PREP Scholar Mentor	Primary Graduate School Academic Affiliation	Research Summary
James Maher, PhD – PREP Director	Biochemistry & Molecular Biology	The Maher lab studies the nucleic acids, DNA and RNA. We are interested in understanding how DNA is bent and looped by proteins, and how this bending is involved in the control of gene expression. http://www.mayo.edu/research/labs/nucleic-acid-structure-recognition/overview
Karen Hedin, PhD – PREP Co-Director	Immunology, Molecular Medicine	Our research program aims to characterize the molecular mechanisms and biological impact of chemokine receptor signaling. http://www.mayo.edu/research/faculty/hedin-karen-e-ph-d/BIO-00084742
Michael Barry, PhD	Immunology	Dr. Barry is working to use genes and viruses to treat a set of very difficult diseases. Because these agents are as adaptable as DNA itself, Dr. Barry and his team can apply these "drugs" against a variety of diseases by fine-tuning which cells they target and avoiding or activating the immune system. This work falls into three areas: gene therapy, gene-based vaccines and anti-cancer virotherapy. http://www.mayo.edu/research/faculty/barry-michael-a-ph-d/bio-00094964
Doo-Sup Choi, Ph.D.	Molecular Pharmacology and Experimental Therapeutics	My research focus on neurobehavioral and addictive disorders, which cause a substantial socio-economic burden to society. Our laboratory utilizes a combination of genetics, pharmacology, proteomics, metabolomics, brain imaging and behaviors to identify clinically useful therapeutic targets of a variety of addiction and other psychiatric disorders such as depression, anxiety, schizophrenia and bipolar disorders. http://www.mayo.edu/research/faculty/choi-doo-sup-ph-d/bio-00094358

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Jason Doles, PhD	Biochemistry & Molecular Biology	Lifelong maintenance of skeletal muscle requires muscle stem cells that activate, expand, and self-renew to repair damaged muscle or to replace muscle cells lost due to normal turnover. Our lab studies how loss or functional corruption of these cells contributes to diverse muscle pathologies, as well as age- associated muscle atrophy (sarcopenia). http://www.mayo.edu/research/faculty/doles-jason-d-ph-d/bio- 20197380
Haidong Dong, M.D., Ph.D.	Immunology	The research of Haidong Dong, M.D., Ph.D., is focused on defining regulatory mechanisms that influence anti-tumor immunity. The long-term goal of his laboratory is to understand the molecular and cellular regulatory mechanisms in tumor-immune cell interactions and translate basic research observations into effective cancer immunotherapies http://www.mayo.edu/research/faculty/dong-haidong-m-d-ph-d/bio-00027557
Richard Ehman, MD	Physiology & Biomedical Engineering	The objective of Dr. Ehman's program is to expand the range of tissue, organ, and system characteristics that can be noninvasively evaluated with magnetic resonance imaging (MRI) techniques. http://www.mayo.edu/research/faculty/ehman-richard-l-m-d/BIO-00026324
Stephen Ekker, PhD	Biochemistry & Molecular Biology	Dr. Stephen C. Ekker's zebrafish genetics laboratory is focused on one major next step in the post-genomics era: Assignment of genes and gene sets critical in vertebrate patterning and organogenesis. http://www.mayo.edu/research/faculty/ekker-stephen-c-ph-d/BIO-00096027

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Bradley Erickson, M.D., Ph.D.,	Physiology & Biomedical Engineering	The research interests of Bradley J. Erickson, M.D., Ph.D., include computer-aided diagnosis and the use of computer technologies to extract information from medical images for diagnostic, prognostic and therapeutic purposes). http://www.mayo.edu/research/faculty/erickson-bradley-j-m-d-ph-d/bio-00077505
Martin Fernandez-Zapico, MD	Biochemistry & Molecular Biology	The research program of Martin E. Fernandez-Zapico, M.D., focuses on the cellular and molecular characterization of epigenetic pathways regulating pancreatic carcinogenesis, a dismal disease with one of the poorest prognoses among all neoplasms. http://www.mayo.edu/research/faculty/fernandez-zapico-martin-e-m-d/BIO-00027450
Diana Gil Pages, PhD	Immunology	In my laboratory, biochemical and genetic approaches are used to study the molecular pathways downstream of CD3Dc related with signaling transduction. http://www.mayo.edu/research/faculty/gil-pages-diana-ph-d/BIO-00095913
Joseph Grande, MD, PhD	Biochemistry & Molecular Biology, Clinical and Translational Sciences	We are currently delineating points of functional crosstalk between the Smad signaling pathways and the MAPK signaling pathways, and how these pathways culminate in transcriptional activation of the collagen IV genes. http://www.mayo.edu/research/faculty/grande-joseph-p-m-d-ph-d/BIO-00077700
Peter Harris, PhD	Biochemistry & Molecular Biology	The research laboratory of Peter C. Harris, Ph.D., focuses on genetic diseases of the kidney, especially polycystic kidney diseases (PKD). http://www.mayo.edu/research/faculty/harris-peter-c-ph-d/BIO-00027798

