscience PhD Student
Elizabeth DiSilvestro – Undergraduate Student
Rachel Supple – Undergraduate Student

Nikki Cheng, Ph.D.
Associate Professor
Department of Pathology and Laboratory Medicine
Member, Center for Epigenetics and Stem Cell Biology

My laboratory is interested in investigating the functions of stromal fibroblasts in the tumor microenvironment during breast cancer progression. Fibroblasts are a major cellular component of the tumor microenvironment and influence cancer cell behavior directly and indirectly through secretion of soluble factors, including growth regulators and angiogenic factors. While genetic alterations in breast fibroblasts may exert pro-tumorigenic effects, little is known of the cellular and molecular signals that regulate fibroblast functions in the tumor microenvironment.

Studies in my laboratory suggest that fibroblasts may interact with breast cancer cells to regulate cancer cell motility and invasion through chemokines signaling. Chemokines are a family of soluble proteins which signal through seven transmembrane G coupled receptors and regulate immune cell recruitment during inflammatory responses and defenses against foreign pathogens. Studies in our laboratory indicate that CCL2 and CXCL1 chemokine signaling may also regulate fibroblast interactions with other cell types in the microenvironment to promote tumor progression. Using multiple approaches including mouse models of cancer, molecular biology, biochemistry and cell culture systems, we are interested in:

- Understanding the mechanisms through which chemokines regulate fibroblast : cancer cell interactions during cancer progression
- Understanding the mechanisms through which chemokines regulate fibroblast mediated immune cell recruitment
- Identifying the signaling pathways regulated by chemokine signaling in the breast cancer microenvironment
- Identifying the regulatory mechanisms of chemokine expression

Ultimately, we are interested in understanding the functions of stromal cells in the tumor microenvironment and the impact of the tumor microenvironment on metastatic spread. By identifying and understanding the molecular signals that create a tumor permissive environment, these studies may contribute to identifying new molecular targets for therapy and developing improved methods for diagnosing and treating metastatic breast cancer.

Meetings Attended

2013 – “Barriers to Breast Cancer Treatment Due to CCL2/CCR2 Chemokine Signaling,” KUCC Symposium,
2013 – TGF-β regulates CXCL1 expression in mammary carcinoma-associated fibroblasts through novel Smad2/3- and HGF/c-MET-dependent mechanisms, KU Student Research Forum, KUMC

2013 - Targeting CCL2 chemokine expression through intra-tumoral delivery of TAT/siRNA complexes inhibits breast cancer progression by enhancing autophagy and necrotic cells death American Association for Cancer Research (AACR) Advances in Breast Cancer Research. San Diego, CA

2013 - De-regulated CXCL1 secretion from tumor stroma cells promotes mammary tumor cell invasion. KUCC Research Symposium

Committees

KUMC

Member, IGPBS Advisory and Admissions Committee, Graduate Program Advisory Committee, Graduate Student Interactions Committee

Editorial and Grant Reviews

Ad hoc reviewer, International Journal of Molecular Science

Reviewer, KL2 Peer Review Panel (Frontiers, The Heartland Institute for Clinical and Translational Research

Trainees

Wei-Bin Fang – Postdoctoral
Benford Mafuadze – Postdoctoral

John Colombo, Ph.D.

Professor
Director, Life Span Institute
Department of Psychology – University of Kansas, Lawrence
Member, Center for the Developmental Origins of Health and Adult Disease

My research interests are in the developmental cognitive neuroscience of attention and learning, with a special focus on early individual differences in these areas and how they relate to the typical and atypical development of cognitive and intellectual function. Currently, I conduct a basic program of research on attention (i.e., the neural basis of learning and how it relates to learning), and its development from infancy to school age. We have conducted research on different attentional profiles in infancy and their predictive validity for intellectual and language outcomes in childhood. We are also currently exploring the use of behavioral and autonomic indices as biobehavioral markers for different developmental disabilities, including autism and ADHD. Finally, we have active programs of work on the degree to which early measures of attention and cognition can be used as outcomes for early intervention; most notably we have employed our expertise in measurement in the evaluation of the effects of prenatal and postnatal supplementation of nutritional compounds on cognitive development.

Meetings Attended

2013 – Pediatric Academic Societies, Washington, DC

2013 - Asia Pacific Conference on Clinical Nutrition, Tokyo, Japan
2013 - Meeting of the Society for Research in Child Development, Seattle, WA

**Committees**

**KU**

Member, Advocates for Community Engaged Scholarship (ACES), Office of Research and Graduate Studies; Merit Committee; Promotion and Tenure Committee

Ad-Hoc Committee on Federal Sequestration, Office of Research and Graduate Studies

Search Committees for Biobehavioral Approaches to Neurodevelopmental Disorders Initiatives, Speech Hearing and Languages Sciences Search and Clinical Child Psychology/Life Span Institute Search

**Other**

Member, External Advisory Committee, the High Risk Baby Siblings Research Consortium, Canada; Scientific Advisory Board, Fonterra Brands, Auckland, New Zealand

Consultant, Fonterra Brands, Auckland, New Zealand; Mead Johnson Nutrition, Evansville, IN

National Advisory Committee, Intellectual and Developmental Disabilities Research Center, Davis Medical School, Sacramento, CA

External Advisory Board, Baby Siblings Research Consortium, Autism Speaks/National Institute of Mental Health/NICHD

**Editorial and Grant Reviews**

Editorial Board/Consulting Editor, *Child Development*

Editorial Board/Consulting Editor, *Infancy*


Regular/Periodic Ad-Hoc Journal Reviews for 36 journals

Member, ZDH1DSR-HNJ1, NICHD Special Emphasis Panel

Standing Member, IES Basic Processes Review Panel

Panel Chair, Basic Processes Review Panel

Study Section Member, NIDCD, ZRG1BBBP-T(03) Special Emphasis Panel (R01 Reviews)

**Seminars Presented**

2013 - “Longitudinal studies of LCPUFA supplementation,” Latin American Meeting of the Mead Johnson Pediatric Nutrition Institute/Latin American Pediatric Association (ALAPE). Mendoza, Argentina

2013 “Micronutrients and cognitive development,” Continuing Medical Education Series, Co-Sponsored by Mead Johnson Pediatric Nutrition Institute-Asia Pacific Region and UBM Medica. Bangkok, Thailand
2013 “Micronutrients and cognitive development,” Continuing Medical Education Series, Mead Johnson Pediatric Nutrition Institute-Asia Pacific Region. KK Women’s and Children’s Hospital, Singapore, Singapore

2013 “Micronutrients and cognitive development,” Continuing Medical Education Series, What’s New: OB-GYN and Pediatric Updates. Sponsored by Mead Johnson Nutrition Institute-Asia Pacific Region. Tu Du Hospital (Bệnh viện Từ Dũ), Ho Chi Minh City, Vietnam

2013 “Building a Foundation: Brain Development, Nutrition, and Cognitive Development,” Continuing Medical Education Series, Mead Johnson Nutrition Institute-Asia Pacific Region. Suzhou, China

2013 “Recent advances in Paediatric Nutrition and Cognitive Development,” Continuing Medical Education Series, Mead Johnson Nutrition Institute-Asia Pacific Region. Kuala Lumpur, Malaysia

2013 “Long-term cognitive benefits from LCPUFA supplementation in Infancy,” Academy of Nutrition and Dietetics Foundation Lecture, Food and Nutrition Conference and Expo. Houston, TX, USA

Ivan Damjanov, M.D., Ph.D.
Professor
Department of Pathology and Laboratory Medicine
Member, Center for Epigenetics and Stem Cell Biology

Collaborative research providing histopathologic and immunohistochemical expertise

Buddhadeb Dawn, M.D.
Maureen & Marvin Dunn Professor of Cardiovascular Diseases
Director, Division of Cardiovascular Diseases
Director, Cardiovascular Research Institute
Vice Chairman for Research
Department of Internal Medicine
Member, Center for Epigenetics & Stem Cell Biology

Research Interests

- Adult cell therapy for cardiac repair
- Organ protection during cardiopulmonary arrest
- Biology of adult stem cells
- Role of cytokines in cardiac remodeling
- Diabetes and cardiovascular injury

Michael S. Detamore, Ph.D.
Professor
Department of Chemical and Petroleum Engineering, University of Kansas, Lawrence
Member, Center for Epigenetics and Stem Cell Biology

My general areas of interest include tissue engineering, biomaterials, stem cells, biomechanics and the temporomandibular joint (TMJ). My specific research interests are gradient-based scaffolds, interpenetrating network hydrogels, and umbilical cord mesenchymal stromal cells. Techniques employed in my laboratory include microsphere fabrication, electrospinning, colloidal gels, dense-phase CO₂ sintering, and viral and non-viral gene delivery to mesenchymal stem cells. Applications include tissue engineering with TMJ tissues, knee cartilage and bone, cranium, and trachea.
Meetings Attended

2013 - “Leveraging Gradients in Osteochondral Regeneration and in Treating Tracheal Stenosis,” BMES Cellular and Molecular Bioengineering Conference, Waimea, HI

2013 - “Colloidal gels as a new class of ‘bingham plastic’ biomaterials for tissue regeneration,” BMES Cellular and Molecular Bioengineering Conference, Kohala Coast, HI

2013 - “Curing Trachea Stenosis”, KUCTC Innovation Fair, Lawrence, KS

2013 – “The potential to enhance stem cell selection through a photo-converting reporter gene,” International Society for Stem Cell Research, Boston, MA

2013 - “Novel hyaluronic acid nanocomposite hydrogel for cartilage tissue engineering: utilizing yield stress for ease of implantation,” ASME Summer Bioengineering Conference, Sunriver, OR

2013 - “Material composition gradients and protein release for tracheal defect repair,” ASME Summer Bioengineering Conference, Sunriver, OR

2013 – “Novel decellularized cartilage nanocomposite hydrogel for injectable tissue engineering scaffolds,” Biomedical Engineering Society, Seattle, WA

2013 - “Decellularized cartilage as a chondroinductive material for cartilage tissue engineering,” Biomedical Engineering Society, Seattle, WA

2013 - “Non-viral gene delivery to drive nerve cell-like differentiation of umbilical cord cells for inner ear hair cell regeneration,” Biomedical Engineering Society, Seattle, WA

2013 - “Osteochondral differentiation of rat bone marrow stem cells in raw material encapsulated microsphere based gradient scaffolds,” Biomedical Engineering Society, Seattle, WA

2013 - “Swelling and degradation of decellularized cartilage and hyaluronic acid nanocomposite hydrogels,” Biomedical Engineering Society, Seattle, WA

2013 - “Polymeric coated microparticle scaffolds engineered for future use in musculoskeletal tissue regeneration,” Biomedical Engineering Society, Seattle, WA

2013 - “Aggrecan as chondroinductive component in interpenetrating network hydrogels for cartilage tissue engineering,” American Institute of Chemical Engineers, San Francisco, CA

2013 - “Enhancing crosslinking efficiency and mechanical performance of glycosaminoglycan hydrogels,” American Institute of Chemical Engineers, San Francisco, CA


2013 - “Improving the crosslinking efficiency of methacrylated chondroitin sulfate gels using oligo(ethyleneglycol diacylates),” Materials Research Society, Boston, MA

Committees

KU - Lawrence
Member, Advisory Board, Midwest Stem Cell Therapy Center (MSCTC) – Lawrence Campus Representative; Engineering Library Committee; Organizing Bioengineering Career Fair Committee; Chemical & Petroleum Engineering ABET Committee; Search Committee Chair for Assistant Professor in regenerative medicine

Director, Biomaterials and Tissue Engineering Track

Co-advisor, Society for Biomaterials Chapter; BMES Student Chapter

Secretary, Chemical & Petroleum Engineering Department Advisory Board

Other

Council member, CMBE-SIG of BMES.

Co-Chair, TMJ Bioengineering Conferences

Program Committee, American Society of TMJ Surgeons (2008–Present)

**Editorial and Grant Reviews**

Editorial Board, *Annals of Biomedical Engineering*

Ad hoc reviewer for 38 journals

Reviewer, NIH study section member (4-yr term), Musculoskeletal Tissue Engineering (MTE) (2011–2015)

Veterans Affairs (VA) study section member (4-yr term), Spinal Cord Injury & Regenerative Medicine (2011–2015)

**Seminars Presented**

2013 - Smith & Nephew, Memphis, TN

2013 - Medtronic, Memphis, TN

2013 - “Gradients and ‘Raw Materials’ in Tissue Engineering,” University of Memphis, Department of Biomedical Engineering, Memphis, TN

2013 - “Gradients and ‘Raw Materials’ in Tissue Engineering,” University of Pittsburgh, Department of Bioengineering, Pittsburgh, PA

2013 - “Gradients and ‘Raw Materials’ in Tissue Engineering,” Sree Chitra Tirunal Institute for Medical Sciences & Technology, Trivandrum, Kerala, India

2013 - “Gradients and ‘Raw Materials’ in Tissue Engineering,” University of Illinois, Department of Chemical and Biological Engineering, Urbana-Champaign, IL

2013 - “Application of Biomaterials in Regenerative Medicine,” Midwest Conference on Cell Therapy and Regenerative Medicine, Kansas City, MO

**Academic Honors**

Raymond Oenbring Teaching Award (student-selected, 1 awarded annually at KU in Chemical & Petroleum Engineering
Featured article, Cellular Reprogramming, Devarajan et al.

Top 5 Most Downloaded Article, Ann Biomed Eng, Detamore et al. 2007

#7 Most Recently Read Article, Tissue Eng B, Xiao et al., over 1-month period

Animesh Dhar, Ph.D.
Associate Professor
Department of Cancer Biology
Member, Center for Epigenetics & Stem Cell Biology

Pancreatic cancer is one of the most lethal malignancies. There are no effective treatments available for this debilitating disease. Recent data from the NCI estimated that in 2010, more than 43,000 individuals in the US would have been diagnosed with pancreatic cancer, and 36,800 would have died from the disease. In fact, the rate of mortality from pancreatic cancers has significantly increased when compared to other cancers. Current treatment paradigms, including surgery are not effective in controlling the disease. Part of the problem is that there are no symptoms early on during the progression of the disease, leading to locally advance or metastatic disease at time of diagnosis. At present, there is no effective treatment available for pancreatic cancer.

Prevention and treatment for pancreatic cancer using crocetin compound derived from saffron, a spice and food colorant present in the dry stigmas of the plant Crocus sativas L., could be a novel strategy. Therefore, current studies related to developing a novel crocetin compound for therapeutic against pancreatic cancer is very exciting. In preliminary studies, it was demonstrated by this group that the crude crocetin mixture could suppress pancreatic tumor in animal model. More recently, our group made highly pure compound from the crocetin, crocetinic acid that is even more potent in inhibiting the tumor growth. Significant aspect of this research is to determine whether crocetin-mediated anti-tumor activity occurs in part through affecting histone acetylation. Epigenetic events link alterations in chromatin structure with the development of cancer. Both histone hyperacetylation and hypoacetylation appear to be important in the neoplastic process. This research is specifically looking at histone deacetylase 1 (HDAC1), which is upregulated in pancreatic cancers. The research is designed to further determine the molecular mechanisms underlying the activity of crocetinic acid, and also expand the preliminary observations determining whether the compound can inhibit metastatic disease. This is of high significance because it is a metastatic disease with poor prognosis, and inhibiting metastasis can significantly improve patient survival. More importantly, these studies will give us the preclinical data essential for moving towards clinical trials.

Meetings Attended

2013 – AACR, Washington, DC
2013 – Indian Science Congress, Kokata, India
2013 – AACR Prevention Meeting, National Harbor, Washington DC
2013 – KUCC Annual Symposium, Kansas City, KS

Editorial and Grant Reviews

Mail Reviewer, Berkhead-Coley Cancer Research Program, Florida Dept. of Health

Faculty Reviewer, Biomedical Research Training Program, KUMC

Seminars Presented

2013 – “Novel Therapeutic Approaches in Pancreatic Cancer, Indian Science Congress Association, Kolkata, India

Luciano DiTacchio, Ph.D.
Assistant Professor
Department of Pharmacology, Toxicology & Therapeutics
Member, Center for Epigenetics and Stem Cell Biology

Genomic and environmental factors in the development of obesity, metabolic syndrome and Type 2 diabetes

According to the Centers for Disease Control and Prevention, the rate of obesity in the United States has doubled since 1990. Today, over sixty percent of the U.S. population is overweight and 30% of adults are categorized as obese, while type II diabetes is the fastest growing non-communicable disease in the U.S. Thus, there is a compelling need to understand and the mechanisms that give rise to and underlie the pathologies associated with excess body weight.

The circadian system is an endogenous timing mechanism that is present across phyla and is responsible for synchronizing an organism’s behavior and physiology to the most optimal time of day. In mammals, this system is based on a subcellular transcription-translation circuit which generates strong, ~24-hour oscillations in up to 20% of the transcriptome of any given organ. Thus, the impact of this system is far-reaching, exerting considerable influence and control over most, if not all, major organismal processes. Importantly, the circadian oscillator has emerged as a critical orchestrator of metabolism and energy homeostasis. Consistently, circadian dysfunction due to environmental factors such as those commonly found in modern lifestyles (jet lag, shift work, artificially-extended photoperiod) has been linked to a number of disease processes, including cancer, obesity, and metabolic syndrome.

The overarching goal of my laboratory is to understand how the genome and the environment interact with one another, and the role this interaction plays in human health in general, and in the development of obesity, metabolic syndrome and Type 2 diabetes in particular. Towards this end I aim to:

(1) dissect the genetic programs involved in the maintenance of energy homeostasis of adult, post-differentiated tissues,
(2) understand the molecular mechanisms of the circadian oscillator, and
(3) elucidate how the circadian oscillator and energy metabolism interact with one another and become dysregulated in obesity and disease.

Yafeng Dong, Ph.D.
Research Associate Professor
Director, Molecular Biology Core Facility
Department of Obstetrics and Gynecology
Member, Center for the Developmental Origins of Health and Adult Disease

The problem of perinatal brain injury, in terms of the costs to society and to the affected individuals and their families, is extraordinary. The most common underlying cause of perinatal brain injury is hypoxia/ischemia. Intrauterine hypoxia and birth asphyxia induced brain damage are associated with increased perinatal mortality and long term sequelae of neurodevelopmental compromise, seizure disorders and cerebral palsy. The roles of ROS, Ca2+, NMDA receptors, excitatory amino acids, and apoptotic genes on fetal brain injury have been studied exclusively. These works have led to substantial conceptual agreement on a general outline of how fetal brain injury triggers and evolves to produce neuropathologic lesions and neurodevelopmental disabilities. However, the precise etiological factors responsible for the development of the majority of fetal hypoxic brain injury have not been identified.
Meetings Attended


2013 – 2013 Annual Meeting – Society for Gynecologic Investigation, Orlando, FL

Trainees

Michael Cooper – IGPBS Student
Wei Wang – Graduate Student

Leigh M. Eck, M.D.
Assistant Professor
Department of Internal Medicine
Member, Center for the Developmental Origins of Health and Adult Disease

- Vitamin D and its impact on premenopausal bone health
- Vitamin D in end stage liver disease

My research interest entails gaining a greater understanding of the impact of nutritional interventions on bone health in lactating women with my current research examining the effects of Vitamin D and DHA in this population.

Committees

KUMC

Member, Core Curriculum Development, Fellowship Workshop Development, Board Preparation Curriculum Development, Semi-Annual Reviews, Diabetes Care Committee, Thyroid Tumor Board, Graduate Medical Education Committee, Academic and Professionalism Committee, Board of Trustees, Grand Rounds Planning Committee

Associate Program Director, Residency Program

Other

Meeting Moderator, Kansas ACP 2013 Kansas Chapter Meeting Planning Committee

Member, Kansas ACP Chapter Executive Planning Committee; APDIM/APM selection to the American College of Physicians Internal Medicine in Training Examination Question Writing Committee, In Training Examination Question Writing Committee

Editorial and Grant Reviews

Reviewer, American Family Physician, Alliance for Academic Internal Medicine in The American Journal of Medicine, Kansas Journal of Medicine, The American Journal of Medical Sciences

Seminars Presented

May 2013 – “Thyroid Disorders,” On Air Presentation, Better Kansas City-KCTV 5
Trainees

Advisor to 6 Internal Medicine residents 2013 to present (*Brietta Forbes, Josef Hannah, Sarah Ifteqar, Bhairvi Jani, Jenny Kendall, Jake Kenyon*)

Mentored 5 chief residents during 2013 (*Tamim Mahayni, Danielle Pellow, Michelle Homan, Colleen Brown, Matthew Jones*).

