MAX RADY COLLEGE OF MEDICINE:

DEPARTMENT OF INTERNAL MEDICINE

Name: Dr. Ashish H Shah
Contact Info:
Address – Y3006 – 409, Tache Avenue, St Boniface Hospital, Winnipeg, MB, R2H 2A6
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Description of research:
Dr Shah's research interest and clinical expertise are in the field of hemodynamic evaluation and structural – congenital heart disease interventions. His research focuses on the principle of "precision medicine". His research incorporates invasive and non-invasive means of hemodynamic evaluation to identify outcome-associated markers that can be incorporated into the routine clinical management to identify high-risk individuals. Current research project investigates patients with ST elevation myocardial infarction (STEMI; or heart attack) and heart failure. Collaborating with colleagues in the Albrechtsen Research Center, we also aim to identify outcome associated biomarkers.

Name: Dr. Janilyn Arsenio
Assistant Professor, Departments of Internal Medicine and Immunology
Canada Research Chair in Systems Biology of Chronic Inflammation
Contact: Janilyn.Arsenio@umanitoba.ca
Lab location: Manitoba Centre for Proteomics & Systems Biology, 799-John Buhler Research Centre
lab website: www.arseniolab.com

Description of Research:
Cell fate decisions – the choice to live or die, to become different cell types with unique functions — are essential to our understanding of health and disease. Different types of T cells are critical for the body's defense machinery against infection and play a role in immune dysregulation which can lead to chronic inflammatory conditions. My lab studies CD8 T cell fate diversity during immunity at the single-cell level. We are interested in how T cells become different functional regulators of the immune response to viral infections, as well as in chronic inflammation (e.g. autoimmunity, cancer), and vaccination. We use single-cell genomics, flow cytometry, microscopy, molecular biologic, and systems-based approaches in our studies.
Background reading/for more info:
Arsenio, J. Single-cell analysis of CD8 T lymphocyte diversity during adaptive immunity. ***Wiley Interdisciplinary Reviews: Systems Biology and Medicine,*** 2020 Mar;12(2):e1475. PMID: 31877242
Kakaradov B*, **Arsenio J***, et al. Early transcriptional and epigenetic regulation of CD8+ T cell differentiation revealed by single-cell RNA-seq. ***Nature Immunology***, 2017 Apr;18(4):422-432. PMID: 28218746

DEPARTMENT OF IMMUNOLOGY

Name: Dr. Deanna Santer, PhD
Assistant Professor and GSK Research Chair in Immunology of Infectious Diseases

Department of Immunology, 4th floor Apotex Centre
Contact: deanna.santer@umanitoba.ca

Description of Research: Interferons (IFNs) serve as the backbone of the innate antiviral immune response. All types of IFNs induce a host of genes collectively called IFN-stimulated genes (ISGs), with antiviral, but also immunomodulatory properties. Research in the Santer lab focuses on the newest, sometimes under-appreciated, family of IFNs, called type III IFNs or IFN-lambdas. These cytokines are unique in inhibiting viruses without promoting inflammation, and thus are being tested as a treatment for COVID-19 with our collaborator in Toronto. Multiple in vitro projects are ongoing, tackling various aspects of human IFN-lambda biology to ultimately understand how IFNs regulate immune responses. An incoming student will be exposed to a variety of techniques (eg. flow cytometry, confocal microscopy, RT-qPCR, cell culture). Students actively participate in lab meetings, can potentially contribute data to a future manuscript as a co-author, and will be able to present their findings to others in the department and at the annual poster competition. Background reading: Santer et al. PLOS Pathogens 2020, PMID: 32353085.