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Haojie Huang, PhD	Biochemistry & Molecular Biology	Dr. Huang's research focuses on regulation of the functions of transcription regulatory proteins by mechanisms such as phosphorylation, acetylation, ubiquitination and protein-protein interaction and these proteins' roles in initiation and progression of cancer, especially prostate cancer. A new direction in his lab is to investigate the biogenesis and functions of enhancer RNAs (eRNAs) and their role in cancer development and progression. http://www.mayo.edu/research/faculty/huang-haojie-ph-d/bio-00027429
Grazia Isaya, MD, PhD	Biochemistry & Molecular Biology	My research centers on the mechanisms that enable the cell to take advantage of the high energetic yield of oxidative phosphorylation (OXPHOS) in spite of the concomitant production of reactive oxygen species (ROS). http://www.mayo.edu/research/faculty/isaya-grazia-m-d-ph-d/BIO-00027613
Aaron Johnson, PhD	Immunology	My laboratory is interested in neuroimmunology. Disruption of the Blood Brain Barrier (BBB) is a common pathologic feature of numerous neurological diseases as diverse as glioblastoma, multiple sclerosis, acute hemorrhagic leukoencephalitis (AHLE), epilepsy, HIV dementia, stroke, cerebral malaria and viral hemorrhagic fevers. http://www.mayo.edu/research/faculty/johnson-aaron-j-ph-d/BIO-00027340
Bruce D. Johnson, PhD	Physiology & Biomedical Engineering	Our research interests center around heart and lung interactions under various conditions (e.g., hypoxia, high altitude, exercise) and in various populations (e.g., heart failure, health, lung disease, aging). http://www.mayo.edu/research/faculty/johnson-bruce-d-ph-d/BIO-00083819
Michael Joyner, MD	Biochemistry & Molecular Biology, Clinical and Translational Sciences	Dr. Joyner and his team study how the nervous system regulates blood pressure, heart rate and metabolism in response to forms of stress such as exercise, hypoxia, standing up, and blood loss. http://www.mayo.edu/research/faculty/joyner-michael-j-m-d/bio-00078027

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Lilach Lerman, MD, PhD	Biochemistry & Biomedical Engineering	Lilach O. Lerman, M.D., Ph.D., directs the Renovascular Disease Research Laboratory, which focuses on the development and application of techniques to study renal and cardiovascular physiology and pathophysiology in animal models and in humans. http://www.mayo.edu/research/faculty/lerman-lilach-o-m-d-ph- d/BIO-00078109
Larry Karnitz, PhD	Molecular Pharmacology & Experimental Therapeutics	Current studies are now focused on identifying additional functions for the 9-1-1 complex, the role(s) of this pathway in tumors treated with other chemotherapy agents, and determining novel way to combine small molecule Chk1 inhibitors, which are now in clinical trials, with additional chemotherapy agents to most effectively treat tumors. http://www.mayo.edu/research/faculty/karnitz-larry-m-ph-d/BIO-00083949
Khashayarsha Khazaie, Ph.D.	Immunology	Dr. Khazaie's lab studies immune responses that help tumors grow and spread as well as immune responses that protect against cancer. A major focus is on regulatory T cells (Tregs), their subsets, and their diverse functions in regulating inflammation and immunity in the gastrointestinal tract. In this context, there is interest in the role of microbiota and circadian rhythm. http://www.mayo.edu/research/faculty/khazaie-khashayarsha-ph-d/bio-20121399
J. Luis Lujan, Ph.D.	Physiology and Biomedical Engineering	My research focuses on neuroprosthetics and neuromodulation techniques for restoring neurologic function following neural injury and disease. In particular, I am interested in using computational modeling and image analysis techniques for understanding the mechanisms of action of deep brain stimulation (DBS) in the treatment of neurologic and psychiatric disorders. I am also interested in the development of brain machine interfaces (BMI) and neural control algorithms. http://www.mayo.edu/research/faculty/lujan-j-luis-m-s-ph-d/bio-2015079000077521