**Patrick E. Fields, Ph.D.**

Associate Professor
Department of Pathology and Laboratory Medicine
Member, Center for Epigenetics and Stem Cell Biology

Recent work in my laboratory has focused on two major areas: the mechanisms of T cell activation and differentiation, and fundamental aspects of embryonic hematopoiesis. Regarding T cells, we are interested in both membrane-proximal and -distal (nuclear) events regulating gene expression involved in cell fate decisions during peripheral T cell differentiation. Of particular interest to the lab is the study of chromatin remodeling in the regulation of cytokine gene expression during peripheral T cell differentiation. We identified a locus control region (LCR), which regulates gene expression in the Th2 cytokine locus. LCRs are regulatory elements that are thought to control gene expression by regulating the accessibility of gene promoters to transcriptional machinery. We use mouse genetics (knockout and transgenic technology) as well as molecular biology and biochemical approaches to study the mechanism by which this LCR functions. These studies will facilitate our long-term goal, which is to understand normal T cell function at the molecular level.

Another major area of research in the laboratory is focused on the role of chromatin remodeling in embryonic hematopoiesis. We have identified a crucial role for the epigenetic modifier, the DOT1L methyltransferase, in early blood development. To examine the function of DOT1L in hematopoiesis, we created a mutant mouse that lacks this enzyme. Mutant embryos are severely anemic, and die at mid-gestation. Yolk sac-derived, erythroid progenitors from these mice exhibit defective responses to erythropoietin as well as abnormal growth and reduced survival, *in vitro*. Interestingly, the effects on hematopoiesis are relatively erythroid-specific. These observations are indicative of a novel role for this enzyme in regulating growth and differentiation factor responses during hematopoiesis, as well as promoting normal erythroid development.

Committees

**KUMC**

Member, Microarray Facility Committee, Transgenic Mouse Facility Committee, IGPBS Graduate Student Admissions Committee, Pathology Graduate Program Advisory Committee, Website Development Committee, Graduate Program Advisory Committee

Alternate Member, Faculty Council Committee, Graduate Program Advisory Committee

**Editorial and Grant Reviews**

Ad hoc Reviewer - *Proceedings of the National Academy of Sciences, USA* (PNAS), *Immunity, Molecular and Cellular Biology (MCB), Immunology, Journal of Blood Research*

Editorial Board Member, *Journal of Biological Chemistry*

Reviewer, NIH/NHLBI and NIH/NIGMS
Trainees

Yi Feng – Graduate Student
Nehemiah Alvarez – Graduate Student
Carrie Malcom – Graduate Student
Jessica Rossol-Alison - Postdoctoral Fellow

Timothy A. Fields, M.D., Ph.D.
Associate Professor
Director, MD-PhD Physician-Scientist Training Program
Department of Pathology and Laboratory Medicine
Member, Center for Epigenetics and Stem Cell Biology

Briefly, our lab is primarily focused on understanding factors that influence progression of polycystic kidney disease (PKD). In particular, we are interested in the influence of inflammation, especially macrophages, on PKD progression. We have recently shown that macrophages infiltrate human PKD kidneys and convert to a phenotype that is deleterious in PKD. Also, using mouse models, we have shown that these infiltrating cells promote disease progression. Our current work is focused on understanding the factors that promote recruitment of macrophages to diseased kidneys, the mechanism by which the PKD kidney microenvironment influences the phenotypic conversion of macrophages, and the specific mechanism(s) by which the macrophages promote disease. An understanding of these mechanisms could identify new targets for therapy in PKD.

Other interests in the lab include understanding signaling mechanisms, particularly those controlled by the Wnt family of secreted molecules, that regulate differentiation and migration of progenitor cells and cancer cells.

Meetings Attended

2013 – American Society of Nephrology 2013 Meeting, Atlanta, GA
2013 – AAMC GREAT Group, MD-PhD Section Meeting, Atlanta, GA

Committees

KUMC
Chair, Research Committee (Faculty Council)
Member, Steering Committee, Clinical and Translational Research Education Center (CTREC)
Chair, MD-PhD Admissions Committee
Selection Committee, Medical School Admissions
Director, MD-PhD Program

Other

Member, RPS Program Committee, Renal Pathology Society

Editorial and Grant Reviews

Ad hoc reviewer, Oncogene, J Histochem Cytochem, Clinical Anatomy
Internal Reviewer, Frontiers/RI Grant Program

Academic Honors

Our paper in press in Kidney International ("Macrophages Promote Polycystic Kidney Disease Progression") was selected by Faculty of 1000 for F1000Prime. It was recommended as being of special significance in its field (http://f1000.com/prime/717980903?bd=1&ui=27410).

Trainees

Jacqueline Peda – Graduate Student

Joseph D. Fontes, Ph.D.
Associate Professor
Department of Biochemistry and Molecular Biology
Member, Center for Epigenetics and Stem Cell Biology

I am interested in how gene transcription is regulated during development and disease and how the mechanisms of regulation might be manipulated as a therapeutic strategy. My laboratory studies the transcriptional regulation of major histocompatibility complex class II (MHC II) genes. MHC II proteins present peptide antigen to CD4+ T cells, and as such these proteins are critical in the normal and pathological functioning of the immune system.

We study the protein factors that bind to MHC II promoters and activate their transcription. The class II trans-activator (CIITA) is known as the "master switch" for MHC II transcription, as all other factors requires for MHC II transcription are present in most cell types and it is the developmental or induced expression of CIITA that is necessary for the transcription MHC II genes. We and others have shown that CIITA mediates the recruitment of chromatin modifying factors as part of its mechanism of action. Studying the role of CIITA in modifying chromatin structure is one ongoing interest of my lab.

Recently, we have identified a new family of transcription factors that associate with CIITA and regulate MHC II gene transcription. This family is the zinc finger X-linked duplicated (ZXD) genes, of which there are three members: ZXDA, ZXDB and ZXDC. These proteins have ten zinc fingers and we have shown that ZXDA and ZXDC have potent transcriptional activation domains. We found that ZXDA and ZXDC heterodimerize and associate with CIITA, and through an as yet unknown mechanism, promote the transcription of MHC II genes. ZXDC is associated with MHC II gene promoters prior to and after the induction of MHC II transcription. Our current work focuses on the ZXD gene family, how they regulate transcription and their role beyond MHC II gene transcription.

MHC class II promoters consist of conserved upstream elements known as the W (or S box), X1, X2 and Y boxes. The complexes that bind the X1 and Y boxes are the heterotrimeric RFX and NFY complexes, respectively. The CREB protein binds the X2 box. These factors serve as a "docking site" for CIITA. A complex of ZXDA and ZXDC interacts with CIITA, but is also present at MHC II promoters in the absence of CIITA, though its binding site is not currently known.

Committees

KUMC

Chair, Phase I Committee

Representative, Education Council Phase I
Member, Curriculum Content Experts Group, Academic and Professionalism Committee, Faculty Assembly, Faculty Assembly Executive Committee

Vice-Chair, Member Admissions and MD Student Selection Committees

Faculty Advisor, Phi Delta Epsilon Medical Fraternity, Delp Society and Career Advising Program

Coordinator, Histone-Chromatin Modification Research Interest Group

**Editorial and Grant Reviews**

Chair, NIH Special Emphasis Panel/Scientific Review Group 2014/01 ZRG1 GGG-E(80) Gene Expression and Regulation Area October 2013

Ad hoc reviewer, *Science Signaling, Molecular Immunology*

**Seminars Presented**

2013 – “Coding and Non-coding Output of the ZXDC Gene: Hematopoiesis and beyond,” University of St. Mary, Keynote Speaker, St. Mary’s Undergraduate Research Forum, Leavenworth, KS

**Academic Honors**

Student Voice Award, Medical Curriculum, 2013

**Trainees**

Andre Koop – Medical Student  
Jon Ramsey – Postdoctoral  
Emily Gripka – Undergraduate Student

**Rama Garimella, Ph.D., M.S., MSc**

Research Assistant Professor  
Department of Hematology and Oncology  
Member, Center for Epigenetics and Stem Cell Biology

The main focus of my laboratory is to understand the mechanisms underlying osteosarcoma pathobiology. Osteosarcoma (OS) is an aggressive bone cancer that occurs during childhood and adolescence. The overall disease burden of osteosarcoma is much higher compared to other cancers because of the affected target population i.e. children, adolescents and young adults. Despite multi-agent chemotherapeutic strategies and surgery, one third of the patients usually relapse with chemoresistant pulmonary metastatic lesions. Hence, there is a need for developing more efficacious therapies which when used alone or in combination therapy will significantly improve and enhance the survival rates in OS patients especially with metastasis. Our research endeavors are geared towards 3 main projects:

- Role of vitamin D in modulating osteosarcoma pathobiology
- Role of osteosarcoma-derived extracellular membrane vesicles (EMVs) in mediating cellular dynamics (osteocyte-osteoclast crosstalk), and extra-cellular matrix remodeling in the osteosarcoma bone microenvironment
- Drug repurposing and osteosarcoma
Using the skills and expertise of a highly interdisciplinary research team, we use a three-tier system composed of cell lines, bioluminescent orthotopic osteosarcoma mouse (BOOM) model, and human OS tissue microarrays to (a) investigate the molecular mechanisms underlying the antineoplastic effects of vitamin D and/or clinical implications of vitamin D deficiency in human OS; (b) elucidate EMV-mediated cellular dynamics in the OS bone microenvironment; and (c) evaluate the efficacy of potential chemotherapeutic agents against human OS. Specifically we are interested in investigating the effects of OS-derived EMVs or vitamin D or chemotherapeutic agents on (a) OS growth and progression (direct effects), and/or (b) on the bone microenvironment and architecture (indirect effects). Understanding the mechanisms underlying OS pathobiology is critical for designing effective therapies targeted to inhibit cancer-induced bone destruction and normalize tumor microenvironment.

Research Interests: Bone and cartilage biology; bone morphogenetic proteins; bone tumor microenvironment; ectopic bone and marrow induction; extra-cellular membrane vesicles in skeletal biology and disease; osteosarcoma: pathobiology, experimental therapeutics; and vitamin D

Meetings Attended

2013 – “Extra-cellular Membrane Vesicles as Potential Mediators of Cancer induced Bone Destruction in the Osteosarcoma Bone Microenvironment,” 13th International Conference on Cancer-Induced Bone Disease, Miami, FL

2013 – “Osteosarcoma Cells modulate Bone Microenvironment via Extracellular Membrane Vesicle Biogenesis and Calcium Signaling pathways,” UMKC Bone and Muscle Day the annual meeting of the American Society of bone and Mineral Research, Baltimore, MD

2013 – “Impact of Vitamin D Deficiency on Osteosarcoma Pathobiology,” University of Kansas Cancer Center’s Masons Day, Kansas City, KS


Editorial and Grant Reviews

Ad hoc reviewer, Tissue Engineering, Journal of Cancer Research and Therapy, Virchows Archiv, Plos One

Seminars Presented

2013 – “Role of extracellular membrane vesicles in modulating osteosarcoma bone microenvironment,” Oral Biology and Craniofacial Sciences Seminar Series, School of Dentistry, University of Missouri, Kansas City, MO

Academic Honors

Nomination to represent Student Promotions and Special Programs Subcommittee of the Schools Academic Committee, University of Kansas School of Medicine

Faculty Domestic or International Travel Award, University of Kansas Medical Center Research Institute

Paige Geiger, Ph.D.
Associate Professor
Department of Molecular and Integrative Physiology
Member, Center for Reproductive Sciences

My research focus also includes the role of estrogen receptors in glucose regulation. Evidence from both human and rodent studies demonstrates the ability of estrogens to modify glucose homeostasis. Premenopausal women have increased insulin sensitivity compared with age-matched men. Premenopausal women are also less likely to develop insulin resistance and have higher levels of GLUT4, the protein responsible for insulin-stimulated glucose uptake in skeletal muscle. In contrast, following menopause a significant decline in insulin sensitivity occurs along with a corresponding increase in fat mass. Estrogen replacement has been shown to ameliorate the increased risk for type 2 diabetes in postmenopausal women and improve whole body and skeletal muscle glucose metabolism. In animal models, insulin sensitivity and glucose metabolism are impaired following ovariectomy and estrogen replacement protects against insulin resistance. Further, aromatase knockout mice, which lack the ability to synthesize estrogen hormones, are insulin resistant. The primary estrogen receptors, ERα and ERβ, are products of two distinct genes. Increased adiposity occurs in humans and mice as a result of decreased ERα activation and mice with global knockout of ERα exhibit impaired glucose tolerance and skeletal muscle insulin resistance. Based on this evidence, the beneficial effects of estrogens on glucose metabolism are thought to be mediated by ERα. My research aims to 1) discover the signaling pathways mediating the beneficial effects of ERα stimulation on glucose uptake in skeletal muscle and 2) determine the ways in which ERα stimulation alters fatty acid handling in adipose tissue.

Committees

KUMC

President, Women in Medicine and Science

Member, Landon Center on Aging and Department of Physical Therapy and Rehabilitation Sciences Faculty Search Committee, ENT Chair Search Committee, Research Advisory Committee, Graduate Student Affairs Committee

Other

Member, American Physiological Society Integrative Biology of Exercise 2012 Meeting Planning Committee

Founding member, Moms in Medicine and Science

Co-founder and faculty advisor, Exercise is Medicine Student Organization

Editorial and Grant Reviews

Editorial Board, American Journal of Physiology, Regulatory, Integrative and Comparative Physiology

Ad hoc reviewer for 20 journals

Advisory Board Member, Emily Taylor Center for Women and Gender Equity

Reviewer, NIH, Integrative Physiology of Obesity (IPOD) study section

Seminars Presented

2013 - Keynote Address: “Heat shock proteins: Novel therapeutic targets for the treatment of insulin resistance and type 2 diabetes,” The 9th Annual College of Biological Science Graduate Student Symposium, University of Guelph, ON, CA.

Academic Honors

KUMC Faculty Leadership Academy, invite only

NIH study section Integrative Physiology of Obesity and Diabetes (IPOD)

University of Kansas Woman of Distinction

Trainees

Kathleen White – Undergraduate Student
David Wilson - Summer undergraduate Student
Kyle Brost – Undergraduate Student
Ashley Ward – IGPBS student
Juante Baldwin – Undergraduate Summer Rotation Student

Matthew C. Goering, Ph.D., H.C.L.D.
Director of Clinical Embryology
The Center for Advanced Reproductive Medicine
Assistant Professor
Department of Obstetrics and Gynecology
Member, Center for Reproductive Sciences

Errors in meiotic chromosome segregation occur in as many as one in every four human oocytes, and the frequency and complexity of these errors increases dramatically as a woman ages. The gain or loss of a chromosome (aneuploidy) is a leading cause of infertility, pregnancy loss and birth defect. During meiosis, recombination tethers pairs of homologous chromosomes to one another through the formation of crossovers. These crossovers, together with the cohesin complex and associated proteins, ensure the proper alignment and segregation of chromosomes at the first meiotic division. In human females, the formation of crossovers occurs during oogenesis in the fetal ovary but does not resolve itself until some 20 to 40 years later when the oocytes are recruited for ovulation during monthly ovulatory cycles. The primary focus of our research is directed at understanding how ovarian physiology and pathophysiology impact the stability of these recombination intermediates and their associated proteins over time. Our long-term goal is to identify therapeutic targets or interventions that may preserve fertility and reduce the risk of pregnancy loss arising from aneuploidy.

Meetings Attended

2013 – The American Society of Reproductive Medicine Annual Meeting, Boston, MA

2013 – The American Society of Human Genetics, Boston, MA

Seminars Presented


Kathleen M. Gustafson, R. EP T., Ph.D.
Research Assistant Professor
Since the 1980’s, there has been increasing recognition that events that occur in utero have long-term implications for future health. Maternal nutrition, physical activity, psychological stress and social disparities have the potential to put the fetus at risk or “program” the offspring for obesity, insulin resistance, diabetes, cardiovascular disease and cancer. Our research is focused on the developmental origins of health and disease. To accomplish these studies, we use a dedicated fetal biomagnetometer to measure naturally occurring magnetic fields that surround bioelectric currents in the maternal and fetal bodies. There are only two dedicated fetal biomagnetometers in the United States. This device is housed at the Hoglund Brain Imaging Center on the Kansas University Medical Center campus. It allows for completely safe, non-invasive studies of women during their pregnancy.

Of principal importance to our research is the magnetocardiogram (MCG), recorded simultaneously from mother and child. Using the MCG, we are able to determine fetal behavioral states and fetal movements including non-nutritive sucking and swallowing, hiccups and periodic fetal breathing. During these unique fetal activities, we have shown how the fetus regulates its heart rate and heart rate variability and how these activities differ when women exercise during pregnancy or take an omega-3 supplement. We now know that when women exercise during pregnancy, their fetus has greater ability to vary its heart rate which may give it an adaptive advantage. Development and maturation of fetal cardiac autonomic control not only gives us insight into cardiac regulation, but also brain development. The autonomic nervous system, in particular vagal regulation, has also been linked to basic cognitive components related to arousal and attention. We believe we have a unique opportunity to make significant contributions to the field of developmental origins.

Committees

KUMC

Member, PhD Advisory Committee – Shengqi Li

Editorial and Grant Reviews


Seminars Presented


2013 – “Investigating the effects of prenatal and infant diet on brain development-the role of DHA,” Translational Discovery Forum, University of Kansas Medical Center, Kansas City, KS

Trainees

Susan Scholtz – Postdoctoral
Ke Liao – Postdoctoral

Jeffrey M. Holzbeierlein, M.D.
John W. Weigel Endowed Associate Professor
Director of Urologic Oncology
Department of Urology
Member, Center for Reproductive Sciences
Dr. Holzbeierlein specializes in the treatment of genitourinary malignancies including prostate, bladder, kidney, testicular, and penile cancers. His research interest includes the androgen receptor as a target of Hsp90 inhibitors in prostate cancer and clinically decreasing the morbidity associated with cystectomy.

**Committees**

KUMC

Member, Executive Research Committee; Data Safety and Review Monitoring Board, Compliance Committee, Cancer Committee, Pensions and Benefits Committee, LCME Task Force Committee, Radiation Oncology Search Committee, Ophthalmology Chair Search Committee, Nominating Committee for the Medical Staff

National

Member, American Urological Association Practice Guidelines Committee, Public Relations and Media Committee for the American Urological Association, Young Urologist’s Committee for the American Urological Association

**Editorial and grant reviews**


**Holly R. Hull, Ph.D.**

Assistant Professor

Department of Dietetics and Nutrition

Member, Center for the Developmental Origins of Health and Adult Disease

Dr. Hull’s research agenda revolves around two themes: examining factors that influence maternal cardiometabolic health during pregnancy and exploring maternal factors that impact fetal development and infant growth and health. Current research ongoing in Dr. Hull’s laboratory examines the influence of in utero hyperglycemia and maternal obesity on fetal growth and offspring adiposity and early growth, a second study examines the impact of maternal body composition, inflammation and fat patterning on infant body composition and a final study is a physical activity intervention to encourage appropriate weight gain in pregnancy.

**Meetings Attended**

2013 – “Comparison of visceral fat measured by magnetic resonance imaging and dual-energy X-ray absorptiometry in women,” Experimental Biology Annual Meeting, Boston, MA

2013 – “Relationship between timing of maternal gestational weight gain and infant body composition at birth,” Pregnancy and Obesity meeting, Boston, MA

**Committees**

KUMC

Member, Elections Committee, School of Health Related Professions

**Editorial and Grant Reviews**

Ad hoc reviewer for 15 journals
Seminars Presented

2013 - “Novel methods to prevent excessive gestational weight gain in overweight women,” Institute for Reproductive Health & Regenerative Medicine, University of Kansas Medical Center, Kansas City, KS

Academic Honors

2013 Fellow-Obesity Society

Tomoo, Iwakuma M.D. Ph.D.
Associate Professor
Department of Cancer Biology
Member, Center for the Epigenetics and Stem Cell Biology

Dr. Iwakuma's primary research focuses on the field of Cancer Research, specifically on cancer progression in bone and soft tissue sarcoma. Over 50% of human cancer has mutations in the tumor suppressor p53 which regulates cell cycle progression, cell death, senescence, chromosome integrity, DNA repair, and metastasis. Therefore, understanding of the pathway involved in the regulation of p53 is essential for discovering novel cancer therapies. With special focus on the tumor suppressor p53 pathway, Dr. Iwakuma dissects the mechanism of cancer progression using genetically engineered mice, as well as tumor transplantation models, and applies disease models to translational research, to ultimately cure cancer

Meetings Attended


2013 – “Significance of MTBP in hepatocellular carcinoma metastasis,” The 7th International Mdm2 Workshop, Cambridge, UK

2013 – “Significance of MTBP in hepatocellular carcinoma metastasis,” The 18th Annual Mayson’s Day

2013 – “Adenosine A3 receptor signaling inhibits stem-like properties of osteosarcoma,” The 10th annual Gilbert S. Greenwald symposium at KUMC

Committees

Chair, KUCC Seminar Series Committee

Editorial and Grant Reviews


Seminars Presented

2013 - “The role of adenosine A3 receptor in osteosarcoma genesis,” Department of Cancer Biology Grant Round. KUMC.