DEPARTMENT OF FAMILY MEDICINE

Name: Dr Gayle Halas, Rady Chair in Interprofessional Collaborative Practice Gayle.Halas@umanitoba.ca

My research focuses on team-based primary health care, and the communication and interactions that enable collaborative practice, particularly for addressing complex patient needs and care. Two project options are available for interested students:

> Research Project 1: Trainees will conduct interviews with people who are the 'system users' (i.e., patients and/or informal caregivers) to help us gain a better understanding of what works and what does not work well when receiving care from multiple health care providers. This fundamental question is the first step toward being able to seek out solutions. *(meets the criteria of being community-based.)*
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> Research Project 2: Trainees will conduct interviews and/or focus groups with University of Manitoba health professional alumni within their first three years of practice to glean insights into how their participation in a 2-year Interprofessional Education (IPE) curriculum during their pre-licensure education has translated into their current practice. Participants will also be asked to discuss the ways in which their current practices and practice environments support effective interprofessional working relationships and processes that positively impact patient outcomes.

Students who have an interest in primary healthcare, teamwork, communication and/or patients' experiences of care are invited to join my research team. Trainees will benefit from working alongside a core group of interdisciplinary researchers, educators, and students in an environment that nurtures experiential learning by sharing ideas, and hearing about other related studies while pursuing one's own individual research projects related to interprofessional collaborative care. Working with our research team will equip motivated students with valuable research skills and an understanding of the entire research process – from proposal development, ethics submissions to data analysis and writing.

DEPARTMENT OF NEUROSURGERY

Name: Dr. Perry Dhaliwal
Email: Pawandeep.Dhaliwal@umanitoba.ca
Research description:

Spinal Cord Injury Management in Manitoba – Relationship Between Mean Arterial Blood Pressure and Functional Outcomes
Acute traumatic spinal cord injury has devastating consequences for patients. Current management strategies have highlighted the importance of maintaining adequate spinal cord perfusion following spinal cord injury though the evidence is limited. The primary objective of this study is to evaluate the association between mean arterial pressure (MAP) and functional outcomes in patients with spinal cord injury.

Name: Frederick A. Zeiler
Rudy Falk Clinician-Scientist Professor
Director of Research - Neurosurgery
Assistant Professor (GFT), Section of Neurosurgery, Dept of Surgery
Assistant Professor (Nil), Dept of Human Anatomy and Cell Science
Assistant Professor (Adjunct), Core Member
Research Affiliate (Nil), Centre on Aging

Email address: Frederick.Zeiler@umanitoba.ca
Research description:
Dr. Zeiler's research program in Winnipeg focused on the application of multi-modal invasive/non-invasive cranial physiologic monitoring for the continuous assessment of cerebral autoregulation, compensatory reserve, autonomics and signal entropy. This program will integrate complex high-frequency signal processing, with neuroimaging, serum/CSF/microdialysis protein and genetic biomarkers. The goal is to uncover the molecular mechanisms involved in impaired cerebrovascular reactivity in TBI, leading to the development of potential therapeutic targets directed at prevention and treatment of vascular dysfunction in TBI. This program maintains strong ongoing collaborative ties with many international centers including: University of Cambridge, Karolinska Institute, University of Helsinki and Maastricht University. His lab is supported by the CIHR, CFI, NIH and multiple other local/regional grants.
https://umanitoba.ca/faculties/health_sciences/medicine/units/surgery/12869.html
https://umanitoba.ca/faculties/health_sciences/medicine/units/surgery/research-overview.html

DEPARTMENT OF PHARMACOLOGY & THERAPEUTICS

Name: Dr. Paul Fernyhough, Dept of Pharmacology & Therapeutics and Division of Neurodegenerative Disorders, St Boniface Hospital Albrechtsen Research Centre.

