RowanGSBS Faculty Research Interests
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Research Areas:
- Aging
- Behavioral neurobiology
- Cell death
- Circadian rhythms
- Developmental biology
- DNA repair & replication
- Drug abuse and relapse
- Genetics
- Meiosis and fertility
- MicroRNAs
- Mitochondrial biology
- Models of human disease
- Molecular oncology
- Monoamine transmitter systems
- Neurodegeneration
- Psychostimulant drug actions
- Ribosome biogenesis
- Signal transduction
- Stem cell biology
- Transcription mechanisms
- Translational research

RowanSOM--Cell Biology and Neuroscience Department:

Mitochondrial Biology::Transcription Mechanisms
Mikhail Anikin, Ph.D. Eukaryotic cell tightly regulates production of proteins in mitochondria. In this process, representatives of the PPR family of proteins serve as nuclear-encoded messengers to control mitochondrial gene expression at the level of transcription and later on during maturation, stabilization, and activation of translation of mitochondrial mRNA. Our research is currently focused on molecular mechanisms of action of PPR proteins.

Transcription mechanisms
Sergei Borukhov, Ph.D. We are focusing our studies on the structure and function of prokaryotic multisubunit RNA polymerase, and on analysis of molecular mechanism of action and biological role of transcription factors Gre and their homologs.

Behavioral Neurobiology
Daniel Chandler, Ph.D. My laboratory is focused on clarifying the structure and function of the brainstem nucleus locus coeruleus (LC), a region involved in arousal, attention, and stress. We use a combination of anatomical, viral-genetic, molecular, and electrophysiological approaches to identify how LC interacts with the rest of the brain and how it is affected by stress.

Behavioral Neurobiology
Brian Clark, Ph.D. Our group uses anatomical, electrophysiological and behavioral methods to study the actions of catecholamines and drugs that affect them on sensory and cognitive functions in the brain. Current work focuses on noradrenergic modulation of prefrontal cortex neurons during a sustained attention task using in vivo models.

Neurodegeneration::Models of human disease::Behavioral neurobiology
Jeremy Francis, Ph.D. We are currently investigating neuron-glia interactions in models of both development and human neurodegenerative disease with a focus on the maintenance of metabolic integrity. Avenues of therapeutic intervention for major neurodegenerative diseases are explored using a gene therapy technology platform in animal model systems.

Aging::Cardiovascular::Inflammation
Carl E. Hock, Ph.D. Current work is focused on the effect of humoral mediators and inflammatory cells in the pathophysiology of ischemic states, the effects of dietary lipids on cardiovascular function and the response of the young and aging heart to ischemia and reperfusion.
We are interested in the roles of microRNAs in embryonic stem (ES) cells and during the early development of the mouse. Specifically, we are applying biochemical and mouse model approaches to elucidate the functions of miR-290-295 / miR-371-373 which appear to be ES cell and early embryo specific.

My research focus is to characterize neuropathological pathways underlying the degenerative processes associated with pediatric leukodystrophies, such as Canavan Disease, and test in vitro and in vivo novel pharmacological and stem cell applications for the development of a therapy for this disease and other leukodystrophies.

My laboratory focuses on studying the effects of cocaine and chronic stress exposure on long-lasting changes in relapse vulnerability. We use a rodent model of craving and relapse and combine behavioral and biochemical techniques to identify neuroadaptations driving cue- and stress-induced changes in relapse vulnerability over time.

My research is focused on regulation of mitochondrial transcription and transcription-coupled processes and how they change in response to oxidative stress in neuronal tissue.

Our major goal is to understand how the accuracy of ribosome assembly is controlled at the molecular level and how defects in this process contribute to human disease.

We are particularly interested in the role of ubiquitination in controlling the activity of ribonucleases that target ribosomes and how this process is regulated in the cell.
Aging::Inflammation::Oxidative Stress

Bernd W. Spur, Ph.D.  We focus on mediators of inflammation, including prostaglandins, phytoprostanes, leukotrienes, lipoxins, resolvins, neuroprotectins, docosatrienes as well as isoprostanes. These mediators are prepared in the natural and isotopically labelled form to explore their biological activities and serve as markers in inflammatory diseases such as Asthma and Alzheimer.

Gene Expression/Transcription::Molecular Modeling::Protein/Nucleic Acid Structure

Dmitry Temiakov, Ph.D.  Our laboratory research is focused on studies of molecular mechanisms of transcription as carried out by different RNA polymerases. In particular, we are interested in function and structure of the human mitochondrial RNA polymerase and mechanisms of mitochondrial transcription regulation.

Aging::Calcium::Drug Development::Neuroscience::Signal Transduction::Vision

Venkat Venkataraman, Ph.D.  We are investigating the processes of neuronal transduction in biological clocks and aging with respect to the role of Ca2+ signaling via alpha2 adrenergic receptors and membrane guanylate cyclases.