2013 – “Discovering Drugs That Induce Degradation of Oncogenic Mutant p53,” COBRE progress meeting. KU.
2013 - “Regulation of osteosarcoma malignancy by adenosine A3 receptor,” CDOHAD Chalk Talk Meeting. KUMC.


2013 – “Discovering Drugs That Deplete Oncogenic Mutant p53,” COBRE progress meeting. KU.

**Academic Honors**

Karen & Kelly Gregg “LaMar’s Donuts” Student award (Swathi Iyer): $125 plus one dozen of donuts

Summer Student Research Training Program (Kyle Freeman/ Tomoo Iwakuma: $3,000) "The role of adenosine A3 receptor in the stem cell-like properties of osteosarcoma"

FY2014 Biomedical Research Training Program (Swathi Iyer, 12,500$/year) "The role of adenosine A3 receptor in the stem cell-like properties of osteosarcoma"

KU Cancer Center Research Symposium, Poster Award 3rd place: $300) "The role of adenosine A3 receptor in the stem cell-like properties of osteosarcoma"

**Trainees**

Yuan Wen - Rotation Student
Alejandro Parrales Briones - Postdoctoral
Consuelo Perez - Volunteer
Atul Ranjan - Postdoctoral
Kyle Freeman - KUMC Medical Student
Kyle Freeman - Student Worker
Ayschia Gaffar - Student Worker
Zachary Salazar - Student Worker
Hiromi Sasaki - Volunteer

**Rajasingh Johnson, M.Phil., Ph.D., HCLD (ABB)**

Assistant Professor
Division of Cardiovascular Diseases, Department of Internal Medicine
Member, Center for Epigenetics and Stem Cell Biology

- Reprogramming of somatic cells to generate induced pluripotent (iPS cells) or multipotent stem cells and its therapeutic potential in regenerative medicines
- Study the mechanisms of reprogramming by histone deacetylation and DNA methylation
- Use of embryonic and adult stem cells in cardiovascular and lung vascular repair and regeneration
- Defensive role of epigenetic modifiers during infection and inflammation.

**Committees**

**KUMC**

Member, KUMC-IACUC, MD/PhD Student advisory committee, 3. Mentor, Parker B. Francis Summer Fellowship Program, 4. Mentor, Fulbright Nehru Doctoral and Professional Research Fellowship Program for 2013, Judging activities at our Student Research Forum 2013, Judging activities at our Resident, postdoc and Fellow Research Day 2013
Editorial and Grant Reviews

Editorial Board Member, *Journal of Regenerative Medicine & Tissue Engineering*, *Advances in Life Sciences*, *Journal of Stem Cell Research & Therapy*, *Cell Science and Therapy*, *Journal of Immunology and Immunopathology Research*

Academic Editor, *PloS One*

Potential Grant reviewer, AHA-RCB1 spring & Fall 2013 study section and Internal Medicine Basic Research Development Award 2013

Seminars Presented

2013 – “Reprogramming of somatic cells and its therapy” at Center for Biotechnology, Anna University, Chennai, India

2013 – ‘Induced pluripotent Stem Cells from Adult human Cells” at Midwest Conference on Cell Therapy and Regenerative Medicine, Kansas City

Trainees

Andrew Simpson - Parker B. Francis Summer Fellowship Program June- August 2013
Sathyamoorthy Balasubramanian-USIEF Doctoral and Professional Research Fellowship Program

**Dev Karan, Ph.D.**

Assistant Professor
Department of Urology
Member, Center for Reproductive Sciences

- Prostate cancer biology
- Cancer immunology immunotherapy
- Inflammation
- Prostate tumor microenvironment

**Editorial and Grant Reviews**

Department of Defence (DOD) Prostate Cancer Research Program (PCRP) Review panels

**Partha Kasturi, Ph.D.**

Assistant Professor
Department of Pharmacology, Toxicology and Therapeutics
Member, Center for Reproductive Sciences

The overall research interest of the laboratory is to understand the role of ATP binding cassette (ABC) transporters in Biology and Medicine. These proteins, found in all species, use the energy of ATP hydrolysis to translocate specific substrates across cell membranes. Most of these transporters play important roles in normal biology and in the therapeutic response to medications.

Our current studies focus on 1) Identifying the physiological function, regulation and clinical significance of ABC transporters and 2) Understanding the significance of protein-protein interactions to the intracellular trafficking and functional activity of these multi domain transport machineries. We explore these questions through molecular and cellular biology, protein biochemistry and genetics. We complement our cell culture
studies with whole animal studies to put our finding at the cellular level in the context of the whole animal. We expect that these studies will not only provide insight into the cellular role of these transporters but also help us translate this knowledge into new diagnostic and treatment strategies to optimize therapy.

**Meetings Attended**

2013 – The Toxicologist, 52nd Annual Meeting and ToxExpo, San Antonio, TX

2013 – 10th International ISSX Meeting, Toronto, Canada

**Committees**

**KUMC**

Member, Toxicology Training Program, Graduate Student Seminar Series Committee, Postdoc Committee, Faculty Mentoring Committee, KUCC Committee, Liver Center, Student Research Forum Judge, School of Medicine Faculty Council, Postdoc and Fellow Research Forum Judge, Student Promotions and Special Programs Committee, Institutional Research Safety Committee

**Editorial and grant reviews**

Editorial Board Member, *Journal of Drug Metabolism and Toxicology, Advances in Pharmacoepidemiology and Drug Safety, Biomarkers in Drug Development, British Journal of Pharmaceutical Research, Journal of Metabolomics and Systems Biology*

Ad hoc reviewer for 21 journals

**Academic Honors**

Mentor for Hemantkumar Chavan on MRI global research travel award

**Trainees**

Hemantkumar Chavan – Graduate Student  
Kishore Kumar Polireddy – Graduate Student  
Kristen Mickey – Graduate Student  
Akshay Narkar – Rotation Graduate Student  
Sumedha Kasturi – Summer Student

**Sarah Finocchiaro Kessler, Ph.D., M.P.H.**

Research Assistant Professor  
Department of Family Medicine  
Member, Center for Reproductive Sciences

Her current research combines interests in reproductive health and HIV by exploring childbearing intentions among people living with HIV, HIV-provider communication about reproductive options, and options for safer conception among serodiscordant couples. She is exploring these issues among HIV-infected women and men in the U.S. (Baltimore), Brazil and Uganda where in collaboration with colleagues, she has documented a similar unmet need for comprehensive reproductive counseling to reduce transmission risks to partners and infants while helping individuals more safely realize their childbearing goals. Dr. Finocchiaro Kessler plans to work with KUMC fertility specialists to explore similar outcomes among couples receiving preconception counseling in the context of infertility, cancer or other chronic illnesses. Dr. Finocchiaro Kessler also works in Kenya and Malawi to pilot an intervention designed to improve Early Infant Diagnosis services for HIV-exposed
newborns. The primary outcomes of this research include increased retention in care and early initiation of treatment among infants diagnoses HIV-positive.

Sarah L. Kieweg, Ph.D.
Associate Professor
Department of Mechanical Engineering, School of Engineering, University of Kansas, Lawrence
Member, Center for the Developmental Origins of Health and Adult Disease

Dr. Kieweg is an Assistant Professor in Mechanical Engineering, at the Lawrence campus of the University of Kansas. She has held a courtesy position in Obstetrics & Gynecology at the KU School of Medicine since 2007. Dr. Kieweg conducts research in non-Newtonian fluid mechanics with applications in biomechanics, primarily to improve the drug delivery of anti-HIV microbicides. Her research also has applications in women’s health including instrument design, soft tissue mechanics of the female pelvic floor, and the biomechanics of delivery.

Dr. Kieweg was an NIH K12 Building Interdisciplinary Research Careers in Women’s Health (BIRCWH) Scholar (2007 – 2011) at KUMC and is the PI of a 5-year NIH phased R21/R33 award, funded through the NIH Microbicide Innovation Program. As co-PI on a Major Research Instrumentation grant from the National Science Foundation, she is conducting high performance computational simulations of thin film flow of non-Newtonian fluids to enable the rational design of microbicide delivery vehicles. Other projects include the development of mathematical models of relevant transport phenomena to design nanomedicines for microbicide drug delivery. Additional funding includes a Kauffman Foundation/Institute for Advancing Medical Innovation proof-of-concept award for a device that will automatically vitrify reproductive cells and tissue to preserve fertility in cancer patients. Her IRHRM collaborators include Dr. David Albertini, Dr. S. Samuel Kim, and Dr. Carl Weiner.

Meetings Attended

2013 – American Physical Society Division of Fluid Dynamics 2013 Meeting, Pittsburgh, PA

2013 – Annual Meeting of the American Institute of Chemical Engineers (AICHE), San Francisco, CA


2013 – “Influence of yield stress and shear thinning on the capillary ridge formation of gravity-driven Herschel-Bulkley fluid on an incline,” American Physical Society Division of Fluid Dynamics 2013 Meeting, Pittsburgh, PA

2013 – “Obstetrician hand pressures during mock deliveries,” American Society of Mechanical Engineers (ASME) Summer Bioengineering Conference, Sunriver, Oregon

Committees

KU-Lawrence

Member, KU Rock Chalk Roadshow (KU Admissions), Faculty Search Committee, Scholarship Committee, ME Doctoral Qualifying Exam Committee

Chair, ME Department Recruitment Committee
Other

Member, Conference Organizing Committee, 2013 ASME Summer Bioengineering Conference; Fluids Technical Committee, ASME Bioengineering Division

Chair, Student Paper Competition, 2013 ASME Summer Bioengineering Conference

Session Chair, APS DFD

Organized session for WCB 2014

Co-Chair, Education Committee, ASME Bioengineering Division

Editorial and grant reviews

Member, NIH Peer Review Panel: NIAID/NICHD R01 Mucosal Environment and HIV Prevention

Reviewer, 2013 ASME Summer Bioengineering Conference

Ad hoc reviewer, *Journal of Non-Newtonian Fluid Mechanics, ASME Journal of Biomechanical Engineering*

Academic Honors

2013 University of Kansas Miller Scholar (School of Engineering)

Leading Light Award (University of Kansas) – Principal Investigators who received external awards of $1 million or more during FY 2012

1 of 20 selected to be on Think Tank on Drug Delivery Systems for HIV Prevention, organized by NIH and the Bill and Melinda Gates Foundation

**S. Samuel Kim, M.D, FACOG**

Associate Professor  
Division Director, Reproductive Endocrinology and Infertility  
Director, Center for Advanced Reproductive Medicine  
KU Cancer Center  
Department of Obstetrics and Gynecology  
Member, Center for Reproductive Sciences

Dr. S. Samuel Kim is an internationally renowned specialist in reproductive endocrinology and infertility. He has 20 years of experience in clinical reproductive medicine and surgery. Dr. Kim is also a highly-esteemed scientist whose reputation as a pioneer in ovarian tissue cryopreservation and transplantation has been recognized worldwide. He spearheaded the founding of the International Society for Fertility Preservation (ISFP), and currently serves ISFP as President. Dr. Kim is Division Director for Reproductive Endocrinology and Infertility at the University of Kansas and Medical Director for the Center for Advanced Reproductive Medicine. He received numerous scientific awards and has been lecturing around the world. In 2011, he published a comprehensive textbook, “Principals and Practice of Fertility Preservation”.

**Adam J. Krieg, Ph.D.**

Assistant Professor  
Department of Obstetrics and Gynecology  
Member, Center for Epigenetics and Stem Cell Biology
The primary focus of our laboratory is the study of the transcriptional mechanisms activated in response to reduced cellular oxygen, or hypoxia. A significant proportion of hypoxic gene expression is mediated by the Hypoxia Inducible Factors (HIFs), transcription factors that induce the expression of genes important for anaerobic metabolism, blood vessel recruitment, cell motility, and stem cell maintenance. Of particular interest is the hypoxic expression of several histone demethylase genes by the HIFs. Since histone demethylases affect gene expression by modifying the chromatin of target genes, hypoxic regulation of this phenomenon creates an intriguing link between cellular microenvironment, HIF activation, and downstream cascades of gene expression that could prolong the initial cellular response to hypoxia. We are currently studying the functional consequences of hypoxic histone demethylase expression in the context of normal cell biology and in disease states ranging from cancer to intrauterine growth restriction.

Meetings Attended

2013 – Society for Gynecological Investigations Annual Meeting, Orlando, FL

2013 – The Tumor Microenvironment: Hypoxia, Angiogenesis and Vascularization, 13th International Workshop, Miami, FL

Committees

KUMC

Member and Speaker Host, Greenwald Symposium Organizing Committee

Editorial and Grant Reviews

Reviewer, KUCC Fall Pilot Grant Award mechanism

Seminars Presented


Trainees

Lei Qiu – Graduate Student
Cailin Wilson – Graduate Student
Kelsey Hampton – IGPBS Graduate Rotation Student
Jacob New – Undergraduate Volunteer

Sacha A. Krieg, M.D., Ph.D., FACOG
Assistant Professor
Director of the Recurrent Pregnancy Loss Program
Division of Reproductive Endocrinology and Infertility
Department of Obstetrics and Gynecology
Member, Center for Reproductive Sciences

Pregnancy loss is the most common complication of human pregnancy, impacting approximately 10-15% of all human conceptions. While for most fertile couples, miscarriage is a sporadic event, approximately 1-5% of fertile couples suffer from recurrent pregnancy loss (RPL), having a profound impact on their fertility and emotional well-being. Although RPL has been attributed to several hematologic, anatomic, hormonal and genetic defects, more than 50% of cases remain classified as having unknown etiology. My research interests focus on this subgroup of patients, in particular patients who are at risk for having endometrial causes of early pregnancy loss. To date we have investigated decidual contributions to recurrent miscarriage via microarray...
analysis. We are beginning to further characterize dysregulated gene products both at a molecular level and in an in vitro model of trophoblastic invasion.

Meetings Attended
2013 – “The histone demethylase JMJD2B is associated with recurrent pregnancy loss and promotes decidualization of endometrial stromal cells,” ASRM 2013

Committees
KUMC
Member, Clinical Committee for Resident Competency

Other
Member, ASRM Scientific program and abstract review committee

Editorial and grant reviews
Ad hoc reviewer, Reproductive Biology and Endocrinology, Gynecological Endocrinology, Journal of Assisted Reproduction and Genetics, Human Reproduction

Editorial board member, Medscape Journal of Medicine, Women’s Health, Obstetrics and Gynecology

Seminars Presented

T. Rajendra Kumar, Ph.D.
Professor
Department of Molecular & Integrative Physiology
Director, Center for Reproductive Sciences

My research focuses on developmental genetics and regulation of the pituitary-gonadal axis using both gain-of-function (transgenic) and loss-of-function (gene knockout) approaches. These unique genetic models mimic many of the human diseases and thus enable us to experimentally track them both in time and space. Specific research themes include (I) delineating mechanisms of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) regulation of testis and ovarian development and function, and (II) identifying mechanisms of origin and development of human pituitary null cell adenoma, and secretion of pituitary gonadotropins, LH and FSH. These studies are clinically relevant and have high translational research potential. These studies will also significantly impact our understanding of the physiology and pathology of the mammalian pituitary-gonadal axis including abnormal pituitary/gonad development, infertility, and cancer of the pituitary and gonads.

Committees
KUMC
Member, Bioinformatics Advisory Committee, Kansas Intellectual and Developmental Disabilities Research Center User Advisory Committee for Core C, Research Design and Analysis, Flow Cytometry Core Advisory Committee, Planning Committee-James L. Voogt Annual Lectureship in Neuroendocrinology, Laboratory Animal Research Advisory Committee
Other

Member, P & T External Evaluation Committee, Cornell University, Ithaca, NY; P & T External Evaluation, University of Virginia Health Sciences Center, Charlottesville, VA; Society for Reproduction National Program Committee, 46th Annual Meeting, Montreal, CA

Co-Leader, HORMONES module, 46th Annual Meeting, Society for Study of Reproduction, Montreal, CA

Team Leader, Abstract Evaluation Committees on Gonadotropins and Endocrinology-Other Sections, 46th Annual Meeting, Society for Study of Reproduction, Montreal, CA

Chair, Hormones Module Session II on Gonadotropins, 46th Annual Meeting, Society for Study of Reproduction, Montreal, CA

Co-Chair, Reproductive Axis Determination, Development & Transgender Medicine-Platform Session, Endocrine Society Meeting, San Francisco

Expert Referee for evaluating the US FDA employee to Permanent Staff Position, Bethesda, MD

Editorial and Grant Reviews

Editorial board, Biology of Reproduction; Frontiers in Neuroendocrine Science Journal of Assisted Reproduction and Genetics

Associate Editor, Journal of Assisted Reproduction and Genetics; Molecular Reproduction and Development

Senior Editor, Journal of Assisted Reproduction and Genetics

Ad hoc reviewer for 15 journals

Member, Special Emphasis Panel-ZRG1-F06-T 20, Fellowship applications assigned to the Endocrinology, Nutrition, Metabolism and Reproductive Sciences Integrated Review Group; Integrative and Clinical Endocrinology and Reproduction (ICER) NIH Study Section Panel

Seminars Presented

2013 – “Gonadotropin re-routing and ovarian function,” Dept. of OB/GYN, McGill University, Montreal, CA

2013 – “Genetic Modification of Intracellular Trafficking and Secretion Pattern of FSH,” Harvard Reproductive Endocrine Sciences Center, Massachusetts General Hospital, Boston, MA

2013 – “Genetic approaches to study gonadotrope tumor biology,” Dept. of Biology, Clark Atlanta University, Atlanta, GA

2013 – “Gonadotropins and ovarian aging,” National Institute of Aging Workshop on Female Reproductive Aging and Women’s Health

2013 – “FSH re-routing and ovarian function,” Dept. of OB/GYN, & the Magee Research Institute, University of Pittsburgh School of Medicine, Pittsburgh, PA

Trainees

Huiizhen Wang – Postdoctoral
Huyen Doan - Postdoctoral
Currently, there are two major research initiatives in our lab:

1. Determining the mechanism of ligand binding and translocation in organic cationic drug transporters

The human organic cation transporter 1 (OCT1) is involved in the uptake and transport of a wide variety of cationic drugs and endogenous compounds. It is primarily expressed in the liver, but significant amounts are also found in the heart, brain, and placenta. Recent work has demonstrated that polymorphisms in this transporter can greatly diminish the efficacy of certain drugs, including the antidiabetic agent metformin and the antineoplastic agent imatinib. Despite its important role in drug disposition and efficacy, little is known regarding the molecular details of ligand binding and transport in OCT1. Understanding the structural and functional characteristics of OCT1, including the basis for substrate and inhibitor selectivity, will greatly improve opportunities for cationic drug discovery and design. In the Lampe lab, we employ novel nuclear magnetic resonance (NMR) techniques using the site-specific incorporation of 13C and 15N labeled unnatural amino acids in heterologously expressed OCT1 to directly map the binding sites of substrate and inhibitor ligands and examine the dynamics of the protein during the ligand translocation process. Data obtained from these NMR investigations are incorporated into a computational model of OCT1 and long-timescale (~1 µsec) molecular dynamics simulations of the OCT1 protein are performed. The results from these simulations will provide us with an accurate model of the ligand translocation process. Using this model, we will be able to predict a priori which ligands will act as substrates, inhibitors, or transactivators of OCT1. Ultimately, this knowledge will lead to the development of safer and more effective medicines with less risk for drug-drug interactions.

2. Designing novel bivalent inhibitors to target the anti-apoptotic protein Survivin

Survivin is an important protein involved in apoptosis, cell proliferation, and angiogenesis. Additionally, its expression is upregulated in almost all types of cancer. Downregulation of survivin expression or inactivation of its function has been shown to inhibit tumor growth and increase survival rates in numerous animal models. In terms of its mitotic function, survivin is an important member of the chromosomal passenger complex, which is essential to chromosomal segregation and mitotic spindle formation during mitosis. Additionally, as a member of the Inhibitor of Apoptosis (IAP) family of proteins, survivin is thought to inhibit apoptosis in cancerous cells by inhibiting cellular caspase activity, although the molecular details of these processes remain unclear. Recently, two distinct small molecule binding sites on the surface of the protein have been identified through Structure-Activity-Relationship screening by NMR (SAR-by-NMR). Attempts to target the sites individually have not led to substantial survivin inhibition in vivo, despite success with this approach in vitro. Therefore, we are currently designing novel bivalent inhibitors that target both sites simultaneously to optimally harness the cooperative binding energy afforded by such an approach. Initially, a small library of bivalent inhibitors will be screened against survivin using SAR-by-NMR to identify lead compounds. Lead compound candidates will be further developed to improve affinity and specificity using standard synthetic medicinal chemistry techniques and prospective drug candidates will be tested using in vitro cell culture and in vivo mouse model systems. Targeting survivin using bivalent inhibitors is likely to be a fruitful approach to treat currently intractable cancers.