Modulating G protein coupled receptors to repair nerves:
We are studying the regulation of neuronal growth and excitability by G protein coupled receptors (GPCR). Adult neurons express the muscarinic receptor GPCR that responds to the neurotransmitter, acetylcholine. We have discovered that the muscarinic receptor controls growth of neurons by regulating the activity of calcium and potassium channels in the plasma membrane. The project will test the hypothesis that muscarinic receptors block potassium channels to enhance excitability while restricting the growth of neurons. The student will learn primary neuron culture and techniques for measuring the axonal outgrowth. The student will treat cultures with specific modulators of muscarinic receptors and potassium channels and assess impact on growth. Data will be analysed and the student will learn how to generate presentations (for oral or poster settings).
For background information the following papers should be reviewed:
Calcutt et al (2017) J Clinical Investigation 127: 608
Sabbir et al (2018) Front Neurosci 12: 402

Name: Dr. Don Miller*,* Department *of Pharmacology & Therapeutics*
Research Interest: My laboratory is focused on finding better ways to treat brain tumors. We are currently examining methods for early detection and treatment monitoring using specific drug biomarkers that are elevated in response to brain tumors. In addition we are exploring new methods for treating brain tumors using nanomedicine approaches to improve drug delivery to the site of tumor.

Name: Dr. Galen Wright, Assistant professor, Department of Pharmacology & Therapeutics, University of Manitoba, and Neuroscience Research Program, Kleysen Institute for Advanced Medicine, Health Sciences Centre **E-mail:** galen.wright@umanitoba.ca

Research description: My lab uses genomics to gain a better understanding of human biology and disease, where bioinformatic analyses are undertaken to inform downstream functional validation experiments. Such research can lead to the identification of novel therapeutic targets, as well as improved risk prediction models. Two areas of key focus are:
1) Precision medicine approaches in neurological disorders
2) The genomics of DNA repair in the brain
Current projects include (i) employing bioinformatic fine-mapping analyses of genome-wide association studies of neurodegenerative disorders, and (ii) undertaking large-scale analyses of gene expression data and other genomic information to understand how DNA repair processes are regulated in the brain.

Background reading: Wright *et al.* (2020) *Lancet Neurol* (PMID: 33098802) and Wright *et al.* (2020) *Hum Mol Genet* (PMID: 32898862)

Name: Dr. Jody Haigh, Associate Professor Jody Haigh, Department of Pharmacology and Therapeutics Research Institute in Oncology and Hematology. CancerCare MB
Email: jody.haigh@umanitoba.ca
https://www.umanitoba.ca/institutes/manitoba_institute_cell_biology/MICB/Scientists/Haigh.html

The **Haigh lab** is interested in the transcriptional and epigenetic control mechanisms involved in blood cell development and transformation. In particular the lab is interested in understanding how transcription factors from the SNAI and ZEB family control gene expression programs through their interactions with key epigenic modifying enzymes to control blood cell development and how this process becomes corrupted in blood cancer. The lab uses cutting edge transgenic technologies, CRISPR/Cas9 based genomic editing approaches, bioinformatics, together with pharmacological inhibitor studies to try to understand and treat aggressive forms of blood cancer. While in the lab you will be exposed to basic molecular biology techniques such as DNA cloning, q-RT-PCR, Western blot analysis as well as tissue culture of stem and cancer cells. Students will gain an advanced understanding of the use of cutting-edge mouse transgenic models and gene editing approaches as well as real time visualization/imaging of blood cancer models and therapeutics.

Sample publications:
Carmichael et al., *The EMT modulator SNAI1 contributes to AML pathogenesis via its interaction with LSD1.* ***Blood Journal*** 2020
Goossens et al., *Oncogenic ZEB2 activation drives sensitivity toward KDM1A inhibition in T-cell acute lymphoblastic leukemia.* ***Blood Journal*** 2017

Name: Dr. Vernon Dolinsky, Associate Professor of Pharmacology and Therapeutics at the University of Manitoba and research scientist and co-lead of the interdisciplinary DREAM diabetes research theme (DREAM) at the Children's Hospital Research Institute of Manitoba.