Behavioral neurobiology

Barry Waterhouse, Ph.D.  The primary research focus of my laboratory is to understand the role of the central monoaminergic systems in brain function and behavior. We concentrate on anatomy, pharmacology, physiology, and molecular biology of the brainstem noradrenergic and serotonergic systems as they relate to cognition and sensory signal processing.

Infection::Inflammation::Drug development

Kingsley Yin, Ph.D.  The focus of our lab is to investigate the cellular mechanisms by which Specialized Pro-resolving Lipid Mediators (SPMs) reduce inflammation, prevent immunosuppression and enhance bacterial clearance in models of bacterial infection. Novel properties of SPMs to decrease bacterial virulence (biofilm formation, exotoxin production) are also being studied.

RowanSOM --Molecular Biology Department:

Cancer::Cell Cycle/Cell Differentiation::Cell Structure::DNA::Gene Expression/Transcription ::Protein Synthesis/Translation

Salvatore J. Caradonna, Ph.D.  My laboratory is interested in the post-translational mechanisms that regulate proteins involved in base-excision repair of DNA. We are studying the aberrant pathways that lead to uracil misincorporation into DNA and strategies that may exploit these pathways for cancer drug development. We are also involved in the study of atypical cyclin-like proteins that affect cell-cycle phase transitions.

Cell death::Genetics::Mitochondrial biology::Molecular oncology

Katrina Cooper, Ph.D.  Following stress cells have to orchestrate a myriad of responses to survive or die. Incorrect choices can lead to deleterious outcomes, e.g. tumor formation. To study this, we use S. cerevisiae, human cells and mouse models. We focus on the conserved cyclin C protein that is destroyed in response to stress and plays a role in apoptosis. Our working hypothesis is that cyclin C is a novel stress related tumor suppressor.

Models of Human Disease::Molecular Oncology::Stem Cell Biology

Renee M. Demarest, Ph.D.  Research in my laboratory focuses on delineating the molecular pathways required for the development, maintenance, and relapse of T-cell acute lymphoblastic leukemia (T-ALL) using mouse models of disease. In addition, my laboratory also screens new therapeutic candidates for efficacy and is developing novel models for preclinical testing in order to increase the translational success rate to the clinic.
Ronald Ellis, Ph.D. We study the development and evolution of germ cells, using cutting-edge techniques that have made nematodes a leading model for animal biology. First, we study the control of germ cell fates. Animals must produce sperm or eggs to reproduce. Although these cells differ dramatically, they are made from similar progenitors. Understanding how this process is controlled could revolutionize our ability to treat reproductive disorders and infertility in humans. Second, we study the origin and evolution of self-fertility. Sexual traits are among the most rapidly changing features in every species. To learn how new traits originate and change, and how developmental pathways shape these processes, we are studying how some nematodes became self-fertile. Third, we study apoptosis in germ cells. Programmed cell deaths play a critical role in germ cell development and aging, and help ensure that mature oocytes are of high quality. We are investigating how cell deaths accomplish these ends.

Gary S. Goldberg, Ph.D. Cells must communicate with each other to coordinate the development and survival of an animal. This communication can be mediated by diffusible factors that pass between cells, or by direct contact through cell junctions. I am interested in how intercellular communication affects cell growth and differentiation, with an emphasis on how cell communication controls tumor cell growth.

Michael F. Henry, Ph.D. Research in the laboratory is focused on evolutionarily conserved mitochondrial translational activators, using yeast as a model system. Defects in mitochondrial gene expression can compromise cellular energy production and generate reactive oxygen species that promote degenerative disease, aging, and cancer.

Eric G. Moss, Ph.D. We study developmental timing, microRNAs and translational control in C. elegans and the mouse. The worm heterochronic gene lin-28 is regulated by microRNAs and encodes a specific mRNA-binding protein. Its human homologue, Lin28, appears also to be a microRNA-controlled developmental regulator.

Catherine Neary, Ph.D. Altered organelle function initiates a cell stress response; failure of this stress response results in the coordinated disassembly of the cell, known as apoptotic cell death. My interest is how metabolic stress affects the initiation of cell death, and how organelles, specifically the mitochondria and cytoskeleton, communicate during the death process. Additional projects in my laboratory include assessing the role of lactic acid metabolism in mitochondrial function, as well as cancer cell dependence on abnormal AMP-dependent kinase (AMPK) activation.