Committees

KUMC

Vice-Chair, Promotions Sub-Committee/Faculty Council

Member, Student Applicant Interviews, Academic Promotions Committee, Elections Committee
Other

Member, Organizing Committee for the Great Plains Annual Symposium on Protein & Biomolecular NMR

Editorial and Grant Reviews

Editorial Board Member, *Journal of Drug Metabolism & Toxicology*

Trainees

Andrew Lickteig – Postdoctoral

**Melissa A. Larson, Ph.D.**
Research Assistant Professor
Department of Molecular and Integrative Physiology
Technical Director, Transgenic and Gene-Targeting Institutional Facility
Member, Center for Reproductive Sciences

Dr. Larson serves as the Technical Director of the Transgenic and Gene-Targeting Facility, a shared, core, research support facility providing a centralized service for the production of transgenic and gene-targeted mice for the investigators of KUMC and the surrounding Kansas City research community. The facility provides services that include the generation of transgenic mice by pronuclear microinjection, generation of chimeric mice by blastocyst injection, targeting of embryonic stem cells, sperm and embryo cryopreservation and genotyping of mice. The facility provides consultation on new projects and training and demonstration in microinjection, embryo transfer surgeries and ES cell culture. The lab is also investigating new technologies that improve the production and maintenance of gene-modified mice, as well as introducing new services and technologies to our users. In addition, Dr. Larson's laboratory has conducted experiments to determine whether a novel recombinase, Dre, functions in mice. Demonstration of its action has provided another tool to manipulate the mouse genome in vivo.

**Gene Lee, M.D.**
Assistant Professor
Department of Obstetrics and Gynecology
Member, Center for the Developmental Origins of Health and Adult Disease

Dr. Lee has recently completed his training in maternal-fetal medicine at the University of Colorado, and is pursuing a career in academic medicine under the WRHR training grant here at KUMC. The topic of his proposal is abnormal uterine contractility which manifests clinically as labor dystocia. The processes of cervical ripening, uterine activation, and electrophysiologic signaling and the coordination of them are topics of interest.

**Meetings Attended**

2013 – 2013 WRHR Symposium, Denver, CO

**Joan Lewis-Wambi, Ph.D.**
Assistant Professor
Department of Cancer Biology
Member, Center for Epigenetics and Stem Cell Biology

Despite the benefits of endocrine therapies such as tamoxifen and aromatase inhibitors in treating estrogen receptor alpha (ERa)-positive breast cancer, many tumors eventually become resistant. Identifying the
underlying cellular and molecular mechanisms responsible for endocrine resistance remains a critical and immediate need. Our laboratory is interested in identifying novel pathways of endocrine-resistance in breast cancer and using that knowledge to help develop alternative treatment options for patients with endocrine resistant and metastatic disease.

One of the projects in our lab involves studying the role of pigment epithelium-derived factor (PEDF) in the development of endocrine resistance in breast cancer. PEDF is a 50 kDa glycoprotein that belongs to the non-inhibitory serine protease inhibitor (SERPIN) superfamily but it does not inhibit proteases. PEDF was first discovered as a factor secreted by retinal pigment epithelial cells, but later found to be expressed in several tissues including brain, spinal cord, eye, plasma, bone, prostate, pancreas, heart and lung. PEDF is a potent antiangiogenic factor that is showing promise as a potential anticancer agent. It is considered a potential tumor suppressor because its expression is high in normal tissues but is low or significantly reduced in various types of malignancies. Loss of PEDF expression in breast cancer tissue has been shown to be associated with disease progression and poor survival, however, the role of PEDF in anthormone resistance and its potential as a therapeutic target for preventing and/or reversing endocrine resistance in breast cancer is not known.

Recently, my laboratory found that PEDF mRNA and protein levels were dramatically reduced in antihormone resistant breast cancer cells and that stable reexpression of PEDF in the resistant cells resensitized them to tamoxifen. In addition, tissue microarray studies of primary and recurrence tumors from patients (N=109) who initially responded to tamoxifen and subsequently failed, revealed that PEDF protein was reduced in ∼52.8% of recurrence tumors compared to primary tumors. Furthermore, we have found that recombinant PEDF is capable of inhibiting the growth of endocrine resistant breast cancer cells in athymic mice and that PEDF also inhibits the growth of ER-negative breast cancer cells. Based on these findings, we hypothesize that PEDF silencing is a novel mechanism for the development of endocrine-resistance in breast cancer and its expression influences the metastatic potential of ERα-expressing tumors and their ability to respond to antihormonal therapy. We plan to use lentiviruses to stably overexpress PEDF in endocrine resistant breast cancer cells to help address the following questions: how does loss of PEDF expression confer resistance to endocrine therapy? 2) How is PEDF expression regulated in breast cancer cells and what role (if any) does the estrogen receptor play in PEDF regulation? 3) What is the mechanism of action of PEDF in endocrine resistant breast cancer cells in vitro versus in vivo?

Another area of research in our laboratory involves investigating the mechanism by which estrogen paradoxically induces apoptosis in endocrine resistant breast cancer cells. Specifically, our laboratory has developed two breast cancer cell lines called, MCF-7:5C and MCF-7:2A, which were clonally selected from parental MCF-7 human breast cancer cells following long-term (>1 year) estrogen deprivation. Unlike MCF-7 cells which require estrogen/estradiol to grow and whose growth is inhibited by tamoxifen and other antiestrogens, MCF-7:5C and MCF-7:2A cells are hormone independent and are resistant to tamoxifen and aromatase inhibitors and these cells undergo apoptosis in the presence of physiologic levels of 17b-estradiol (E2) in vitro and in vivo. Investigation into the mechanisms of E2-induced apoptosis in MCF-7:5C and MCF-7:2A breast cancer cells reveals that it is a mitochondrial mediated event involving the BCL-2 family proteins and endoplasmic reticulum stress. More recently, we have found evidence to suggest that the phospholipid scramblase 1 (PLSCR1) protein might be a novel mediator of estrogen-induced apoptosis in our endocrine resistant cells. PLSCR1 is a member of the PLSCR gene family that has been implicated in multiple cellular processes including movement of phospholipids, gene regulation, immuno-activation, and cell proliferation/apoptosis. PLSCR1 and other family members (PLSCR2, PLSCR3, PLSCR4, and PLSCR5) are highly induced by interferons (IFNs) such as INF-a, IFN-b, and to a lesser extent INF-g and their induction is associated with apoptosis. We have found that suppression of PLSCR1 using siRNA completely blocks the ability of the resistant cells to undergo apoptosis in the presence of E2 as well as other apoptosis-inducing agents. Furthermore, we have found that calcium mobilization is dramatically altered in these cells due to suppression of PLSCR1. Currently, we are investigating how PLSCR1 regulates E2-induced apoptosis in MCF-7:5C cells and what role (if any) the other family members (i.e. PLSCR2-PLSCR5) play in this process. We are also studying the clinical significance of PLSCR1 expression in invasive breast cancer and whether PLSCR1 protein has therapeutic benefits in other types of cancers such as triple negative and inflammatory breast cancer.
Editorial and Grant Reviews
Reviewer, California Breast Cancer Research Program, Etiology, Prevention & Progression Section
Reviewer, NIH-CRCHD, R21
Ad Hoc Reviewer, University of Mississippi National Science Foundation Pilot Grant
Ad Hoc Reviewer, Fox Chase Cancer Center, American Cancer Society Pilot Grant

Seminars Presented
2013 – KUMC, Dept. of Physiology Seminar Series, Kansas City, KS
2013 – KUMC KUCC Seminar Series, Kansas City, KS
2013 – KUMC Dept. of Biochemistry Seminar Series, Kansas City, KS
2013 – KUMC Dept. of Anatomy & Cell Biology Seminar Series, Kansas City, KS
2013 – KUMC, Dept. of Cancer Biology Program Meeting, Kansas City, KS

Trainees
Asona Lui – MD/PhD Student
Hye Juong Choi – Postdoctoral
Joshua Ogony – Postdoctoral
Arushi Kumar – Undergraduate Student
Franklin Zhong – H.S. Student

Benyi Li, M.D., Ph.D.
Associate Professor
Associate Director for Biomedical Training Program
Director for Basic Research
Department of Urology
Member, Center for Epigenetics and Stem Cell Biology

Critical to the prevention and treatment of urologic cancers is basic science research. In the Urologic laboratory at Kansas University Medical Center we are investigating the various causes of cancer. Dr. Benyi Li, M.D., PhD. received training in molecular biology and prostate cancer research in China, Japan, and Baylor College of Medicine, Houston, TX. His interests focus on molecular pathways which cause prostate cancer to grow and metastasize. In addition, he has created an inducible Akt system to allow further study of the molecular mechanisms behind prostate cancer.

Meetings Attended
2013 – Annual Meeting of the AUA, San Diego, CA
2013 – The 10th Annual World Congress on Urological Research, Nashville, TN

Committees
KUMC
Editorial and Grant Reviews

Ad hoc reviewer for 41 journals

Ad hoc grant reviewer for 11 review panels

Editorial Board Member, Medical & Surgical Urology, Journal of Contemporary Urologic and Reproductive Oncology, World Journal of Clinical Urology, World Journal of Translational Medicine, Journal of Biological Methods

Journal Editor-in-Chief, Journal of Urology & Nephrology

Seminars Presented


2013 – “Nanotech-based therapeutics for human prostate cancer,” The 8th Annual Meeting, Chinese Association of Uro-genital Oncology, Hangzhou, China

2013 – “Targeting PI3K/p110beta with nanotech-based therapy for prostate cancer,” Three George University College of Medicine, Yichang, China

2013 – “Implication of Nanotechnology in prostate cancer management, “Hefei Symposium on Prostate Cancer Center of Medical Physics and Technology, Hefei Institute of Physical Science, Chinese Academy of Sciences, Hefei, China

Trainees

Ruitao Zhang – Postdoctoral
Neeraj Koduri – Summer Student
Yuzhe Tang – Visiting PhD Graduate Student
Xiangxing Kuang – Visiting Master Graduate Student
Aidong Yang – MD/PhD, Visiting Scholar
Zhejun Yan – MD/PhD, Visiting Scholar
Aijing Sun – MD/PhD, Visiting Scholar

Academic Honors

Panel Moderator: AUA abstract highlights, World Chinese Urological Society, 2013 Annual Meeting, Atlanta, GA

Xiaogang Li, Ph.D.
Associate Professor
Department of Internal Medicine-Nephrology & Hypertension
Member, Center for Epigenetics and Stem Cell Biology

The primary focus of my research is to understand the molecular pathogenesis of autosomal dominant polycystic kidney diseases (ADPKD) and to translate these findings for ADPKD treatment. To this end, my lab has two emphasis areas of research:
1. **TNF-alpha signaling and apoptosis signaling in ADPKD.** In the past we found that a tumor necrosis factor-α-mediated pathway promoting cyst and treatment of Pkd2+-/- mice with the TNF-α inhibitor etanercept prevented cyst formation. This study uncovered the connection among TNF-α signaling, polycystins and cystogenesis. (Published in *Nature Medicine*, 2008). Recently, we found that a second mitochondria-derived activator of caspase (Smac)-mimetic, induces TNFα-dependent cystic renal epithelial cell death specifically, leading to the removal of cystic epithelial cells from renal tissues, thus, preventing cyst formation. Our current study helps to clarify the role of apoptosis in the regulation of cyst size and in a larger sense may open a new approach to target renal cysts and prevent their endless expansion by the administration of Smac-mimetics, which encourages a paradigm shift from current efforts that focus on normalizing cell function in cystic epithelial cells to directly targeting these cells for removal. (Submitted to JASN).

2. **Epigenetics and ADPKD.** We have conducted extensive research on the function of histone deacetylases (HDACs) and histone methyltransferases (HMTs) in ADPKD. In the past, we found that: i) Polycystin-dependent fluid flow sensing targets histone deacetylase 5 to prevent the development of renal cysts (Xia et al., *Development*, 2010); ii) Inhibition of histone deacetylases targets the transcription regulator Id2 to attenuate cystic epithelial cell proliferation (Fan et al., *Kidney International*, 2012); iii) HDAC6 regulates epidermal growth factor receptor (EGFR) endocytic trafficking and degradation in renal epithelial cells (Liu et al., *Plos One*. 2013). We are now focusing on: i) Vitamin B3 prevents cyst formation through Sirt1 mediated cyst epithelial cell proliferation and apoptosis (Submitted to JCI after revision); ii) SIRT2 regulates ciliogenesis and contributes to loss of polycystin-1 mediated abnormal centrosome amplification (Submitted to Nature Communication under review); iii) Aberrant histone and/or protein methylation, which is regulated by heat shock protein 90, and/or DNA methylation of CpG island containing promoters leads to permanent silencing of genes in both physiological and pathological contexts in cystic epithelial cells.

**Lynda K. McGinnis, Ph.D.**
Research Assistant Professor
Department of Molecular & Integrative Medicine
Member, Center for Reproductive Sciences

Over 4 million children have been born from artificial reproductive techniques (ARTs). To protect the health of children born by ARTs, we need to improve our understanding of gamete biology, embryology and the signaling pathways essential for normal healthy development. Our research focuses on tyrosine kinase signaling in the oocyte during maturation and fertilization. Several of these kinases are activated in cultured somatic cells in response to stress. While some of these kinases, such as FYN and FER are very highly expressed in oocytes, their response to in vitro culture stress of oocytes and embryos is unknown. The long-term goal of my research is to define the regulation and targets of these kinase signaling pathways in oocytes and to determine if these pathways function properly during clinical in vitro maturation and fertilization procedures.

**Meetings Attended**

2013 – Society of Reproduction Annual Meeting, Montreal, Quebec, Canada

**Editorial and Grant Reviews**


Guest co-editor, *Special Issue in Honor of Professor John Bigger’s, J Reprod Genet*
Academic Honors

Educational Scholar, Doctors as Educators, KUMC

Co-organizer of the Symposium: Physiology of the Oocyte and Embryo – A Celebration of Professor John D. Biggers, Annual Meeting of the American Society for Reproductive Medicine, Boston, MA

Stuart J. Macdonald, Ph.D.
Associate Professor
Department of Molecular Biosciences, KU-Lawrence
Director, Kansas INBRE KU Satellite Bioinformatics Core
Member, Center for Epigenetics and Stem Cell Biology

The Macdonald lab studies the genetic control of complex, polygenic trait variation. Using the elite Drosophila model system, we are interested in resolving the cellular pathways, genes, and ultimately the precise nucleotide sequence changes that lead to phenotypic variation. We have developed a novel suite of resources for the genetic dissection of complex traits - the Drosophila Synthetic Population Resource (FlyRILs.org) - and have used this system to accurately resolve QTL (Quantitative Trait Loci) contributing to a range of morphological, stress-related, and drug response traits. In combination with high-throughput, next-generation sequencing technologies, such as RNA-seq, we are generating a detailed picture of the mechanisms underlying phenotypic differences among individuals.

A major research goal in the lab is to articulate the relationship between variation segregating within species, and that leading to divergence between species. To accomplish this we are focusing on a rapidly-evolving, male-specific sexual trait in Drosophila. The posterior lobe of the male genitalia shows dramatic morphological variation across closely-related Drosophila species, and since these species are only partially reproductively-isolated, we have begun to map the genomic regions responsible for this inter-specific morphological variation. We are also engaged in identifying the loci responsible for the much more subtle posterior lobe variation evident within species. Our ultimate goal is to understand the developmental pathways leading to morphological change in the posterior lobe, and determine whether the genes and pathways responsible for variation within a species have also been recruited to drive rapid evolutionary change in the structure across species.

Meetings Attended

2013 – Workshop on MAGIC-type Populations, National Institute of Agricultural Botany (NIAB), Cambridge, UK

2013 – 12th Annual Complex Trait Community Community Meeting, Madison, WI

Committees

KU-Lawrence

Member, Faculty Senate, Kansas IDeA Network of Biomedical Research Excellence (K-INBRE) incentives and awards committee, faculty research committee, COBRE-funded Genomics and Model Organisms Core Facility Steering Committee, Public Relations Committee

Chair, Graduate Recruitment Committee, Chairperson Search Committee

Editorial and Grant Reviews

Ad hoc reviewer for 9 journals (15 manuscripts total)
Seminars Presented

2013 – “Genomics and Systems Biology of Complex Traits in the Drosophila Model System,” Kansas Masonic Cancer Research Institute, The University of Kansas Cancer Center, Kansas City, KS


Academic Honors

KU Center for Teaching Excellence (CTE) 16th Annual Celebration of Teaching Reception-Recognized by Molecular Biosciences graduate Students for graduate mentoring and instruction

Trainees

Luisa Suarez – Undergraduate Student
Kristen Cloud – Undergraduate Student
Emily Pfeifer – Undergraduate Student
Adam Reeves – Undergraduate Student
Matthew Turner – Undergraduate Student
Kenna Whitley – Undergraduate Student
Chad Highfill – Graduate Student

Courtney Marsh, M.D., M.P.H.
Assistant Professor
Reproductive Endocrinology Division
Department of OB/GYN
Member, Center for Reproductive Sciences

My research focuses on modification of known risk factors in women with polycystic ovary syndrome (PCOS) to reduce prevalence of PCOS related co-morbidities such as infertility, endometrial cancer, diabetes, cardiovascular disease, and obstructive sleep apnea. My research focuses on understanding link between obesity and PCOS through non-invasive neuroimaging techniques. Findings from this translational research will be used to tailor weight loss in reproductive aged individuals. Previously, I researched hypothalamic feedback of estrogen in anovulatory mice and emotional and cognitive processing in PCOS women using fMRI. Currently, I am part of a multidisciplinary team with interests in obesity, reproductive, and metabolic diseases. We use functional magnetic resonance imaging techniques to better understand satiety and food cues in reproductive aged women. Hormones and metabolic profile will be obtained to correlate with brain activation with food processing to further tailor weight loss therapy.

Meetings Attended

2013 – Society for Gynecologic Investigation, Atlanta, GA

Academic Honors

Reproductive Endocrinology and Infertility Fellowship, University of Michigan, Ann Arbor, MI
Dr. Ann Manzardo is a Behavioral Pharmacologist who specializes in the field of addiction research. She has advanced training in biostatistics and expertise in the epidemiology of alcoholism. Dr. Manzardo has established a translational research program in the Department of Psychiatry and Behavioral Sciences through which she has directed funded research projects on alcoholism spanning multiple scientific disciplines: clinical, epidemiological and genetic. Her research has emphasized the study of gender disparate effects of inherited biological and neurodevelopmental risk factors for the development of alcoholism. And the role of thiamine deficiency in alcohol abuse behaviors. Dr. Manzardo has continued the tradition of collaborative study of the Danish Perinatal Cohort in the Department of Psychiatry with her studies of the influence of premature birth on the development of alcoholism. Dr. Manzardo has also recently expanded her research interests to include bioinformatics as it is applied to the genetics of alcoholism.

Clifford W. Mason, Ph.D.
Research Assistant Professor
Department of Obstetrics and Gynecology
Member, Center for the Developmental Origins of Health and Adult Disease

The core of our research focuses on the pathopharmacology of the maternal-placental-fetal unit. Pregnant women often need to take medications to treat diseases including those induced during pregnancy. As a result, a major concern arising from the use of medications by pregnant women is the transfer of drugs across the placenta barrier. Our data indicate there are changes in drug transport proteins in placenta of women with normal and abnormal pregnancy. Changes in placental transporters could result in altered fetal drug exposure leading to drug toxicity. Our research addresses three core questions. First, how do pathophysiological responses to pregnancy disease affect placental drug transporters? Second, do pathological changes in transporter expression levels correlate with placental drug transfer, and therapeutic outcome? Finally, what are the regulatory pathways that drive transporter expression and can pharmacoresistance to drugs be overcome by targeted inhibition of proteins within these pathways? The results will help predict how pathophysiological responses to pregnancy diseases alter placental transfer and therapeutic efficacy or toxicity of drugs.

We are also interested in understanding the mechanism(s) of myometrial activity as it pertains to labor. Specifically, we focus on molecular differences in pathways responsible for smooth muscle contraction during term and preterm labor.

Trainees

Erin Farmer – IGPBS Rotation Student

Dev Maulik, M.D., Ph.D., FACOG, FRCOG
Professor and Chair, OB/GYN, Truman Medical Center
Senior Associate Dean of Women’s Health, University of Missouri, Kansas City
Professor of Basic Science, University of Missouri, Kansas City
Chair, Maternal Fetal Medicine, Children’s Mercy Hospital
Member, The Center for the Developmental Origins of Health & Adult Disease

Fetoplacental Angiogenic Mechanisms Related To Fetal Growth Restriction And Preeclampsia
This ongoing project has been investigating the angiogenic mechanisms underlying fetal growth restriction and preeclampsia. Our objective is to develop prenatal biomarkers that may potentially contribute to improved clinical management of these conditions, and to innovate novel therapeutic intervention strategies.