My research program is focused on understanding mechanisms responsible for diabetes, gestational diabetes and cardiovascular disease development, including the developmental origins of these diseases with the aim of developing novel therapies. The student will learn molecular biology techniques involving the analysis of gene expression. The student will learn to analyze their data and deliver presentations in an oral and poster format.
To learn more about this research area, please read our recent paper P. Agarwal et al Critical Reviews in Clinical Lab Sciences(2020) and visit: https://www.dreamdiabetesresearch.com

DEPARTMENT OF PHYSIOLOGY & PATHOPHYSIOLOGY

Name: Dr. E. Eftekharpour, Associate Professor, Department of Physiology & Pathophysiology Location: Regenerative Medicine Program
Contact: (204)789-3214
Email: eftekhar@umanitoba.ca

Research: Why does a nerve cell die in Alzheimer's Disease? Can we prevent it?
Free radicals can cause cell death and when this occurs in the brain cells, the damage is irreversible. Research in my lab is focused on cell and molecular biology, imaging, and biochemistry to examine the cause of nerve cell death and find new therapies for Alzheimer's disease (AD). Nerve cell loss in AD results in personality changes in the grandparents, rubbing them from everything we like about them. Classical AD research has focused on two major structures that is found in the brain tissue: extracellular Amyloid plaques and intracellular neurofibrillary tangles, however, attempts to prevent formation, or to remove those have been generally ineffective.

New aspects of research show the involvement of nucleus in cell death. We have found how decreased antioxidant oxidant levels induces structural changes in the nucleus which alters faulty gene expression, including evolutionary retroviruses hidden in our genome. We are using this information to find therapies that will prevent structural and molecular changes.

A summer student in my lab will work with graduate student and will help in doing immunostaining, confocal microscopy, and image quantification. The student will also have the opportunity to learn cell culture and techniques for measuring gene expression and protein level in the cells.

Name: Dr. Tabrez Siddiqui, Assistant Professor, Department of Physiology & Pathophysiology
Location: Kleysen Institute for Advanced Medicine
Contact: (204) 318-2564
Email: Tabrez.siddiqui@umanitoba.ca

Research: The student will join ongoing efforts in understanding the mechanisms of neuronal communication and their disruption in neurodevelopmental and psychiatric disorders such as autism and schizophrenia. The lab utilizes a wide variety of approaches in molecular, cellular, systems, and

behavioural neuroscience to address both fundamental questions in the developmental and plasticity of neuronal connections in distinct brain regions important for learning, memory, and behaviour. The student will be mentored by the Principal Investigator and other senior lab members in experimental design and execution, data analyses and interpretation, figure preparation, and research presentations. Interested students may directly contact Dr. Siddiqui by email (Tabrez.siddiqui@umanitoba.ca) to discuss potential projects.

Name: Dr. Katinka Stecina, Associate Professor, Department of Physiology & Pathophysiology
Location: Spinal Cord Research Centre
Contact: (204)789-3761
Email: Katinka.Stecina@umanitoba.ca
Website: https://scrc.umanitoba.ca/wp/researchers/katinka-stecina/

Research: Spinal neural networks are important for the recovery of walking after stroke or spinal cord injury. In the Stecina laboratory, spinal neural networks are in the focus of research. Rodent models are used with electrophysiology and computational methods and neuron for network mapping. Students interested in neuroscience, computational sciences, electrical engineering will have a great time working in this lab and experience multiple types of research techniques.

Name: Dr. Adrian West, Assistant Professor, Department of Physiology and Pathophysiology
Location: Children's Hospital Research Institute of Manitoba
Contact: (204)789-3603
Email: Adrian.West@umanitoba.ca

Research: Traditional 2D cell culture models have been a staple of biomedical research for over 100 years. However, 2D cell culture presents limitations that reduce our ability to replicate healthy and disease states, and make it difficult to measure outcomes important to tissue and organ function. These concerns are particularly important when considering muscle diseases where muscle contraction is a major contributor to the pathology, because it is difficult to measure contraction in cultured cells.