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Carlos B. Mantilla, M.D., Ph.D.	Anesthesiology and Physiology	Carlos B. Mantilla, M.D., Ph.D. studies the control of breathing in humans. The long-term goal of Dr. Mantilla's research team is to develop rational and effective therapies for the treatment of diseases that impair the ability to breathe independently. http://www.mayo.edu/research/faculty/mantilla-carlos-b-m-d-ph-d/bio-00086450
Y.S. Prakash, MD, PhD	Physiology & Biomedical Engineering	As an anesthesiologist, physiologist and electrical/biomedical engineer, Dr. Prakash's longstanding interest has been in lung diseases, with the intent of developing novel therapies and approaches to treat diseases such as asthma in children and adults (especially in women), and more recently pulmonary hypertension. http://www.mayo.edu/research/faculty/prakash-y-s-m-d-ph-d/BIO-00083390
Marina Ramirez-Alvarado, PhD	Biochemistry & Molecular Biology	Marina Ramirez-Alvarado, Ph.D., studies misfolding and amyloid formation in light chain amyloidosis. http://www.mayo.edu/research/faculty/ramirez-alvarado-marina-ph-d/BIO-00028052
Lewis Roberts, M.B., CH.B., PhD	Clinical and Translational Sciences	The major goal of my laboratory is to understand the mechanisms by which liver cancers develop, grow and spread; with the goal of identifying the critical pathways needed for the growth of individual cancers and eventually being able to provide the necessary information so that a doctor treating a patient with liver cancer can select specific treatments targeted at the growth signaling pathways which are most critical for that individual patient's cancer and can tailor the treatment design to most effectively control or eliminate that specific cancer. http://www.mayo.edu/research/faculty/roberts-lewis-r-m-b-ch-b-ph-d/BIO-00084430

PREP Scholar Mentor	Primary Graduate School Academic Affiliation	Research Summary
Keith Robertson, PhD	Molecular Pharmacology & Experimental Therapeutics	My research focuses on determining how epigenetic marks, especially DNA methylation, are established and maintained in normal cells. He is also interested in how these marks become disrupted and lead to common human diseases such as cancer, diabetes, cardiovascular disease and neurologic disorders. http://www.mayo.edu/research/faculty/robertson-keith-d-ph-d/bio-20035097
Steve Riederer, PhD	Physiology & Biomedical Engineering	Dr. Riederer's overall research interest is in the technical development of magnetic resonance imaging (MRI). This includes addressing fundamental limitations and considering new applications. http://www.mayo.edu/research/faculty/riederer-stephen-j-ph-d/BIO-00026656
Michael Romero, PhD	Physiology & Biomedical Engineering	My laboratory studies ion-solute movements across cell membranes. Membrane transporters, particularly in the kidney, account for ~10% of mammalian genomes and 50% of current drug targets. We want to understand and exploit this portion of the genome. http://www.mayo.edu/research/faculty/romero-michael-f-ph-d/BIO-00095232
Stephen Russell, MD, PhD	Virology and Gene Therapy	Dr. Russell's research centers on demonstrating the value of oncolytic virotherapy for the treatment of cancer. http://www.mayo.edu/research/faculty/russell-stephen-j-m-d-ph-d/bio-00027628
Isobel Scarisbrick, PhD	Neurobiology of Disease	Our research program broadly focuses on the roles of proteolysis in development, plasticity and pathogenesis within the CNS. We are currently studying the nature of proteolytic cascades which mediate the pathophysiology of CNS demyelinating disorders, such as multiple sclerosis (MS), and those which contribute to secondary degenerative events following traumatic spinal cord injury (SCI). http://www.mayo.edu/research/faculty/scarisbrick-isobel-a-ph-d/bio-00086606