**Biomedical Projects**

This includes several subprojects: (a) development of functional fetal echocardiography; (b) novel Doppler ultrasound approaches for fetal hemodynamic assessment; and (c) development of electromyography of uterine activity.

**Development of Novel Eicosanoids for Tocolysis.**

This project has been developed in close collaboration with Kansas City VA Research Department.

**Meetings Attended**

2013 - Central Association of Obstetrics and Gynecology Annual Clinical Meeting, Meritage Resort, Napa, CA

2013 - XI World Congress of Perinatal Medicine, Managing Fetal Growth Restriction: Current Challenges, Moscow

2013 - Society of Maternal Fetal Medicine, New Orleans, LA

**Committees**

**UMKC**

Member, Council of Chairs, Faculty Promotion and Tenure Committee, Graduate Medical Education

Trustee, Central Association of Obstetricians and Gynecologists

Joint Chair, Steering Committee, Quaternary Perinatal Center Project (Fetal Health Center), Children's Mercy Hospital

Member, Executive Committee, Truman Medical Center; Executive Committee, Children’s Mercy Hospital; Finance Committee University Physician Associates

Program Director, Maternal Fetal Medicine Fellowship Program (ABOG Accredited)

**Editorial and Grant Reviews**

Editor-in-Chief, *Journal of Maternal, Fetal and Neonatal Medicine, Informa, UK*

Co-Series Editor, *Series on Maternal Fetal Medicine, Informa/CRC Press*

Consulting Editor, *Maternal Fetal Medicine Section, The Global Library of Women's Medicine, Sapiens Global Library Inc. UK*


Reviewer, *American Journal of Obstetrics and Gynecology, Obstetrics and Gynecology, Echocardiography, Ultrasound in Obstetrics and Gynecology*

**Academic Honors**

Invited Chair for the Session on Fetal Growth Restriction, XI World Congress of Perinatal Medicine, Moscow
Trainees

Paul Singh – 3rd year Fellow
Teresa Orth – 2nd year Fellow
Shilpa Babba – 3rd year Fellow

Nancy A. Muma, Ph.D.
Professor and Chair
Department of Pharmacology and Toxicology-University of Kansas, Lawrence
Member, Center for Reproductive Sciences

Our research is directed toward an understanding of the mechanisms involved in neuropsychiatric and neurodegenerative disorders. Currently, we are examining the mechanisms regulating adaptations in serotonin receptor signaling as new targets for therapeutic intervention. Serotonin receptor signaling is altered by a number of drugs used to treat mood disorders such as depression and anxiety and psychiatric disorders including schizophrenia. For example, we recently found that a novel estrogen receptor system modifies serotonin receptor signaling and is a potential target for the treatment of depression and other mood disorders associated with the onset of menopause.

Committees

KU-Lawrence

Member, School of Pharmacy Administrative Committee, School of Pharmacy Executive Committee, School of Pharmacy Academic Misconduct Committee, University of Kansas Search Committee for Animal Care Veterinarian

Editorial and Grant Reviews

Editorial Board Member, Journal of Neuropathology and Experimental Neurology, Journal of Experimental Pharmacology, Frontiers in Alzheimer’s Disease

Ad hoc Reviewer, Psychoneuroendocrinology, International Journal of Neuropsychopharmacology, Neuropsychopharmacology, Biochemical Pharmacology, Brain Pathology, Journal of Neuropoendocrinology

Seminars Presented

2013 - “Estrogens and SSRIs Modulate Serotonin Receptor Signaling in the HPA Axis”, Department of Anatomy and Cell Biology, University of Kansas School of Medicine, Kansas City, KS

Trainees

Zhen Mi – Graduate Student
Carrie McAllister – Graduate Student
Quan Li – Research Assistant Professor
Paul Kimball – Research Associate

Ajay K. Nangia, M.B., B.S.
Associate Professor
Clinical Director of Andrology
Department of Urology
Member, Center for Reproductive Sciences
Dr. Nangia's interests in the field of urology are micro-surgical reconstruction including vasectomy reversal, male infertility and male sexual/reproductive dysfunction. He is actively involved with research in male contraception, as well as the study of vitamin D in sperm/testicular physiology.

Committees

KUMC

Member, Student Promotions Subcommittee, Election Committee, EMR Advisory Committee, Faculty Council, Internet/Web Committee, Indian Creek Governance Committee, 2013 Greenwald Symposium Planning Committee, Ethics Committee, Urology Staff Liaison, Urology Resident Education Committee, Urology Residency Committee

Other

Member, American Urological Association (AUA) (Public Media, Plenary Program Planning, Men's Health Initiative and Health Policy Committees), Society for the Study of Male Reproduction Nominating Committee, American Society of Reproductive Medicine Resident Education Committee, South Central Section of the American Urological Association (Health Policy and Resident Prize Paper Committees), Kansas Urological Society Program Planning Committee, American Board of Urology Written Examination Committee, Clerkship Advisory Committee, Dartmouth-Hitchcock Medical Center, Resident Prize Paper Committee, South Central Section of the AUA, Abstract Review Committee, American Society of Reproductive Medicine, 2013 ASA Program Planning Committee

Editorial and grant reviews

Editorial Board Member, Journal of Andrology, Journal of Assisted Reproductive Genetics, Journal of Men’s Health


Grant Reviewer, AUA Foundation Grant Review Committee

Warren B. Nothnick, Ph.D., H.C.L.D.
Professor
Department of Molecular and Integrative Physiology
Member, Center for Reproductive Sciences

Current medical treatment approaches rely on the fact that endometriosis is an estrogen-dependent disease. Yet, relief is at the expense of induction of a hypo-estrogenic state, which is counterproductive for infertility treatment and associated with unwanted menopausal-like side effects, with the major drawback being a potential reduction in bone density.

Clearly, development of more effective and better tolerated compounds which spare the induction of a hypo-estrogenic state are warranted. We are currently exploring novel targets which are over-expressed in endometriotic tissue (compared to eutopic endometrium) which may play a role in the events conducive to endometriosis development and/or growth. Further, we are examining the potential of these molecules as targets for development of novel, estrogen-sparing treatments for endometriosis. The outcomes from this research have significant potential to provide novel insights into the role of these molecules in pathogenesis of endometriosis and potentially modify the way in which this debilitating disease is treated.
Meetings Attended

2013 - Annual Meeting for the Society for Gynecological Investigation, Orlando, Florida

2013 – Annual Meeting for the Society for the Study of Reproduction, Montreal, Canada

Committees

KUMC

Scientific Director, Laboratory Animal Resources; University of Kansas Medical Center

Chairman, Laboratory Animal Resources Advisory Committee for the University of Kansas Medical Center,

Member, Advisory Committee for the University of Kansas Medical Center Institutional Official

Member, 3rd Floor Enrichment Committee, Institute for Reproductive Health and Regenerative Medicine, The Gilbert S. Greenwald Reproductive Biology Symposium planning committee

Editorial and grant reviews

Ad hoc Reviewer, NIH/NICHD, Special Emphasis Panel (ZRG1 EMNR-H (02) M), Member Conflict: Environment, Development and Reproductive Biology August 8 – 9, 2013

Ad hoc Reviewer, NIH/NICHD, Special Emphasis Panel (ZHD1 DRG-D (43) 1, 8/1/13 (Teleconference)


Seminars Presented


Academic Honors

University of Kansas Medical Center Faculty Research Investigator Award

Arindam Paul, Ph.D.

Research Assistant Professor
Department of Pathology and Laboratory Medicine
Member, Center for Epigenetics and Stem Cell Biology

My long-term research interest is on some key problems in the area of developmental biology and cancer biology described below.

Neuronal commitment of rat embryonic stem (ES) cells as well as induced pluripotent (iPS) cells. In this project, we are trying to develop serum free in vitro culture conditions to generate neural progenitors and terminally differentiated neural cell lines such as motor neurons, oligodendrocytes, astrocytes from rat ES and iPS cells.

Development of Novel Therapeutic Strategy to prevent breast cancer metastasis of targeting different signaling mechanism. We are evaluating small molecule compounds targeting different signaling pathways for regulation of epithelial mesenchymal transition, invasion and metastasis of triple negative breast cancer cells using both in vitro assay systems and in vivo conditions.
Identification of novel therapeutic targets to prevent Invasive Breast Cancer development. We are pursuing genome wide screening approach to identify novel regulators at various stages of invasive breast cancer development under in vivo conditions. The long term goal for this project is to develop small molecule compounds for future therapeutic modality to prevent invasive breast cancer development.

Soumen Paul, Ph.D.
Associate Professor
Department of Pathology and Laboratory Medicine
Member, Centers for Epigenetics and Stem Cell Biology, and Reproductive Sciences

During mammalian embryogenesis, a whole organism is developed from a single fertilized egg. So, one of the fascinating questions in biology is "How do cells adopt different cell fates? Research in our laboratory focuses on defining molecular mechanisms that regulate tissue-specific gene expression to orchestrate developmental and physiological processes. We are asking how transcriptional mechanisms that involve, transcription factors/cofactors, distinct epigenetic marks, and other chromatin-associated factors regulate chromatin structure and thereby regulate gene expression during developmental, and physiological processes as well as during pathological conditions.

One of our research interests is to define molecular processes that control the genesis of early cell lineages, their self-renewal, differentiation, and function. The first lineage decision during mammalian development is the establishment of trophectoderm (TE) and inner cell mass (ICM) lineages. These differentiation events begin during pre-implantation development when blastomeres are fated towards TE and ICM. TE develops into parts of the placenta, while the ICM forms embryonic and some extra-embryonic structures. To understand this early lineage commitment, we are using embryonic stem (ES) and trophoblast stem (TS) cells as model systems. We are also using transgenic mouse models to test our hypotheses.

Another area of our research interest is to dissect mechanisms to understand the molecular regulation of blood vessel formation (vasculogenesis and angiogenesis) and vascular cell (endothelial cell) specification and function. Therefore, to begin to dissect regulatory mechanisms of blood vessel formation, we are defining the transcriptional regulation of key genes during early vascular development and adult angiogenesis.

We predict that our research will contribute towards development of progenitor cells or new tissues for regenerative therapeutics including vascular tissue engineering. Our efforts will also contribute towards therapeutics that will promote endogenous regeneration. In addition, we expect to establish new modes of anti-angiogenic therapy during pathological conditions.

Editorial and grant reviews

Trainees
Pratik Home – Postdoctoral
Biswarup Saha – Postdoctoral
Ganeshkumar Rajendran – Postdoctoral
Avishek Ganguly – Postdoctoral
Biraj Mahato-Postdoctoral

Kenneth R. Peterson, Ph.D.
Professor and Vice Chair
Department of Biochemistry and Molecular Biology
Director, Center for Epigenetics and Stem Cell Biology
Red blood cells carry oxygen to tissues and organs throughout the body and ferry waste carbon dioxide from them to the lungs for exhalation. Hemoglobin is the molecule in red blood cells responsible for this transport and is comprised of two a-like globin chains, two b-like globin chains and four heme molecules. Many diseases of red blood cells, termed hemoglobinopathies, have been described. Sickle cell disease (SCD) affects red cell shape and renders them ineffective; resulting in anemia along with attendant complications. SCD is gene-derived; that is, it is caused by a single point mutation in the coding sequence of the adult b-globin gene. A second disease of these cells, b-thalassemia, also causes anemia. b-thalassemias result from an array of mutations in the b-globin locus that affect b-globin gene function. Gene therapy could aid in the replacement of the mutant globin gene and help cure these disorders.

The human b-globin locus consists of five functional b-like globin genes, all of which serve as the b-chain in the hemoglobin molecule during different stages of development. The e-globin gene is expressed in the primitive yolk sac during the first six weeks of gestation; the g- and a-globin genes are transcribed in the fetal liver from the sixth week to shortly after birth; and the b-globin gene (and to a much lesser extent the d-globin gene) is expressed in bone marrow soon after birth for the duration of life. The e-globin and g-globins are silenced in the adult. Introducing an active fetal g-globin gene in the adult by bone marrow transplantation to substitute for a defective adult b-globin gene is one goal of current gene therapy efforts. Realizing this goal requires understanding the molecular mechanisms that regulate globin gene switching. Our laboratory is focused on the cis- and trans-control of human b-like globin gene expression during development; that is, the identification and characterization of DNA elements and transcription factors regulating globin synthesis via interaction of the proteins with these sequences. A major regulatory motif of this class is the locus control region (LCR). The mechanisms by which LCRs function are largely unknown, but it is becoming clear that they are important regulatory elements for developmental control of gene expression, not only for the b-globin locus, but for other mammalian loci as well. Mechanisms underlying the developmental regulation of globin gene switching that are under analysis in the lab include: 1) the sequence determinants of LCR-globin gene interaction and their specificity, 2) the function of the LCR DNAse I-hypersensitive sites, 3) the physical structure of LCR-globin gene contacts, 4) the role of chromatin domain boundary elements within the b-globin locus, 5) g-globin gene silencing - identification of both cis-acting silencer sequences and repressor proteins, and 6) activation of g-globin gene expression - validation of putative, partially characterized protein activators, identification of novel transactivators, and testing of pharmacologic activators. Experimental systems involve analysis of transgenic mice and cell lines produced with human b-globin locus yeast artificial chromosomes (b-YACs) as transgenes, as well as the ancillary bacterial and yeast molecular biology procedures necessary to generate these mice and cell lines. In addition, we have established unique cell lines from the bone marrow and fetal liver of our b-YAC transgenic mouse lines using a novel system to enforce dimerization of growth signal transduction monomers into a functional molecule, resulting in multi-potential cell lines that proliferate, but do not differentiate. These will be used to select for novel hereditary persistence of fetal hemoglobin (HPFH) mutations, fetal globin transactivator proteins and for screening small molecule inducers of g-globin gene expression. A variety of cutting-edge molecular biology and biochemistry techniques are used to study cis-regulation, protein-DNA, and protein-protein interaction aspects of gene expression during development within these systems.

Meetings Attended

2013 – Annual Meeting of the American Society of Hematology, New Orleans, LA

Committees

KUMC

Member, Graduate Committee, Biochemistry and Molecular Biology Study Section, BMB KLSIC Space Advisory Committee, Graduate Faculty, Advisory Board for the Transgenic and Genetic Technologies Support Facility, Executive Research Board, Institute for Reproductive Health and Regenerative Medicine, High Throughput Genomics Facility Advisory Committee, Kidney Institute Internal Executive Advisory Committee, LCME Educational Resources Self-Study Committee
Chairman, Appointments, Promotions and Tenure Committee; Search Committee for Development, Metabolism and Cancer Faculty

Participant, BMB Heartland Undergraduate Biochemistry forum, Annual IGPBS Recruitment Weekend

Associate member, University of Kansas Cancer Center (KUCC), Risk Factors for Carcinogenesis Research Program

Chair, Institutional Human Stem Cell Research Oversight Committee

**Editorial and grant reviews**


**Seminars Presented**

2013 – “Lectures and Laboratory Methods, PRIDE Summer Institute Programs to Increase Diversity among Individuals Engaged in Health-Related Research,” Georgia Health Sciences University

2013 – “Center for Advanced Professional Studies (CAPS),” Blue Valley School District, Overland Park, KS

2013 - Lecture, Kansas City University of Medicine and Biosciences, Kansas City, MO.

**Trainees**

Allen Chazelle – Graduate Student
Matt Parker – Undergraduate Student
Jennifer Hanson – Visiting Graduate Student

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**Brian K. Petroff, D.V.M., Ph.D.**

Associate Professor
Division of Hematology/Oncology
Department of Internal Medicine
Member, Center for Reproductive Sciences

Our research efforts have a dual focus 1) prevention of ovarian aging and chemotherapy and other ovarian toxicant induced infertility 2) prevention of breast and ovarian cancers through the characterization and antagonism of promising targets in human and animal chemoprevention trials. Early work showing ovarian follicular loss in polluted environments (i.e. dioxin) mediated by the aryl hydrocarbon receptor was the underpinning for later work indicating that tamoxifen may protect against follicular loss from alkylating agent chemotherapy. I was recruited to the Department of Medicine, Division of Hematology/Oncology in 2004 to collaborate on translational aspects of early prevention trials in breast and ovarian cancer. This included development of the first model of nearly simultaneous ER+ breast and ovarian pre-cancer which would be invaluable in assessment of risk and mechanism of action biomarker modulation for Phase II human prevention trials. In this manner investigators would be able to preview the effects of an intervention on the ovary as well as breast in a model which is hormonally analogous to a late premenopausal woman. During the validation of this model with the Selective Estrogen Receptor Modulator (SERM), tamoxifen, it was noted that tamoxifen could protect against carcinogen (DMBA) induced ovarian follicle loss and hence aid in preserving fertility. The observations were repeated for cyclophosphamide. The breast and ovarian cancer model itself is being used in a multi-PI multi-project Komen Promise Grant awarded in 2010. I have been instrumental in overseeing the development of more advanced molecular techniques to characterize biomarker change in breast chemoprevention trials from the small amounts of material available from random peri-aerolar fine needle aspirations including proteomics and stem cell markers, lipidomics, hormone measurements and gene expression after and laser capture micro-dissection. I have held a leadership position in the developing University of Kansas Cancer Center as coleader of Cancer Prevention since 2008.
Meetings Attended

2013 – Annual Meeting of the American Association for Cancer Research, Washington, D.C.

2013 – Annual Meeting of the Society for the Study of Reproduction

Committees

KUMC

Member, Thesis committee, Pan Wang and Jonathan Fitzgerald, Institutional Animal Care and Use Committee, Protocol Review and Monitoring Committee, KU Cancer Center, Shared Equipment Committee, KU Cancer Center, Leadership Council, KU Cancer Center, ACS Training Grant Advisory Board, KU Cancer Center, Ad hoc research committee

Editorial and Grant Reviews

Ad Hoc reviewer for 24 journals

Editorial Board Member - Current Medicinal Chemistry

North American Managing Editor - Reproductive Biology

Grant reviewer, NICHD training grants

Seminars Presented

2013 - “Effects of flaxseed lignan SDG on early breast and ovarian cancer progression,” Komen for the Cure Annual Meeting, Dallas, TX

2013 – “Secoisoresorecinol diglycoside (SDG, flaxseed lignan) improves biomarkers of early breast cancer progression in rats at high risk for breast and ovarian cancer,” AACR Annual Meeting, Washington DC

2013 - “Endocrinology and ovotoxicity from AhR ligands,” Michigan State University

Academic Honors

Komen Zumba Scholar

Trainees

Jonathan Fitzgerald – Postdoctoral

Fernando Pierucci-Alves, D.V.M.

Research Assistant Professor
Department of Anatomy & Physiology, Kansas State University
Member, Center for Reproductive Sciences

Sperm cells mature and acquire fertilizing capacity while transiting through the lumen of the male excurrent system, which is composed by the efferent ducts, epididymis and vas deferens. This ductal system is lined in its entirety by epithelial cells carrying out an array of secretory and absorptive mechanisms. These epithelial activities are required for successful spermatozoa maturation and fertility. Our research program is dedicated to understanding how growth factors, specifically transforming growth factor beta (TGFβ) regulate epithelial and sperm cell biology. By enhancing our knowledge of how this signaling pathway participates in the physiology of this organ system, we expect to form the basis for future diagnostics and treatment of infertility cases that remain primarily undiagnosed.
Trainees
Sheng Yi – Graduate

Stephen J. Renaud, Ph.D.
Research Assistant Professor
Department of Pathology and Laboratory Medicine
Member, Center for Reproductive Sciences and Center for Developmental Origins of Health and Adult Disease

Our laboratory is interested in the fundamental regulation of placental development. The placenta is essential for human reproduction, and placental maldevelopment is implicated in a host of obstetric complications that cause significant morbidity and mortality for moms and babies in the United States and worldwide. Specifically, we are interested in trophoblast differentiation and behavior, since these cells comprise the epithelial component of the placenta and perform the vast majority of its functions. Our research interests can be broadly divided into two themes:

i) Transcriptional control of trophoblast differentiation: trophoblast cells undergo a multilineage differentiation pathway. Active projects in the laboratory involve deciphering the transcriptional regulation of syncytiotrophoblast regeneration by conserved, zinc finger OVO-like transcription factors. We have evidence that OVO-like proteins control the expression of endogenous retroviral “syncytin” genes, which are known to catalyze syncytiotrophoblast generation.

ii) Defining interactions between maternal immune cells and trophoblast cells: we are interested in how trophoblast cells interact with maternal immune cells. Trophoblast cells express paternal antigens and should be recognized as foreign by maternal immune cells. Why trophoblast cells are tolerated under most circumstances is not clear, and it is hypothesized that aberrant interactions between maternal immune cells and trophoblast cells may play a role in the development of some obstetric complications. We have recently generated rats harboring a functional loss of the interleukin-15 gene, resulting in natural killer (NK) cell depletion. Since NK cells comprise the predominant uterine leukocyte population, we are currently investigating reproductive outcomes in this innovative model.