My laboratory specialises in a cutting-edge technology called 3D bioprinting to manufacture life-like muscle tissues using cultured cells, solving numerous critical limitations of traditional techniques. Students participating in summer projects will learn to culture cells, prepare 'bioink' for 3D bioprinting, and perform contraction assays on printed tissues. They will also learn histological and molecular techniques to assess muscle structure and function. Importantly, the research will take place within the Children's Hospital Research Institute of Manitoba, which will allow students to interact with a wider community of scientists undertaking basic science, clinical and population-level research.

Name: Drs. Katinka Stecina and Kristine Cowley, Department of Physiology & Pathophysiology
Location: Human Spinal Cord Injury Research Facility for Health, Balance and Motor Control
Contact: Dr. Stecina (204)789-3761
Email: Katinka.Stecina@umanitoba.ca or Kristine.Cowley@umanitoba.ca

Research: Are you interested in motor control research? Would you like to learn about recording muscle

activity (EMG), video kinematic recording of movement and measuring loads during standing and stepping? Would you like to know how these outcome measures are used to tell us how neurons in the spinal cord contribute to movement, balance and even general health? If so, contact us and see if a URA is right for you.

Name: Dr. Kristine Cowley, Department of Physiology & Pathophysiology
Location: Human Spinal Cord Injury Research Facility for Health, Balance and Motor Control
Contact: (204)789-3305
Email: Katinka.Stecina@umanitoba.ca or Kristine.Cowley@umanitoba.ca

Research: Are you interested in muscles and bone? Would you like to know how neurons in the spinal cord contribute to training adaptations in muscle and bone? If so, you might like to join our group investigating the spinal neural mechanisms that contribute to musculoskeletal deterioration after spinal cord injury.

Name: Drs. Kristine Cowley and Jeremy Chopek, Department of Physiology & Pathophysiology
Location: Spinal Cord Research Centre
Contact: Dr. Cowley (204)789-3305
Email: Kristine.Cowley@umanitoba.ca or Jeremy.Chopek@umanitoba.ca

Research: Are you interested in figuring out how the spinal cord integrates information about movement with the activation of tissues and organs that support movement? If so, you might like to join the labs of Jeremy Chopek and Kristine Cowley as they investigate the fundamental neural circuitry and mechanisms that contribute to integration between locomotor-related and autonomic-related neural circuitry in the spinal cord.

Name: Dr. Davinder S. Jassal, Associate Professor, Department of Physiology & Pathophysiology Location: Bergen Cardiac Care Centre, St. Boniface Hospital
Contact: (204) 258-1290 Email: djassal@sbgh.mb.ca
Website: https://www.sbrc.ca/jassal/

Research: The Cardiovascular Imaging Laboratory (CVI) utilizes non-invasive cardiac imaging techniques to assess cardiovascular function in both the basic science and clinical settings. The lab's undergraduate, medical, and graduate trainees make use of echocardiography (ultrasound), cardiac computed tomography (CT), and cardiac magnetic resonance (CMR) imaging to advance our understanding of cardiac physiology and disease.

Breast cancer is a major public health concern in Canada. Although the current combination of surgery, radiation, chemotherapy, and targeted biological therapy may lead to remission in women with breast cancer, the administration of chemotherapy drugs, in particular Doxorubicin (DOX), is associated with an increased risk of developing heart failure. The addition of Trastuzumab (TRZ) in breast cancer therapy further compounds this issue of drug induce heart failure. Although DOX+TRZ decreases the risk of recurrence and death in the breast cancer setting, a major side effect is the risk of developing heart failure in nearly 1 in 4 women, affecting over 8000 Canadian women on an annual basis.
The main goals of our current Cardio-Oncology research program is to examine the use of nutraceuticals and physical exercise in the prevention of DOX+TRZ mediated cardiotoxicity in the clinical setting.