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Lisa A. Schimmenti, M.D.	Clinical and Translational Sciences	Dr. Schimmenti works on the genetics of hearing loss. Our laboratory studies zebrafish models of deafness with the goal of identifying novel drugs that could potentially improve hearing, first in the fish and hopefully one day in people. In the lab you will learn how to develop a research plan, use zebrafish as a model organism, learn genetics, molecular biology techniques, and microscopy. http://www.mayo.edu/research/faculty/schimmenti-lisa-a-m-d/bio-20205892
Virginia Shapiro, PhD	Immunology	Our current work is focused on understanding the biochemical mechanism behind ALX and LAX function in T cells, and the role these proteins play in regulating T cell responsiveness. http://www.mayo.edu/research/faculty/shapiro-virginia-m-ph-d/BIO-00097048
Gary Sieck, PhD	Physiology & Biomedical Engineering	Gary C. Sieck, Ph.D., studies the neural control of breathing muscles, including the diaphragm and airway smooth muscle. http://www.mayo.edu/research/faculty/sieck-gary-c-ph-d/BIO-00083569
Caroline Sussman, PhD	Physiology & Biomedical Engineering	We focus on pathogenic alterations in kidney development and maintenance leading to cyst formation and polycystic kidney disease (PKD). http://www.mayo.edu/research/faculty/sussman-caroline-r-ph-d/BIO-00095375
Vicente Torres, M.D., Ph.D.	Nephrology & Hypertension	My research centers on the study of polycystic kidney (PKD) and liver (PLD) diseases, and related disorders. Current work in my laboratory examines the hypothesis that upregulation of cyclic nucleotide signaling caused by dysregulation of intracellular calcium homeostasis has a central role in the pathogenesis of PKD. http://www.mayo.edu/research/faculty/torres-vicente-m-d-ph-d/bio-00077282

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Raul Urrutia, MD	Biochemistry & Molecular Biology	The mission of our lab is to promulgate the study and application of epigenetics and epigenomics to medicine, mechanistically and translational. Epigenetics is a transformational biomedical paradigm which explains forms of inheritance that are independent of the coding capacity of the DNA, namely of genetics. We are interested in how, through epigenetics, patterns of gene expressions are fixed and inherited to give rise to normal phenotypes and how disruption of these mechanisms leads to disease. http://www.mayo.edu/research/faculty/urrutia-raul-a-m-d/bio-00084279
Andre van Wijnen, Ph.D.	Biochemistry & Molecular Biology	Andre J. van Wijnen, Ph.D., and his colleagues are working to improve the current clinical standards of care in orthopedic repair, restoration and rejuvenation of the skeleton. His research group designs and validates molecular strategies for therapeutic applications that control the ability of mesenchymal stem cells to adopt a defined cellular phenotype or to retain a self-renewing multipotent state. http://www.mayo.edu/research/faculty/van-wijnen-andre-j-ph-d/bio-20014240
Lie Wei Wang, MD, PhD	Molecular Pharmacology & Experimental Therapeutics	My research program is focused on the pharmacogenomics of anti-cancer drugs. Pharmacogenomics is a study of role of genetic variation in variation in drug response. http://www.mayo.edu/research/faculty/wang-liewei-m-d-ph-d/BIO-00027513
Anthony Windebank, MD	Neurobiology of Disease, Clinical and Translational Sciences	The common biological theme is to understand cellular mechanism underlying neuronal death and factors governing regeneration in the nervous system. These mechanisms are studied in cellular, drosophila, and rodent model systems. http://www.mayo.edu/research/faculty/windebank-anthony-j-m-d/BIO-00077352

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Richard Weinshilboum, MD	Molecular Pharmacology & Experimental Therapeutics	Richard Weinshilboum, M.D. studies pharmacogenomics — the role of inheritance and individual variation in DNA sequence or structure in drug response. The goal is to develop safer and more effective drug therapy to treat diseases that range from cancer to depression. http://www.mayo.edu/research/faculty/weinshilboum-richard-m-d/BIO-00025916
Michael J. Yaszemski, M.D., PH.D.	Biomedical Engineering and Orthopedics	Michael J. Yaszemski, M.D., Ph.D., investigates bone, cartilage and spinal cord regeneration using synthetic polymeric scaffolds, cells and controlled delivery of bioactive molecules. Dr. Yaszemski's Tissue Engineering and Biomaterials Laboratory is equipped to perform polymer synthesis and characterization and scaffold fabrication utilizing injectable techniques and solid freeform fabrication techniques. http://www.mayo.edu/research/faculty/yaszemski-michael-j-m-d-ph-d/bio-00027371