Collectively, it is anticipated that data derived from these studies will improve our understanding of placental morphogenesis and shed light on the etiology of pregnancy complications associated with aberrant placental development.

Meetings Attended
2013 – Greenwald Symposium on Reproduction and Regenerative Medicine, Kansas City, KS
2013 – International Federation of Placenta Associations, Whistler, BC, Canada
2013 – Society for the Study of Reproduction, Montreal, QC, Canada
2013 – University of Kansas Medical Center RFF Research Day, Kansas City, KS

Academic Awards
National Institutes of Health Travel Award for Early Career Investigators
University of Kansas Medical Center RPF Research Day, Kansas City, KS 2013 - Top prize for presentation pertaining to reproductive biology
University of Kansas Medical Center RPF Research Day, Kansas City, KS 2013 -1st place oral presentation (overall)
**Evelyn A. Reynolds, M.D.**
Assistant Professor
Division of Gynecologic Oncology
Department of Obstetrics and Gynecology
Member, Center for Reproductive Sciences

Evelyn A. Reynolds, M.D. is a specialist in gynecologic oncology and pelvic surgery. She completed her medical education and residency in obstetrics and gynecology at the University of Rochester School of Medicine in Rochester, NY. Following her residency, she completed a fellowship in pelvic surgery at Emory University in Atlanta, GA and held a faculty position at the same institution. She then joined the Mayo Clinic in Rochester, MN where she completed a fellowship program in gynecological oncology. Throughout her educational and professional career she has actively participated in cancer research. Dr. Reynolds has a particular interest in outcomes-based clinical research and the elimination of health disparities. Her current research involves the assessment of the treatment patterns of older women diagnosed with ovarian cancer.

**Committees**

**KUMC**

Member, The Protocol Review and Monitoring Committee (PRMC)

**Seminars Presented**

2013 – “Major Recent Advances in the field of Gynecologic Oncology,” HaysMed Cancer Symposium 2013, Hays, KS

2013 – “Approach to the Abnormal Pap Smear,” 2013 Cancer Update for Primary Care Physicians Symposium, Overland Park, KS

**Rocio M. Rivera, Ph.D.**
Assistant Professor
Division of Animal Sciences
University of Missouri-Columbia
Member, Center for Reproductive Sciences

Assisted reproduction in humans and animals has been linked to inappropriate control of the epigenome in gametes and preimplantation embryos that results in adverse consequences during fetal and postnatal development. Commonly used assisted reproductive technology (ART) procedures include: ovarian hyperstimulation (superovulation), in vitro maturation, in vitro fertilization, intra-cytoplasmic sperm injection, embryo culture, and embryo transfer. The research conducted in my laboratory aims at understanding the mechanisms whereby manipulations of mammalian gametes and embryos result in alterations of the epigenome. The long term goal of our research is to provide recommendations in order to decrease the negative side effects associated with ART.

**Meetings Attended**

2013 – Frontiers in Reproduction Symposium, Arlington, VA

2013 – Rocky Mountain Reproductive Sciences Symposium, Loveland, CO

2013 – Animal Sciences Graduate Research Forum, Columbia, MO

**Committees**

**MU**
Coordinator, Reproductive Biology Seminar Series
Chair, Division of Animal Sciences Graduate Committee
Member, Department Graduate Committee, NIH's Initiative for Maximizing Student Diversity Program Advisory Committee

Editorial and Grant Reviews
Ad hoc reviewer for 20 journals
Reviewer, The Marsden Fund-Royal Society of New Zealand; The SVSE6 Evaluation Committee of the French National Research Agency (ANR)

Seminars Presented
2013 – “Genomic imprinting and loss-of-imprinting in bovine pre- and post-implantation embryos,” Northwestern University, Evanston, IL
2013 – “Large offspring syndrome an animal model for Beckwith-Wiedemann Syndrome,” Oklahoma State University, Stillwater, OK
2013 – “Disrupted Development,” University of Missouri seminar series, Columbia, MO

Academic Honors
University of Missouri Freshman Interest Group Co-Facilitator Spotlight Recognition
NIH Loan Repayment Program – Contraception and Infertility Research

Trainees
Zhiyuan Chen – Postdoctoral
Kira Marshal – Graduate Student
Collin Morris – Undergraduate Student
Laura Moon – Undergraduate Student
Lauren Anderson – Undergraduate Student

Katherine F. Roby, Ph.D.
Research Associate Professor
Department of Anatomy and Cell Biology
Member, Center for Reproductive Sciences

The laboratory has two major areas of focus, ovarian biology and ovarian cancer. In regard to ovarian biology we are interested in understanding the cellular and molecular events controlling ovarian follicular development and ovulation. Specific interests focus on TNF, Src tyrosine kinase, and serum amyloid A. In regard to ovarian cancer, specific interests include defining the early molecular events associated with initiation of ovarian cancer, identification of targets for drug development, and the preclinical development of new therapies for the treatment of ovarian cancer. Ovarian cancer is primarily an intraperitoneal cancer and thus exhibits unique characteristics that can be exploited in treatment schemes. We have also extended our drug development/treatment studies to other cancers within the peritoneal cavity including disseminated colorectal cancer and mesothelioma.
Committees

KUMC

Member, Biostatistics/Informatic Shared Resource (B/ISR) Advisory Committee for the Kansas University Cancer Center, Member, Review Panel, Biomedical Research Training Grant Program, Pre- and Post-doctoral fellowships, Kansas University Cancer Center Pilot Project Grant Program, Executive Board, Institute for Reproductive Health and Regenerative Medicine, Institutional Animal Care and Use Committee, Review Panel, KU Research Institute / Lied Grant Program

Chair, Organizing Committee, Gilbert S Greenwald Symposium on Reproduction and Regenerative Medicine

Other

Member, American Cancer Society Institutional Research Grant Committee

Member Review Panel: American Cancer Society Junior Faculty Grants

Editorial and Grant Reviews

Ad hoc reviewer for 16 journals


Member, NIH, Special Emphasis Panel, Fellowships: Oncological Sciences. June 2013 review panel.


Chair, Department of Defense, Congressionally Directed Medical Research Programs Ovarian Cancer Research Program Review Panel Clinical and Experimental Therapeutics October 2013

Trainees

Sarah Mullinex – Summer Graduate Student

M.A. Karim Rumi, M.B.B.S., M.S., Ph.D.
Research Associate Professor
Department of Pathology and Laboratory Medicine
Member, Center for Epigenetics and Stem Cell Biology and Center for Reproductive Sciences

SATB regulation of trophoblast stem-state. Research involves identifying mechanisms utilized by SATB homeodomain proteins to maintain the trophoblast stem state and inhibit trophoblast differentiation. Mutant SATB mouse models in conjunction with rodent and human trophoblast cell models are used in the analyses. A recently awarded NIH grant supports our mouse SATB model-related research.

Regulation of the reproductive tract by sex steroid hormones. We are using zinc finger nuclease genome editing to generate rat knock-out models for disruptions in estrogen and progesterone receptor signaling. We are also utilizing the Brown Norway rat, an animal with progesterone resistance, to investigate the effects of sex steroid hormones on the uterus.

Meetings Attended

2013 – Greenwald Symposium on Reproduction and Regenerative Medicine, Kansas City, KS

2013 – International Federation of Placenta Associations, Whistler, BC, Canada
The focus of my research is to understand the pathogenetic mechanisms of craniofacial birth defects. Craniofacial malformations afflict about 5% of all infants born in the United States and comprise approximately one third of all birth defects. These anomalies result in significant medical, social and economic consequences. Orofacial clefts are one such common congenital facial defect that affects 1/800 live births. Cleft lip with or without cleft palate (CL/P) comprises the majority of orofacial clefts. The Center for Disease Control and Prevention (CDC) estimates that the lifetime cost for treating kids born each year with CL/P is over US$697 million. We have identified mutations in a novel cytoskeletal gene, \textit{SPECC1L}, in patients with a severe manifestation of facial clefts that extend from the oral cavity to the eye - called oblique facial clefts (ObFC). Although less common, insights into the cellular and molecular mechanisms underlying ObFC will directly impact our understanding of more common facial malformations, including cleft lip and hemifacial microsomia.

**Meetings Attended**

2013 - American Society of Human Genetics Annual Meeting, Boston, MA

**Seminars Presented**

2013 – “Role of SPECC1-like proteins in craniofacial morphogenesis and malformation,” Kansas-INBRE Symposium in Manhattan, KS

2013 – “Role of SPECC1-like proteins in craniofacial morphogenesis and malformation,” University of Missouri Kansas City Dental School-Oral Biology Seminar Series, Kansas City, MO

**Editorial and Grant Reviews**

Ad hoc reviewer, \textit{American Journal of Human Genetics}

2013 Inter-Institutional Study Section Member for Frontiers Pilot Grants, KUMCRI Clinical Pilots and Lied Basic Science Grant, and KU Diabetes Institute Pilot Grants
Trainees

Nathan Wilson – Graduate Student
Luciane Silva – Rotation Student
Lauren Hipp – Summer KU Undergraduate Student

Bruce Schultz, Ph.D.,
Professor
Department of Pharmacology, Kansas State University
Member, Center for Reproductive Sciences

Research efforts are focused on understanding the physiological regulation of epithelial ion transport and barrier functions. Transepithelial movement of ions provides for electrolyte and fluid homeostasis and, in the case of milk, is necessary for production. Dysfunction of epithelial transport mechanisms, especially the anion channel CFTR, is associated with reproductive, pancreatic, renal, intestinal, and pulmonary disorders. In the laboratory, we strive to achieve a better understanding of epithelial physiology and to develop interventions that prevent or overcome such pathological conditions.

Common mechanisms to accomplish ion transport are employed by a variety of epithelia. However, the cellular and subcellular location, along with regulatory apparatus, provides for unique combinations of mechanisms to support specific needs at each locale. Furthermore, a particular epithelium can modify its function depending upon the stage of tissue development or the endocrine state of the individual. In the laboratory, we are studying reproductive, renal, intestinal and mammary epithelia in order to understand their unique transport capabilities. These observations are particularly instructive for reproductive and mammary epithelia since relatively little is known regarding the mechanisms that they employ.

We developed an in vitro system to study ion transport by epithelia lining the male reproductive tract. This system allows us to identify mechanisms of ion transport in this tissue along with the hormones and neurotransmitters that modulate such activity. This line of investigation is particularly important as we try to understand the causes of congenital bilateral absence of the vas deferens (CBAVD), a form of infertility that commonly affects cystic fibrosis patients. CBAVD has recently gained recognition as a 'mild' form of cystic fibrosis.

The laboratory collaborates with Dr. John Tomich (Department of Biochemistry) in a project to develop synthetic channel forming peptides for the treatment of cystic fibrosis. Since the primary defect in cystic fibrosis is the loss of an epithelial anion channel, we reasoned that providing such a conductance could reduce or preclude the effects of the disease.

We gratefully acknowledge ongoing or past support from the National Institutes of Health, the United States Department of Agriculture, and the Cystic Fibrosis Foundation.
Committees

KSU

Member, K-State 2025 Research Themes Committee, University Faculty Senate and Executive Committee, Provost’s Review Committee – Ralph Richardson CVM Dean, Veterinary Research Scholars Program Selection and Steering Committee ad hoc contributor, Safety Committee, Disaster Preparedness Special Committee, PhD Committee-Xiangming Li, Anatomy & Physiology Search Committee – A&P Director of Research Operations

Chair, Faculty Senate Caucus

Associate Department Head

Other

Member, Society for the Study of Reproduction-Awards Committee; Publications Committee; Ethics Subcommittee Chair, Abstract Review for Male Reproductive Duct, Mastitis Research Workers (NE1048 Multistate Research Project)

PhD Examiner, Otago University, Dundeden, NZ

Editorial and Grant Reviews

Editorial Board, American Journal of Physiology – Cell Physiology


Grant Reviewer, KUMC Research Institute Internal Grants Program, Hong Kong Research Grants Council

Trainees

Qian Wang – Graduate Student
Sheng Yi – Graduate Student
Samuel Molina – Graduate Student
Allan Prior – Graduate Student
Jimmie Stewart – Undergraduate Student
Jacob Hull – Undergraduate Student
Tyler Dubek – Undergraduate Student

Peter G. Smith, Ph.D.

Professor
Co-Director, Kansas Intellectual and Developmental Disabilities Research Center
Founding Director, Institute for Neurological Disorders
Department of Molecular and Integrative Medicine
Member, Center for Reproductive Sciences

Nerves regulate function and structure of peripheral cells. Target cells in turn provide molecular signals that govern the quantity and type of innervation they receive. Our research examines this interplay between nerve and target and the factors that govern neuronal growth and degeneration. We are especially interested in how this relationship is affected by gonadal steroid hormones such as estrogen. Ongoing projects examine mechanisms and consequences of neuroplasticity in peripheral tissues including: reorganization of cardiac innervation following myocardial infarction, which may contribute to sudden cardiac death; estrogen-induced
remodeling of innervation of the reproductive tract; mechanisms by which nerve projections are pruned under normal and pathophysiological conditions; and the role of estrogen in the etiology of female pain syndromes.

**Committees**

**KUMC**

Member, Board of Directors, KUMC Research Institute, Laboratory Animal Resources Advisory Committee, Clinical and Translational Sciences Award Application Writing Committee

Chair, Research Committee, KUMC Research institute, cDNA Microarray Advisory Committee

**Editorial and Grant Reviews**

Associate Editor - Autonomic Neuroscience: Basic and Clinical

Ad hoc Reviewer, 37 journals

Reviewer - Pennsylvania Department of Health, The Grant Workshop, Fonds zur Forderung der wissenschaftlichen Forschung (Austria Science Fund), Wellcome Trust, National Science Foundation, KUMC Center for Aging Research Review Committee, Feasibility Grants Competition, Claude Pepper Older Americans, Independence Center, Nathan Shock Center, & Alzheimer Disease Research Center, The Geriatrics Center, University of Michigan, KUMC School of Allied Health Research Committee, University of Calcutta School of Medicine, University of Vermont School of Medicine, Miami University, Oxford Ohio, KUMC Research Institute Lied Foundation, KUMRI Collaborative Research Grants (Chair), City University of New York, Oregon Health Sciences University, University of Missouri, Columbia

Ad Hoc Study Section service, Urologic and Kidney Development and Genitourinary Diseases; Molecular, Cellular, and Developmental Neuroscience; Neurological, Aging and Musculoskeletal Epidemiology

**Seminars Presented**

2012 – “Peripheral Nervous System Plasticity and Chronic Pain,” University of Tennessee – Memphis

**Trainees**

Tim Donohue – MD/PhD Student
Sarah Tague – Graduate Student
Argenia Doss – Graduate Student
Eva Selfridge – MD/PhD Student
Gwenaelle Clarke - Postdoctoral
Aritra Battacherjee – Graduate Student

**Chad Slawson, Ph.D.**

Assistant Professor  
Department of Biochemistry and Molecular Biology  
Member, Center for Epigenetics and Stem Cell Biology

Research Focus: To Understand the Regulation of the Post-Translational Modification O-GlcNAc During Growth and Development:

O-GlcNAc is the addition of a single N-acetyl-glucosamine residue to serine/threonine residues of proteins found in the cytoplasm or nucleus (O-GlcNAcylation). Unlike extracellular glycosylation, the sugar residue is
not elongated into complex oligosaccharides and is processed dynamically in response to cellular stimuli by a single O-GlcNAc transferase (OGT) or O-GlcNAcase (OGA). O-GlcNAc is involved in many cellular processes such as nutrient sensing, stress response, transcription, translation, cell signaling, and cell cycle regulation. Currently, we are asking several questions to understand how O-GlcNAc regulates mitosis such as how is OGT targeted to specific structures at M phase as well as to specific substrates? What is the dynamics of O-GlcNAcylation throughout mitosis? What mitotic signaling pathways are regulated by O-GlcNAcylation? My laboratory uses a variety of techniques from cloning, western blotting, imaging, and mass spectroscopy in order to answer these questions.

Meetings Attended

2013 – Experimental Biology Meeting, Boston, MA

Committees

KUMC

Member, 2013 Heartland Undergraduate Biochemistry Forum Committee KUMC, Allen Chazelle Dissertation Committee, Mary Ashley Rimmer Dissertation Committee, Fang Tao Dissertation Committee (Pathology Department), Academic Academic and Professionalism Committee, Students Promotions and Special Programs Sub-committee

Other

Dissertation Committee, Tanja Bhuiyan, University of Lausanne, Switzerland

Editorial Reviews

Ad hoc Reviewer - Journal of Biological Chemistry

Seminars Presented

2013 -. “Altering O-linked β-N-Acetylglucosamine Cycling Disrupts Mitochondrial Function.” KUMC Alzheimer’s Center and Alzheimer’s Association Research Colloquium

2013 - “O-GlcNAc Signaling: Implications for Cancer and Alzheimer's Disease”. Merck Pharmaceuticals, Kenilworth, NJ

2013 - “The O-GlcNAc Post-Translational Modification: New Insights into Cellular Function”. KUMC Cancer Center, Kansas City, KS

2013 - “The O-GlcNAc Post-Translational Modification: A Critical Regulator of Cellular Function”. University of Kansas Biophysics Seminar, Department of Physics and Astronomy

2013 - “O-GlcNAc Signaling Regulates Mitochondrial Function: Implications for Alzheimer’s Disease”. KUMC Translational Research Forum, Kansas City, KS

2013 - “The O-GlcNAc Post-Translational Modification: A Critical Regulator of Cellular Function”. Kansas State University, Department of Diagnostic Medicine and Pathobiology, Kansas City, KS

Academic Honors

2013 Mentorship Award, Masters of Science in Molecular Biotechnology Program, KUMC
Trainees

Zhen Zhang - IGPBS Student
Ee Phie Tan - IGPBS rotation Student
Amanda Brinker – IGPBS rotation Student
Miranda Machacek – MD/PhD Student
Christopher Lanza – Summer undergraduate Student

Michael J. Soares, Ph.D.
University Distinguished Professor
Director, Institute for Reproductive Health and Regenerative Medicine
Department of Pathology and Laboratory Medicine
Member, Centers for Epigenetics and Stem Cell Biology, Reproductive Sciences, and Developmental Origins of Health and Adult Disease

Our laboratory is interested in the regulation of cell differentiation, especially as related to trophoblast stem cells, and signaling pathways controlling their developmental fate. Our research efforts include investigating species-specific reproductive adaptations and signaling events involved in the establishment and maintenance of pregnancy; the prolactin gene family, intrauterine inflammatory and immune cells, uterine vasculature, decidual cells, and the invasive trophoblast cell lineage. These scientific pursuits have important implications regarding pregnancy-related diseases such as preeclampsia, intrauterine growth restriction, and pre-term birth. Our research also includes the establishment and characterization of mutant rat models. Genome editing strategies have been used to generate rats with mutations in key genes regulating estrogen signaling. These animal models represent new tools for biomedical scientists in a range of disciplines, including cancer biology, reproduction, women’s health, environmental health, metabolism, immunology, neurosciences, and cardiovascular biology.