Randy Strich, Ph.D. In response to cellular damage, the cell must decide between repairing the injury and continue living or inducing a programmed cell death pathway termed apoptosis. My laboratory utilizes both yeast and transgenic mouse models to dissect the molecular decision underlying apoptotic entry. Specifically, we focus on the role that mitochondrial dynamics plays in this decision and how this process impacts human diseases including cancer.
Molecular Oncology::Signal Transduction::Translational Research
Venu Bommireddy, Ph.D.  Cytosolic DNA sensing pathway is the first line of defense against foreign pathogens/intruders and play central role in cGAS-STING mediated innate immunity, inflammation and pathogen resistance. Small molecule synthetic compounds that target these pathways are being investigated to develop effective Immunomodulatory therapeutics. vgrbv@Oncoveda.com

Genetics::Models of Human Disease::Molecular Oncology
Grant Gallagher, Ph.D.  Associate Member. The first interest revolves around immuno-oncology and development of therapeutic approaches in that area. The work involves defining novel targets, building a drug-screening platform, conducting post-assay verification screening, and designing suitable in vivo models that validate and verify therapeutic efficacy.  G.Gallagher@ibr-genetics.com

Diseases – human – non cancer::Gene expression/Transcription:: Pathogenic Microorganisms
Scott Gygax, Ph.D.  Associate Member. The research focus of my lab is to understand the mechanisms of antimicrobial resistance in bacterial, parasitic, and fungal pathogens. As a member of The Women’s Health Research Center at MDL, we also have a major focus on understanding the origins of vaginosis and vaginitis and the causes of recurrence. Additionally, we focus on applied microbiology for the development of point-of-care diagnostics and drug therapy. sgygax@mdlab.com

Genetics::Translational Research
David Hilbert, Ph.D.  Associate Member. My research focuses on the discovery of new antimicrobial agents for the treatment of life-threatening infections. Current interests include Clostridium difficile toxins and carbapenem resistant pathogens. I am also investigating the role of the vaginal microbiome in women’s health with a focus on bacterial vaginosis and Trichomonas vaginalis. dhilbert@femeris.com

Apoptosis::Cancer::Cell Cycle/Cell Differentiation::Drug Development::Gene Therapy::Signal Transduction::Virology
Lisa P. Huang, Ph.D.  Associate Member. My current research focuses on the identification of cancer biomarkers in the diagnosis and monitoring of cervical cancer, bladder cancer, and prostate cancer. Another of my research focuses on studying the mechanisms of DNA repair and drug resistance in bladder cancer and prostate cancer. These researches aid to assist in novel drug discovery. lhuang@mdlab.com

Translational Research::Drug Discovery::Cancer
Michael McQueney, Ph.D.  Associate Member. Our laboratory focuses on: 1) identifying small molecule drug candidates that modulate the immune system in the tumor microenvironment as a means to treat cancer, and 2) identifying novel biomarkers for cancer diagnosis. mmcqueney@oncoveda.com

Cell Cycle/Cell Differentiation::Drug Development::Gene Expression/Transcription::Genetic Diseases::Pathogenic Microorganisms::Signal Transduction
Joseph Nickels, Ph.D.  Associate Member. Our research uses proteomic/genomic methods and mouse models to understand the biology of diseases, such as cancer initiation and metastasis, cardiovascular disease, and infectious mycoses. Our goal is discovering novel genes that can be used as biomarkers and drug targets, thus allowing us to diagnose and treat these diseases. jnickels@mdlab.com

Apoptosis::Cancer::Cell Cycle/Cell Differentiation::Drug Development::Gene Expression/Transcription::Signal Transduction
Jason Trama, Ph.D.  Associate Member. Our laboratory uses proteomic and genomic data to identify biomarkers for gynecologic and urologic cancers. Our goal is to develop noninvasive methods for diagnosis and monitoring. We also study the mechanisms of tumorigenesis, metastasis and drug resistance in order to identify targets for therapy. jtrama@mdlab.com
Ilana Stroke, Ph.D. We are using high throughput compound screening (HTS) technology to identify small molecules providing the basis for novel drugs modulating microbial infection, the immune system, cancer, metabolic disease, and cardiovascular disease. istroke@mdlab.com

Kwangwon Lee, Ph.D. Adjunct Professor. The cellular machinery that underlies the 24-hr oscillation is called the circadian clock. The advancement of our understanding of circadian clock-related human symptoms has been greatly assisted by the knowledge accumulated on clocks in model organisms. We study the genetic and molecular mechanisms of the circadian clock in *Neurospora crassa*.

Joseph V. Martin, Ph.D. Associate Member. We study how thyroid hormones (TH) influence the adult mammalian brain through nongenomic mechanisms. THs modulate GABAa receptor binding and protein phosphorylation in nerve terminal fractions without cell nuclei. Currently, temporal patterns of TH release from brain tissue are measured in relation to the subsequent cellular TH response and EEG.

Daniel H. Shain, Ph.D. Adjunct Member. Annelid development and evolution.

William M. Saidel, Ph.D. Adjunct Member. Visual sensory physiology, neuroethology, neuroanatomy.

Nir Yakoby, Ph.D. Adjunct Professor. We use Drosophila oogenesis to study how a layer of follicle cells forms eggshells’ 3D structures. This process is guided by the conserved epidermal growth factor receptor and bone morphogenetic protein signaling pathways. We aim to identify the pathways’ modifications that account for eggshells’ morphological variations among Drosophila species.