Name: Dr. Chris Pascoe, Assistant Professor, Department of Physiology & Pathophysiology Location: Children's Hospital Research Institute of Manitoba (CHRIM)
Contact: (204) 789-3345 Email: cpascoe@chrim.ca
Website: https://sites.google.com/view/thepascoelab/home

Research: My research program is interested in understanding the developmental origins of asthma and other chronic lung disease. Specifically, how early life environmental exposures, such as diabetes and cigarette smoke, influences the development and function of the lung at a cellular and molecular level. My lab also has a specific interest in understanding how the lung using lipid signaling molecules, called oxylipins, to coordinate cell and organ function. By understanding the origins of lung disease we can develop better treatments and preventative strategies.

Name: Dr. Peter Thompson, Assistant Professor, Department of Physiology & Pathophysiology Location: Children's Hospital Research Institute of Manitoba (CHRIM)
Contact: (204) 975-7787
Email: Peter.Thompson@umanitoba.ca Website: https://www.thompsonlab.ca

Research: My lab explores the molecular mechanisms that drive the development of Type 1 Diabetes (T1D), a life-long metabolic disease of insulin deficiency. We are taking a new and innovative approach to understanding T1D by investigating pathological changes in the pancreatic beta cells, the main cell type responsible for insulin production, which is destroyed by autoimmunity in T1D patients. The summer student project will employ biochemical and genetic approaches on a beta cell line model to discover new transcriptional regulatory mechanisms that control pathogenic phenotypes in pancreatic beta cells.

Name: Dr. Soheila Karimi, Professor, Department of Physiology & Pathophysiology Location: Regenerative Medicine Program
Contact: (204) 272-3109
Email: Soheila.Karimi@umanitoba.ca
Lab Site: http://home.cc.umanitoba.ca/~karimis/

Research: Karimi's research program focuses on development of regenerative medicine therapies for tissue regeneration and neurological recovery after spinal cord injury and multiple sclerosis. We employ neural stem cell therapy combined with drug delivery and bioengineering approaches in preclinical models. Stem cell therapy offers tremendous potential for nervous system repair. Our goal in this project is to design an effective combinatorial treatment to optimize the outcomes of current cellular therapies. The undergraduate student researcher will be trained by senior members of Karimi's team to learn required techniques and contribute to the project. While the student will be able to observe and learn all the available techniques in the laboratory, they will be primarily involved in molecular biology, imaging and assessments of tissue samples. Upon successful completion of the project, the student will also have the opportunity to contribute towards scientific publications. Karimi's laboratory is located within the Regenerative Medicine Program (RMP) in the Max Rady College of Medicine. Karimi's research program is nationally and internationally funded, and is well-equipped with advanced technologies to

conduct an array of in vitro and in vivo approaches in neuroscience, regenerative medicine and stem cell research with high translational implications.

Name: Dr. Andrew Halayko, Professor, Canada Research Chair in Lung Pathobiology, Department of Physiology and Pathophysiology
Location: Children's Hospital Research Institute of Manitoba (CHRIM) Contact: Andrew.halayko@umanitoba.ca

Research: Asthma Pathophysiology: Origins and New Treatment Development
Our recognized lab is based in the Children's Hospital Research Institute of Manitoba, which has outstanding modern facilities for diverse cell biology and physiology research. Our lab is among many that take on summer undergraduate interns, so the training environment is dynamic. Our work focuses on molecular pathways associated with oxidative stress and how pathogenic oxidized biomolecules cause asthma symptoms, and increase asthma risk. We use lung cell cultures and tissues from human donors, as well as from small animal models of asthma. Undergraduate students partner with a senior doctoral student for day-to-day supervision. After training in specific research techniques, the undergraduate student is assigned a specific project to generate data that is to be included in a scientific manuscript that the lab is developing. Students will participate in weekly lab meetings, and will present their findings in a lunch time seminar series, as well as an annual poster competition.