Meetings Attended

2013 – V Latin American Symposium on Maternal Fetal Interaction and Placenta and IV Latin American Symposium on Reproductive Immunology, Iguazu Falls, Parana, Brazil

2013 – Society for the Study of Reproduction Annual Meeting, Montreal, Canada

Committees

KUMC

Member, Research Institute Technology Transfer Advisory Committee, Executive Dean’s Basic Science Planning Committee, High Throughput Genomics Facility Advisory Committee, Advisory Committee for the Huron Changing for Excellence Project, Executive Vice Chancellor Transition Team for Research Committee, Advisory Committee for the Genomics Core, Research Bridging Fund Organization Committee

Other

Member, Society for the Study of Reproduction Nominating Committee

Editorial and grant reviews

Editorial Board, Placenta, Biology of Reproduction

Ad hoc Reviewer, Developmental Biology; Endocrinology; Human Reproduction; Journal of Assisted Reproduction and Genetics; Journal of Clinical Investigation; Journal of Cell Science; Journal of

**Seminars Presented**

2013 - "Stem cells and rodent placental development," V Latin American Symposium on Maternal Fetal Interaction and Placenta and IV Latin American Symposium on Reproductive Immunology, Iguazu Falls, Parana, Brazil

2013 - “Adaptations at the maternal-fetal interface,” Pathology Research Lecture Series, University of California-San Diego, La Jolla, California

2013 - “Regulatory pathways controlling placentation,” Department of Molecular and Cellular Biology Seminar Series, Baylor College of Medicine

2013 - “Adaptive mechanisms controlling hemochorial placentation,” Department of Biochemistry and Molecular Biology, Tokyo University of Pharmacy and Life Sciences

2013 - “Adaptive mechanisms controlling hemochorial placentation,” East Japan Embryo Transfer Society, National Institute of Agrobiological Sciences, Tsukuba, Japan

2013 - “Adaptive mechanisms controlling hemochorial placentation,” FAMS Animal Reproduction Symposium: Challenges for improving reproductive efficiency. Iwate University, Morioka Japan

2013 - “Origins of a rapidly evolving checkpoint controlling testicular function,” School of Veterinary Medicine, Kitasato University, Towada, Japan

2013 - “The prolactin family, reproductive adaptations, and big testes,” Veterinary Sciences/Animal Resource Sciences, University of Tokyo, Tokyo, Japan

**Trainees**

Pengli Bu – Postdoctoral
Stephen J. Renaud – Postdoctoral
Kaiyu Kubota – Postdoctoral
Pramod Dhakal – Postdoctoral
Damayanti Chakraborty – Postdoctoral
Wei Cui - Postdoctoral

**Katherine Swenson-Fields, Ph.D.**

Research Associate Professor
Department of Anatomy and Cell Biology
Member, Center for Epigenetics & Stem Cell Biology

The research focus of our lab, shared with Dr. Timothy Fields, is centered the role of the renal inflammatory environment, with a particular focus on macrophages, in polycystic kidney disease (PKD) progression. Macrophages normally infiltrate tissues in response to infection or injury where they act first to sterilize the environment and then to promote repair, cell proliferation and regeneration of damaged tissues, a function, which they effect by secreted factors. Following tissue repair, further infiltration of these cells no longer occurs
and their numbers normally decline to that found in the pre-injured state. We have found large numbers of infiltrated macrophages in the kidneys of both human and mouse individuals with PKD, and have demonstrated that the presence of these cells contributes to cyst expansion and functional renal decline. In addition we have shown that macrophages promote the proliferation of PKD cyst cells when co-cultured in vitro, and that these pro-proliferative effects are mediated by soluble factor/s. These studies suggest that the normal functions of macrophages to transiently promote tissue regeneration following injury are continuously and, thus, pathologically present in PKD kidneys to promote cyst cell proliferation and resultant cyst expansion. Current studies are underway to identify the specific factors and signaling pathways that promote renal macrophage recruitment and the pro-proliferative cyst-expanding effects of these cells. This research will facilitate the achievement of our broader goals to develop therapeutic agents that block these macrophage processes in PKD that can be used clinically to slow progression of this disease.

Trainees
Sally Salah – Graduate Student

Russell H. Swerdlow, M.D.
Gene and Marge Sweeny Professor
Departments of Neurology, Molecular & Integrative Physiology, Biochemistry & Molecular Biology
Director, Alzheimer’s Disease Center
Director, Neurodegenerative Disease Program
Member, Center for Epigenetics and Stem Cell Biology

Dr. Russell Swerdlow is a physician-scientist at the University of Kansas. He has studied Alzheimer's disease for approximately 25 years and is recognized for his contributions to the Alzheimer's disease research field. He directs the NIH-funded University of Kansas Alzheimer's Disease Center, serves as an attending physician at the Kansas University Medical Center's Memory Disorders Clinic, directs the Kansas University Medical Center's Neurodegenerative Disorders Program, and is a Professor in the Departments of Neurology, Molecular and Integrative Physiology, and Biochemistry and Molecular Biology at the University of Kansas School of Medicine.

Dr. Swerdlow received his undergraduate and doctor of medicine degrees from New York University. He trained as a neurologist and Alzheimer's disease specialist at the University of Virginia, co-founded the University of Virginia's Memory Disorders Clinic, and participated in pivotal clinical trials for most FDA-approved Alzheimer's disease medications. Before leaving Virginia for Kansas in 2007, Dr. Swerdlow chaired the Alzheimer's Disease and Related Disorders Commission of the Commonwealth of Virginia. He is a recipient of an S. Weir Mitchell Award from the American Academy of Neurology, a Cotzias Award from the American Parkinson's Disease Foundation, and several grant awards from the National Institutes of Health. He has served as the Research Committee Chair of the CurePSP Foundation; is on the editorial board of several research journals including the Journal of Alzheimer's Disease; and frequently sits on NIH, Veteran's Administration, and non-profit research foundation study sections.

In addition to his clinical duties, Dr. Swerdlow studies brain energy metabolism and the role brain energy metabolism plays in Alzheimer's disease and other neurodegenerative diseases. He was the first to propose using ketone bodies to improve brain energy metabolism in Alzheimer's disease patients, presaging the development of this now-utilized Alzheimer's disease treatment approach. His laboratory is actively working on new ways to manipulate brain energy metabolism. The goal of this work is to create new and effective treatments that will hopefully help people with Alzheimer's disease.

Meetings Attended
2013 – 46th Annual Meeting of the Society for the Study of Reproduction, Montreal, Canada
2013 – Annual Meeting of the American Society of Reproductive Medicine, Boston, MA
2013 – Annual Meeting of the Society for Molecular Biology and Evolution, Chicago, IL
2013 – AD/PD International Meeting, Florence, Italy
2013 – ISN-ASN International Meeting, Cancun, Mexico

Committees

KUMC

Vice-Chair, Research Committee
Member, Shared Resources Subcommittee

Other

External Advisory Board Member, Louisiana State University Institute for Dementia Research and Prevention, Baton Rouge, LA

External Advisory Board Member, Center of Excellence for Research in Complementary and Alternative Medicine in Alzheimer’s Disease, Mount Sinai School of Medicine, NY

External Advisory Board Member, Pennington Biomedical Research Center, Louisiana State University, Baton Rouge, LA

Editorial and grant reviews

Reviewer, The Journal of Mitochondrial Biology, The Open Pathology Journal, Mitochondrial Therapy, Frontiers in Aging Neuroscience, International Journal of Clinical and Experimental Medicine, Biochimica et Biophysica Acta – Molecular Basis of Disease, Degenerative Neurological and Neuromuscular Disease, Metabolic Brain Disease, Neurology (Behavioral and Cognitive Neurology Section), Bioenergetics, American Journal of Neurodegenerative Disease

Senior Editor, Journal of Alzheimer’s Disease

Grant Reviewer - Alzheimer’s Association, NIH: CDIN, MDCN, Several SEPs, University of Arizona Alzheimer’s Disease Core Center Pilot Program, Alzheimer’s Research UK, Croucher Foundation, Thiel Foundation

Seminars Presented

2013 – “Alzheimer’s Disease Research at the University of Kansas Alzheimer’s Disease Center,” Kansas City Sertoma Group Bimonthly Meeting, Kansas City, MO

2013 – “Mitochondria, Brain Aging, and Alzheimer’s Disease,” Gordon Research Conference, Des Diablerets, Switzerland

2013 – “Mitochondria in Alzheimer’s Disease,” University of Denver, Denver, CO


2013 – “Brain Aging and Dementia,” Sanitarium Corporate Board, Baltimore, MD
2013 – “Mitochondria, Alzheimer’s Disease, and Bioenergetic Medicine,” University of Alabama, Birmingham, AL

2013 – “Mitochondria,” Community of Reason Society, University of Missouri, Kansas City, MO

2013 – “Mitochondria, Brain Aging, and Alzheimer’s Disease,” University of Missouri, Kansas City, MO

2013 – “The Neurodegenerative Dementias/The University of Kansas Alzheimer’s Center,” Kansas Medical Education Foundation Grand Rounds, Topeka, KS

2013 – “Alzheimer’s Disease and Healthy Brain Aging,” Kansas City Southwest Clinical Society 2013 Meeting, Overland Park, KS

**Trainees**

Lezi E - Graduate Student
Nairita Roy – Graduate Student

**Patricia A. Thomas, M.D., M.A., FACP, FASCP**
Professor
Department of Pathology and Laboratory Medicine
Member, Center for Reproductive Sciences

Dr. Thomas' research interests are related to racial/ethnic differences in breast cancer and health disparities research. Her clinical expertise is in cytopathology and breast pathology. Dr. Thomas published a textbook in 2010 on breast pathology targeting non-pathologist physicians and even the general public. She is internationally known for her expertise in cytopathology, particularly for her knowledge and skills in the Fine Needle Aspiration (FNA) cytology technique and breast FNA.

**Meetings Attended**

2013 – KUMC PathOLogical Training Program for Students and Families: Disparities in Obesity, Omaha, NE

2013 – NIH Science Education Partnership Award (SEPA) Annual Meeting, Omaha, NE

2013 – Unconscious Bias Learning Laboratory – AAMC and Cook Ross Collaboration and Inaugural Session, “Transforming the World, One Organization at a Time,” Silver Spring, MD

2013 – National Council on Health Disparities and Diversity in the Health Professions (NCDHP), Center of Excellence and Health Careers Opportunity Program Directors National Meeting and Legislative Update, Washington, DC

**Committees**

Member, Admission Interview Committee, Selection Committee

Member, National Planning Committee for HSHPS Professional Development and Data Systems Workshop

**Editorial and Grant Reviews**

Ad hoc reviewer, *Family Medicine Journal*

Co-Editor, *Special Edition of Global Advances in Health and Medicine*

Editorial Board, *Annals of Clinical Cytology and Pathology*
Panel reviewer, Congressionally Directed Medical Research Programs: Breast Cancer Research Program Era of Hope Scholar Award applications peer review

Academic Honors

W. Montague Cobb NMA Health Institute (http://cobb.nmanet.org/index.php/About/) An Institute launched by the National Medical Association (NMA) in 2004 to develop, evaluate and implement strategies to promote wellness and eliminate health disparities in the African American Community.

Highlighted as the Hispanic–Serving Health Profession Schools (HSHPS) e–Feature, September, 2013

Trainees

Asona Lui – MD/PhD Student

J. Brantley Thrasher, M.D., F.A.C.S.
Professor and the William L. Valk Chair
Department of Urology
Member, Center for Reproductive Sciences

Dr. Thrasher’s basic science research interest is in the area of prostate cancer and he is currently a co-investigator or consultant in NIH, Center for Disease Control, and Department of Defense funded research. His clinical research interests are in the area of prostate, bladder, and renal cancer, as well as reconstruction, and he serves as the investigator on numerous investigator initiated, industry funded, and institutionally funded protocols.

Meetings Attended

2013 –105th Annual Meeting, American Urological Association, San Diego, CA

Committees

KUMC

Member, General Surgery Chair Search Committee, Perioperative Governance Committee, Medical Disaster Committee, Medical Staff Executive Committee, Multidisciplinary Cancer Committee (KUCC)

Other

Member, Residency Review Committee for Urology, Kansas State Budget Allocation Committee

Clinical Consultant, Scientific Committee for the Kansas IDeA Networks of Biomedical Research Excellence (K-INBRE)

Editorial and Grant Reviews

Coordinating Editor, Practical Reviews in Urology, Oakstone Medical Publishing

Editor, Annals in Urology

Associate Editor, 5 Minute Urology Consult, Williams and Wilkins, Philadelphia, PA

Member Editorial Advisory Board, American Family Physician

Section Editor of Cancer Prevention Urologic Oncology, Seminars and Original Investigation, W.B. Saunders Co., Philadelphia, PA
Editorial Consultant, Urology Times Editorial Council, Cleveland, Ohio

Specialty Society Editor for the Journal of Urology, Representing the Society of Urologic Oncology

Consulting Editor, 5 Minute Urology Consult, 2nd Edition, Williams and Wilkins, Philadelphia, PA

Ad hoc reviewer, Journal of Urology, Urology, Cancer, Prostate, Journal of Endourology

Seminars Presented

2013 – “Applicability of MIC-1 as a Potential Biomarker for Radical Disparity in Prostate Cancer,” 92nd Annual Meeting South Central Section Meeting, American Urological Association, Chicago, IL


Academic Honors

America’s Top Surgeons

America’s Top Doctors

Best Doctors in Kansas City (Kansas City Business Journal)

Kansas City’s Top Doctors

American Association of GU Surgeons

Super Doctor, Kansas City (Kansas City Magazine)

The Best Doctors in America

Jay L. Vivian, Ph.D.
Research Associate Professor
Department of Pathology and Laboratory Medicine
Scientific Director, KUMC Transgenic Facility
Member, Center for Epigenetics and Stem Cell Biology

My research uses the mouse as a genetic, stem cell, and developmental system to study signaling during embryonic development. My group also makes substantial use of mouse embryonic stem cells for genetic engineering and as a model for regulation of gene expression and early embryonic differentiation. My group is interested in understanding the signaling pathways and genetic hierarchies that regulate gene expression and stem cell self-renewal in embryonic stem cells. My work utilizes mutant and transgenic mouse models for our studies. We also use and generate human induced pluripotent stem cells to both model human disease including congenital developmental disorders, and as a source for cellular therapies for spinal cord injury.

Meetings Attended

2013 – Central Region IDeA Conference, Kansas City, MO

Committees

KUMC

Member, Laboratory Animal Resource Center Advisory Committee, Human Stem Cell Advisory Committee, Greenwald Symposium Planning Committee, KUCC Shared Resource Committee, KUMC Faculty Council, KUCC Strategic Planning Subcommittee on Shared Resources
Editorial and Grant Reviews


Reviewer, Medical Research Council Research Board, KUMC Internal Grant (Lied, Clinical/CTSA) award review committee

Editorial Board Member - *America Journal of Stem Cell Research, Cloning and Transgenesis*

Seminars Presented


2013 – “Gene variant discovery in developmental disorders: Developing animal and cellular models,” KUMC Institute for Neurological Disorders Translational Discovery Forum, Kansas City, KS

**Jinxi Wang, M.D., Ph.D.**
Harrington Distinguished Professor
Director, Harrington Laboratory for Molecular Orthopedics
Department of Orthopedic Surgery
Member, Center for Epigenetics and Stem Cell Biology

The Harrington Laboratory for Molecular Orthopedics, which is primarily supported by NIH grants and the Mary Alice and Paul R. Harrington, M.D. Distinguished Professorship Endowment, was established in 2005. The laboratory is well equipped for conducting research involving biochemistry, cell biology, and molecular biology of skeletal tissues. Our major research interests are to study the regulatory mechanisms by which pluripotent mesenchymal stem cells differentiate into osteoblasts (bone-forming cells) or chondrocytes (cartilage-forming cells) and investigate the role of specific signaling pathways in bone/cartilage regeneration and diseases. Currently, research in our laboratory is focused on the following projects: (1) the role of bone sialoprotein (BSP) in osteoblast differentiation and bone regeneration, (2) molecular regulation of chondrocyte differentiation and articular cartilage regeneration, and (3) pathogenetic mechanisms and novel therapeutics for osteoarthritis.

Meetings Attended

2013 – 2013 Annual Meeting of the Orthopaedic Research Society, San Antonio, TX

2013 – 2nd Joint Meeting of the International Bone and Mineral Society and the Japanese Society for Bone and Mineral Research, Kobe, Japan

2013 – 8th Combined Meeting of Orthopaedic Research Societies, Venice Italy

2013 – 2013 Annual Meeting of the American Society for Bone and Mineral Research, Baltimore, MD

2013 – Bone and Muscle Day, University of Missouri, Kansas City, MO
Committees

KUMC

Member, Research Committee, Institutional Animal Care and Use Committee (IACUC)

Other

Member, New Investigator Mentoring Committee, the Orthopedic Research Society (ORS, USA)

Editorial and Grant Reviews

Ad hoc reviewer, Arthritis Research and Therapy

Reviewer, NIH-Ad hoc member of NIH Skeletal Biology Development and Disease (SBDD) Study Section, NIH-Ad hoc reviewer for the NIH Director’s Early Independence Awards (DP5 grants)

Seminars Presented

2013 – “Epigenetic regulation of Nfat1 expression in articular chondrocytes and its implication in osteoarthritis,” IRHRM, Kansas City, KS

2013 – “Molecular regulation of chondrocyte differentiation,” Dept. of Anatomy and Cell Biology Seminar, Kansas City, KS

2013 – “US Dept. of Defense (DoD) grant applications,” ORS/OREF 2014 Annual Grant Writing Workshop, San Antonio, TX

2013 – “Posttraumatic osteoarthritis: Pathogenesis and novel therapeutic strategies,” Keck School of Medicine, Los Angeles, CA

Academic Honors

Session Moderator – New Investigator Recognition Award Session 2-Bone. ORS 2013 Annual Meeting, San Antonio, TX

Session Moderator – Oral Poster Presentations-Late-Breaking ASBMR 2013 Annual Meeting, Baltimore, MD

Trainees

William Kramer – Orthopedic Resident
Kenneth Caldwell - Orthopedic Resident
Mingcai Zhang – Postdoctoral
Yi Feng – Postdoctoral
Paul Cowan – Orthopedic Resident

Carl P. Weiner, M.D., M.B.A.

K.E. Krantz Professor and Chair
Department of Obstetrics and Gynecology
Associate Director, Institute for Reproductive Health and Regenerative Medicine
Director, Center for Developmental Origins of Health and Adult Disease

Dr. Weiner's laboratory investigative interests focus on the regulation of uterine quiescence during pregnancy, impact of chronic fetal hypoxia, and the discovery, interpretation, and application of biomarkers for reproductive pathology. His laboratory has multiple firsts in the application of proteomics, genomics and transcriptomics to reproductive science. Dr. Weiner is a strong advocate of the strategic linking of clinical and basic research, and
is the founder and President of Perinet Inc., a biomedical development company created to facilitate the
development of his laboratory's findings.

Meetings Attended
2013 – Society for Maternal Fetal Medicine, San Francisco, CA
2013 – Society for Gynecologic Investigation, Orlando, FL
2013 – ASME 2013 Summer Bioengineering Conference, Sun River, OR

Committees
KUMC
Member - Executive Committee, Executive Vice Chancellor’s Advisory Committee, BIRCWH Internal Advisory
Committee, WRHR Internal Advisory Committee, Obstetrics and Gynecology Education Committee

Other
Member, Blue Cross Blue Shield of Kansas City Medical Advisory Committee, Sunflower State Health Plan’s
Utilization Management Committee, Society of Gynecologic Investigation Nominations Committee,
American Gynecological and Obstetrics Society Audit Committee

Editorial and Grant Reviews
Reviewer, 36 journals
Editorial Board, Fetal and Maternal Medicine Review

Seminars Presented
2013 - “CELL FREE PLASMA RNA IN PREGNANCY-The endocrine language of love and hate.” Department
of Obstetrics and Gynecology, University of Missouri, Kansas City School of Medicine, Kansas City, MO
2013 - “CELL FREE PLASMA RNA IN PREGNANCY-The endocrine language of love and hate.” Department
of Obstetrics and Gynecology, Christiana Care Health System, Newark, DE
2013 - “IMPROVING PERINATAL SAFETY-Are we our own worst enemies? Simulation Training for Obstetrical
Emergencies.” 12th World Congress in Fetal Medicine, Marbella, Spain
2013 - “IMPROVING PERINATAL SAFETY: Are we our own worst enemies? Simulation Training for
Obstetrics-Bringing PROMPT to China.” Zhejiang University School of Medicine, China
2013 - “Antenatal Care for the High Risk Pregnancy: A pragmatic approach for the future.” Sun Yat-sen
University School of Medicine, Guanzhou, China

Academic Honors
Visiting Professor, Hangzhou University School of Medicine, Hangzhou, China, September 4-8, 2013.
Visiting Professor, Sun Yat-sen University School of Medicine, Guanzhou, China, September 9-16, 2013.
Trainees

Zhu, Shuguang PhD 11/12 -11/14 Laboratory sabatical Sun Yat-Sen University, Guangzhou, China
Zhang, Lahong PhD 8/12 -1/17 Senior Research Associate Hangzhou Normal University, China
Chen, Kaiyun PhD 7/13 -7/14 Research Associate Professor Sun Yat-Sen University, Guangzhou, China
Tian, Ying MD 12/13-3/14 Research Associate Professor Third Hospital of Hebei Medical University,
Shijiazhuang, China
He, Lily 6/13 – 6/14 Research Associate Guangdong Medical College, China
Tai, Minghui 7/11-10/14 Research Associate Zian Jiaotong University, China
Bae, Jingon 8/2013-8/2014 Visiting Clinical Scholar Keimyung University of Daegu, S. Korea
Fuenzalida, Javiera 7/2013 – 8/2013 Visiting Clinical Scholar Universidade de los Andes, Chile

Mark L. Weiss, Ph.D.
Professor
Department of Anatomy and Physiology – Kansas State University
Adjunct Professor, KUMC, Department of Physiology
Associate Director, Terry C. Johnson Center for Basic Cancer Research
Founding Fellow, Midwest Institute for Comparative Stem Cell Biology
Member, Center for Epigenetics & Stem Cell Biology

Weiss’ research focus is on stem cell biotechnology and regenerative medicine. His lab successfully produced stem cell lines such as rat embryonic stem cells and induced pluripotent stem cells, and rat and human mesenchymal stromal cells derived from the umbilical cord matrix or from other tissues such as bone marrow. Weiss’ lab investigates promising cellular therapeutics for regenerative medicine. For example, mesenchymal stromal cells have been tested in a variety of rodent preclinical disease models including neurodegenerative diseases such as Parkinson’s disease, heart disease such as myocardial infarction, and cancer. Based upon the immune properties of Wharton’s jelly derived mesenchymal stromal cells (WJCs), Weiss’ lab tested them for treating graft versus host disease (GVHD). The first round of preclinical data indicated that rat WJCs prevent the development of GVHD. Now, Weiss’ group will determine if WJCs can treat on-going GVHD in their preclinical rodent model.

Weiss’ lab focuses upon the mechanisms of pluripotency in stem cells. Weiss’ lab is producing new rat models of human disease using gene targeting in rat embryonic stem cells and reporter cell lines that report when a particular gene is activated during development.

Committees

KSU
Member, Faculty Senate Committee on University Planning, Review Committee of Departmental Documents, Search Committee-Anatomy & Physiology Dept. Head

Editorial and Grant Reviews

Ad hoc reviewer, 28 journals

Seminars Presented

2013 – “Genetic engineering using pluripotent stem cells,” University of South Carolina, Columbia, SC
2013 – “Where are we will cell therapy for GVHD?” First Midwest Conference on Cell Therapy and Regenerative Medicine, Kansas City, MO
Academic Honors
Phuoc Bui (undergraduate), KSU President’s undergraduate research award

Trainees
Pavan Rajanahalli – Postdoctoral

Michael W. Wolfe, Ph.D.
Associate Professor
Research Integrity Officer, KUMC
Department of Molecular and Integrative Physiology
Member, Centers for the Developmental Origins of Health & Adult Disease, Reproductive Sciences

Mammalian reproduction is regulated by a number of hormones produced at various locations: hypothalamus in the brain, gonadotropes within the anterior pituitary gland, the gonads and also by the placenta during pregnancy. The glycoprotein hormones, luteinizing hormone (LH) and follicle-stimulating hormone (FSH) synthesized in pituitary gonadotropes and chorionic gonadotropin (CG) by the placenta, are essential to mammalian reproduction. Research in my laboratory is directed towards understanding the cellular and molecular mechanisms involved in regulating the genes encoding these hormones. One area of emphasis is on how gonadotropin-releasing hormone secretion by hypothalamic neurons is regulated and how it signals to pituitary gonadotropes to induce the expression of the genes for LH. A second area focuses on elucidating the events associated with the differentiation of placental trophoblast cells and their acquisition of expression of CG.

We use a variety of experimental approaches and models to examine cell differentiation and gonadotropin gene expression such as the study of DNA-protein and protein-protein interactions, DNA microarrays, promoter analysis, transgenic mice and primary cultures of human trophoblasts. Our overall goal is to identify the physiologically relevant molecular and cellular events responsible for regulating cell differentiation and expression of the gonadotropin subunit genes. This will provide a better understanding of how the reproductive system is normally regulated and ultimately, will provide clues as to how diseases, drugs and the environment impact reproductive success.

Meetings Attended
2013 – 10th Annual Gilbert S. Greenwald Symposium, Kansas City, KS

Committees
KUMC

Member – Institutional Animal Care and Use Committee, Interdisciplinary Graduate Program in Biomedical Sciences Advisory Board, School of Medicine Elections Committee, Phase I committee for medical curriculum, Phase I remediation sub-committee, Phase I Gastrointestinal module curriculum review committee, Graduate Council

Director, Physiology Graduate Student Advisory Committee

Thomas M. Yankee, Pharm.D., Ph.D.
Associate Professor
Department of Microbiology, Molecular Genetics, and Immunology
Member, Center for Epigenetics and Stem Cell Biology
T cell homeostasis is critical for maintaining the balance between immune competency, autoimmunity, and malignancy. To maintain a steady state number of T cells, we need to continuously produce new T cells to offset the number of T cells that die or differentiate. Our research is focused on the signaling pathways that regulate T cell development and activation. In particular, we study an adaptor protein called Gads and seek to understand the biochemical and biological functions of Gads.

Gads consists of an N-terminal SH3 domain, an SH2 domain, a linker region, and a C-terminal SH3 domain. The SH2 and C-terminal SH3 domains bind LAT and SLP-76, respectively. The formation of the LAT/Gads/SLP-76 complex is required for TCR-mediated calcium mobilization. Whether Gads regulates other signaling pathways is currently unknown. In addition, the functions of the N-terminal SH3 domain and the linker region are unclear. Gads can also be phosphorylated, but the biological function of this phosphorylation is unclear.

The biological functions of Gads can be divided into two areas: T cell development and T cell activation. T cell development is an ordered series of stages that culminates in the generation of a diverse T cell repertoire with limited ability to recognize self-antigens. Gads is required for the two stages of T cell development that correspond to the stages at which the two chains of the T cell receptor are generated. Defects in these stages can lead to immune deficiency or autoimmune disease. The second area of interest is T cell activation. Although Gads appears to have the same biochemical function in CD4+ T cells and CD8+ T cells, the biological effects of Gads-deficiency are different in these populations. CD4+ T cells fail to survive without Gads while CD8+ T cells are only mildly impaired without Gads. Using an infection model, we showed that Gads is required for optimal expansion of CD8+ T cells, but not for the differentiation of CD8+ T cells into effector or memory cells.

Meetings Attended

2013 – 10th Annual Gilbert S. Greenwald Symposium, Kansas City, KS

2013 – KU Cancer Center Research Symposium, Kansas City, KS

Committees

KUMC

Member, Research Committee, Executive Committee, Academic Committee, Education Council
Subcommittee, Phase I Committee, Graduate Affairs Committee, Promotion and Tenure Committee

Alternate scientific member, IACUC

Chair, Institutional Research and Safety Committee, Faculty Search Committee

Editorial and Grant Reviews

Reviewer, KUMC Biomedical Research Training Program

NIH ad hoc reviews, Consultant reviewer for ZAA1 BB 93 P, “Chronic Alcohol and Immune Dysfunction Alcohol Research Center, Internet-assisted reviewer of NIH COBRA grant applications

Reviewer, Italian Ministry of Health

Ad hoc reviewer, Apoptosis, American Journal of Hematology, Clinical and Developmental Immunology, Expert Reviews in Clinical Immunology, Inflammation, Journal of Immunology, Neuroimmunomodulation, Peptides
Renal tubule transport of salts, minerals and water Paracellular transport, and the role of tight junction proteins Disorders of mineral metabolism (calcium and magnesium)

Claudins and paracellular transport
A current focus of the laboratory is to understand the molecular and structural basis of paracellular epithelial transport and its regulation. Paracellular transport refers to transport in between cells. It is now well-recognized that paracellular transport is a major route for vectorial transport of solutes and water. The rate-limiting step in paracellular transport (the paracellular "barrier") is constituted by the tight junction, which is the most apical of the intercellular junctions. Tight junctions consist of large complexes of multiple different proteins. The claudins are a novel family of tight junction proteins that are postulated to form paracellular ion channels. If correct, claudins would likely be structurally and biophysically different from any known ion channels. There are at least 20 different claudin isoforms, raising the exciting possibility that isoform-specific expression may be responsible for the variability in paracellular permeability properties of different epithelial tissues. Investigation of claudin physiology promises to reveal novel insights into the pathogenesis of clinical renal diseases associated with disturbances of the paracellular barrier, such as oliguric acute tubular necrosis, ischemic allograft dysfunction, and certain forms of salt-sensitive hypertension, including pseudohypoaldosteronism, Type II (Gordon's syndrome). We are currently actively investigating the function of these proteins by overexpressing them in cell culture monolayers and performing electrophysiological and tracer flux measurements in Ussing chambers, and by site-directed mutagenesis of key residues in the putative pore-lining region.

WNK kinases and renal tubule NaCl reabsorption
WNK1 and WNK4 are serine-threonine kinases that regulate transcellular and possibly paracellular salt transport in the distal renal tubule. Mutations in these kinases cause pseudohypoaldosteronism, Type II (PHAII), which is characterized by salt-sensitive hypertension with hyperkalemia. WNKs seem to have broad regulatory roles in the distal tubule epithelium, but the mechanism underlying the pathogenesis of PHAII is still incompletely understood. We are currently exploring the substrates of WNK4 phosphorylation. In collaboration with Dr. Alicia McDonough in the Department of Cell and Neurobiology, we are investigating the role of angiotensin II and reactive oxygen species in the regulation of a key downstream effector of WNK kinases, the thiazide-sensitive NaCl cotransporter, NCC.

Meetings Attended
2013 – Experimental Biology Annual Meeting, Boston, MA
2013 – West Coast Protein Crystallography Workshop XXI, Monterey, CA
2013 – American Society of Nephrology Annual Meeting, Atlanta, GA

2013 – NKF Annual Meeting, Orlando, FL

**Committees**

**KUMC**

Member, Clinical Enterprise Transition Planning, Education and Research Subgroup, Children’s Mercy Hospital Transitional Care Work Group, Transplant Oversight Committee, Ad Hoc Hearing Committee on Faculty Personal/Professional Misconduct, Hematology/Oncology Division

Director Search Committee

Chair, Surgery Search Committee

**Other**

Chair of Ancillary Studies Committee, Consortium of Radiologic Imaging Studies of PKD (CRISP)

Member, Abstract Review Category CKD: Epidemiology and Outcomes, American Society of Nephrology Annual Meeting; NIGMS Protein Structure Initiative Biology Network Steering Committee

**Editorial and Grant Reviews**

Editorial Board, *American Journal of Physiology: Renal Physiology, Faculty of 1000 Medicine, Frontiers in Renal and Epithelial Physiology*

Section Editor, *Current Opinion in Nephrology and Hypertension*

External Reviewer, Wellcome Trust Programme Grants (UK)

External Referee Panel, National Kidney Research Fund (UK)

Reviewer, NIH ZDK1 GRB-9 Renal Transport Program Projects Special Emphasis Panel

Chair, NIH ZRG1 DKUS-N Kidney Physiology and Pathophysiology: Member Conflicts Panel

**Seminars Presented**


2013 – “Role of Tight Junctions in the Kidney,” Visiting Professor, Mayo Clinic, Rochester, MN


**Trainees**

Joshua Curry – MD/PhD Student

Lei Pei – Graduate Student
Xuan Zhang, M.D., Ph.D.
Senior Scientist
Department of Cancer Biology
Member, Center for Reproductive Sciences

I am interested in the biology and therapy of women’s cancer. Specifically, my research has been focused on the roles of oncogenes such as RET, HGF, FoxM1 in the development and carcinogenesis of the ovary, uterus, and breast, as well as the potential of targeting these signaling pathways in cancer therapeutics. The objectives of my current research are to understand the interactions between p53 and FoxM1 in ovarian cancer, and to explore the role of FoxM1 in ovarian cancer drug resistance. By elucidating the regulation of FoxM1 and its clinical implication, I aim to help improve our understanding of ovarian cancer and advance the prevention and treatment of this lethal disease.

Editorial and grant reviews

Ad hoc reviewer, BMC Complementary and Alternative Medicine; Expert Review of Endocrinology and Metabolism; Human Reproduction; International Journal of Biological Science; Molecular Human Reproduction; Reproduction; Reproductive Biology and Endocrinology; Reproductive Sciences

Liqin Zhao, Ph.D.
Assistant Professor
Department of Pharmacology & Toxicology
KU-Lawrence
Member, Center for Reproductive Sciences

Our research, focusing on brain aging and neurodegeneration (with an emphasis on Alzheimer’s disease; AD), aims:

At the basic level, to understand the neurobiological effects of sex hormones and the molecular basis underlying sex differences in the risk of developing AD. Some particular areas of interest include: menopause/perimenopause, estrogen receptor beta, insulin/IGF signaling, insulin-degrading enzyme, energy metabolism, apolipoproteins, and gene expression and regulation.

At the translational level, to advance basic scientific findings into therapeutic development for prevention and early intervention of pathological brain aging and neurodegeneration. Some particular areas of focus include: non-hormonal alternative therapies, estrogen receptor beta modulators, phytochemicals, and lifestyles in modulation of aging health.

Meetings Attended


2013 - Alzheimer’s Association International Conference, Boston, MA

2013 – The Society for Neuroscience 43rd Annual Meeting, San Diego, CA
Editorial and Grant Reviews


Ad hoc reviewer for 24 journals

Bao-Ting Zhu, Ph.D.
Professor
Department of Pharmacology, Toxicology and Therapeutics
Member, Center for Reproductive Sciences

• Enzymes involved in the multiple pathways of hepatic and extrahepatic estrogen metabolism, and factors that modulate the activity and levels of these metabolizing enzymes.
• Molecular mechanisms underlying the carcinogenic and anticancer actions of some endogenously-formed estrogen metabolites.
• Unique physiological actions (e.g., neuroprotection, neuro-endocrine modulation, immune modulation) exerted by bioactive endogenous estrogen metabolites, and the estrogen receptor-independent mechanism of their actions.
• Identification of novel cellular proteins that can modulate the biological functions of estrogen receptors and their ligands.

Committees

Member, Promotion and Tenure Committee, Postdoctoral Development Committee

Editorial and Grant Reviews

Editorship/associate editorship, World Journal of Gastroenterology, Contributing Associate Editor-in-Chief (since 2011)

Editorial Board, Experimental and Therapeutic Medicine (since 1/2010)


Hao Zhu, Ph.D.
Associate Professor
Department of Clinical Laboratory Sciences
Member, Center for Epigenetics and Stem Cell Biology

As a biochemist and molecular biologist, I have been studying the biological function and properties of Ncb5or (NADH cytochrome b5 oxidoreductase) in the past decade. This is a novel redox enzyme associated with pathogenesis of lean diabetes in mice. Our recent findings show that Ncb5or deficiency leads to profound cellular changes in lipid and iron metabolism, increased oxidative and ER stress. Thus, the Ncb5or-null mouse represents a novel monogenic diabetes model. My lab is currently studying the role of Ncb5or in iron homeostasis and mitochondrial function in pancreatic beta-cells and neural tissues.
Meetings Attended

2013 – The 10th Annual Great Plains Pediatric Endocrine Symposium, Kansas City, MO

2013 – 73rd Annual Meeting of American Diabetes Association, Chicago, IL

Committees

KUMC

Vice Chair, Faculty Assembly Research Committee

Member, Radiation Safety Committee

Editorial and Grant Reviews

Ad hoc reviewer, Biochimie, Biochemical Pharmacology, Chemico-Biological Interactions, Lipids in Health and Disease

Grant Reviewer, Diabetes UK (The British Diabetic Association), RD Lawrence Fellowship Application,

Seminars Presented

2013 – “Common Defects of Mitochondria and Iron in Neurodegeneration and Diabetes (MIND) – Studies of Ncb5or Knockout Mouse,” Neuroscience Graduate Program, KUMC, Kansas City, KS

2013 – “Role of iron metabolism in monogenic Ncb5or diabetes,” Research Talk, School of Health Professions Faculty Assembly, KUMC, Kansas City, KS

2013 – “Role of Ncb5or in iron homeostasis,” Research in Progress, Liver Center, KUMC, Kansas City, KS

2013 – “Iron metabolism and diabetes,” 2nd Affiliated Hospital, Zhejiang University School of Medicine, Hangzhou, China

2013 – “Iron metabolism and diabetes,” School of Public Health, Zhejiang University, Hangzhou, China

2013 - “Iron metabolism and diabetes,” Shanghai Institute of Medical Genetics,” Shanghai, China

2013 – “Ncb5or-dependent iron homeostasis in beta-cell function and survival,” Chalk Talk, IRHRM, Kansas City, KS

Trainees

Matthew Strou – Graduate Student
Zhinong Yin – Visiting Research Scholar
Victor Vasquez Montes – Summer Intern
Nikolai Donald Nez – Summer Student
Jie Dai – Visiting Research Scholar


Albertini DF and Olsen R (2013) Effects of fertility preservation on oocyte genomic integrity. In: Oocyte Biology in Fertility Preservation; Editor S S Kim; Chapter 3 Springer-Verlag, N.


Dawn B, Yu ASL. Significance of hypomagnesemia in cardiovascular disease. In: UpToDate, Basow DS [editor], UpToDate, Waltham, MA, 2013. (electronic teaching materials)


**Detamore MS.** Human umbilical cord mesenchymal stromal cells in regenerative medicine. Stem Cell Research & Therapy, 4:142, 2013.


E L, Lu J, Burns JM, **Swerdlow RH**. Effect of exercise on mouse liver and brain


**Eck LM.** (2013). Should Family Physicians Routinely Screen for Vitamin D Deficiency?” Am Fam Physician. 15;87(8).


Geiger PC and Gupte AA. The role of estrogen in the regulation of peripheral glucose dynamics. Integrative Biology of Women’s Health, Ed. EE Spangeburg. 2013 Springer.

Gellar S, Pomeroy C, Thomas PA, Women’s Health Research: Road Map to the Future. Global Advances in Health and Medicine, September 2013, Volume 2, Number 2.


Li Q, Sullivan NR, McAllister CE, Van de Kar LD, **Muma NA.** Estradiol accelerates the effects of fluoxetine on serotonin 1A receptor signaling, Psychoneuroendocrinology, 38:1145-1157, 2013.


Stubbs J, Yu ASL: Overview of the causes and treatment of hyperphosphatemia. In: UpToDate, Basow DS [editor], UpToDate, Waltham, MA, 2013. (electronic teaching materials)


Wang L, Weiss ML, Detamore MS. Recent patents pertaining to immune modulation and musculoskeletal regeneration with Wharton's jelly cells. Recent Patents on Regenerative Medicine, 3(3): 182-192, 2013 (Invited for Special Issue on Perinatal Stem Cells Patents and Applications: Regenerative Medicine, Tissue Repair, Immune Modulation).


Yu ASL, Gupta A: Causes and treatment of hypermagnesemia. In: UpToDate, Basow DS [editor], UpToDate, Waltham, MA, 2013. (electronic teaching materials)


Yu ASL, Kala Ahluwalia G: Causes of hypomagnesemia. In: UpToDate, Basow DS [editor], UpToDate, Waltham, MA, 2013. (electronic teaching materials)


b. Abstracts


Chavan H, Krishnamurthy P. (2013). Impaired transcriptional activation of specific cytochrome P450 genes in ABCB6 deficient mice. ISSX Meeting.


Holets LM, Gupta V, Roby KF, Prohaska C, Tash JS. (2013) Space Flight Induces Down-Regulation of Estrogen Receptor Alpha Gene and Protein Expression in Mouse Uterus and Ovary, and New Methods for
Tissue Storage and RNA/Protein Harvesting Suitable for ISS Tissue Dissection/Fixation in Flight ISS Research and Development Conference, Denver Colorado.


Manzardo AM, Mettman DJ, Penick EC, Poje AB and Butler MG. (2013) Androgen receptor gene polymorphism is associated with impulsivity and alcoholism severity in women with alcoholism. 61st Nebraska Symposium on Motivation: Genes and the Motivation to Use Substances, Lincoln, Nebraska.
Manzardo AM, Mettman DJ, Penick AB, Poje AB and Butler MG. (2013) Androgen receptor gene polymorphism is associated with impulsivity and alcoholism severity in women with alcoholism. 63rd Annual Meeting of American Society of Human Genetics, Boston, Massachusetts.


Pierce AN, Wang R, Ryals JM, Christianson JA. (2013) Pelvic organ-specific increase in sensitivity and dysregulation of the HPA axis following neonatal maternal separation in female mice. Kansas City Chapter of the Society for Neuroscience annual retreat, KUMC, Kansas City, KS.


Rivera RM. (2013) Bovine fetuses with phenotypic characteristics similar to those reported for the human overgrowth condition Beckwith-Wiedemann Syndrome have biallelic expression of the imprinted gene Kcnq1ot1. TM’s 2nd World Molecular and Cell Biology Online Conference.


Tang Y and Li B. (2013) Novel Natural Compound Alternol induces ROS-dependent Bax activation and apoptotic cell death in prostate cancer. The 10th World Congress on Urological Research, Nashville, TN.


Whitmore TW, Osaka I, Hefty PS, Camarda KV and Kieweg SL. (2013) Rational design of polymeric delivery vehicles for anti-HIV and anti-Chlamydial microbicides. Annual Meeting of the American Institute of Chemical Engineers (AIChE), San Francisco, CA.


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<td>$273,785</td>
<td>$139,630</td>
<td>9/1/2013</td>
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