Name: Dr. Suresh Mishra, Depts. of Internal Medicine and Physiology & Pathophysiology (Adjunct)
Location: John Buhler Research Centre Contact: suresh.mishra@umanitoba.ca

Research: Students joining my research program in the field of endocrinology and metabolism will acquire a variety of skills that include the knowledge of cell biology, molecular biology, biochemistry, and endocrinology; and its related tools and techniques, along with a good understanding of metabolic and immune regulation at the systemic level. In addition, students will get many opportunities to learn how to integrate sex as a biological variable, in order to get new insights in physiology and pathophysiology (related to sex differences in susceptibility and resistance to metabolic and immune diseases), using a number of standard and modern tools and techniques, including transgenic preclinical models. A major focus of my research and training program is to instill in my trainees critical thinking and a problem-solving attitude in biomedical research. I believe that because of this training, students will be able to enrich themselves in building their own career in various areas of the health sciences.

Name: Dr. Sabine Mai, Professor, Tier I Canada Research Chair in Genomic Instability and Nuclear Architecture in Cancer, Department of Physiology & Pathophysiology
Location: Research Institute of Oncology and Hematology, CancerCare Manitoba Contact: (204)787-2135
Email: Sabine.Mai@umanitoba.ca
Website: http://www.umanitoba.ca/institutes/manitoba_institute_cell_biology/

Research: The three-dimensional (3D) spatial organization of the genome in smoldering myeloma (SMM). Background: Multiple myeloma (MM) is an incurable blood cancer. There are two precursor lesions of MM, in which the patients are not showing symptoms. These precursor lesions are called monoclonal

gammopathy of undetermined significance (MGUS) and smoldering myeloma (SMM). While some patients will be with stable precursor lesions for many years, others will progress. It is currently unclear who will progress.

We have shown that the 3D spatial organization of the genome is very different in patients with MGUS, SSM and MM. This project is a pilot study and will focus on patients will SMM. We aim to define criteria that will enable us to determine who will progress and who will remain with stable disease.
Rationale: Patients with SMM may have stable disease and not progress or present with high risk SMM and will progress to myeloma. 3D imaging is a tool that allowed us to distinguish indolent from aggressive tumors, and we propose to apply it to a SMM patient cohort. The goal of this pilot study is to establish if we can differentiate between indolent and progressive forms of SMM blindly using 3D imaging tools, which will include quantitative super resolution microscopy of genomic DNA organization, and quantitative 3D imaging of the genome (telomeres, centromeres and chromosomes). The proposed pilot study will address whether the 3D spatial organization of the genome will allow us to define which patient with SMM is stable or will progress to MM.
Hypothesis: The 3D spatial organization of the genome significantly differs between patients with SMM when they are with indolent or progressive disease.
Objective: To define the 3D spatial genomic differences in 20 SMM patients with indolent disease by using super resolution microscopy to image and measure the spatial organization of the genome and 3D imaging to define the positions of telomeres, centromeres and chromosomes.

Name: Dr. Tooru Mizuno
Department of Physiology & Pathophysiology
415 Basic Medical Science Building
Phone: 204-789-3765
Email: Tooru.Mizuno@umanitoba.ca

Description of Research:
Obesity is a serious health problem, but unfortunately only a limited number of drugs are currently available for the treatment of obesity. There is a huge demand for additional treatment options, in particular more effective and safe anti-obesity drugs. In order to fulfill this demand, it is important to understand the mechanism through which body weight is maintained within the normal range. Environmental factors also affect physiological function such as behavior and metabolism through alterations in function of metabolically active tissues (brain, liver, etc.). When mice are maintained in the enriched environment (i.e. higher levels of environmental stimulation compared to the conventional husbandry condition), these mice are leaner and are resistant to the development of obesity and diabetes. Thus, environmental enrichment provides a unique experimental model that may help identify a key mechanism as a potential target for anti-obesity drug development. We are interested in understanding specific signaling pathways that are activated by environmental enrichment using techniques such as gene and protein expression analysis in metabolically active tissues. Students will get hands-on experience on research techniques such as cell culture, biochemical analysis, molecular biological analysis and data analysis under the direct supervision by senior laboratory members. She/he will be provided with the opportunity to interact with other members of the Division of Endocrinology and Metabolic Diseases.