Principal Investigator: Aminu Bello, MD, PhD
Professor, Department of Medicine/Nephrologist

Institution and location: University of Alberta

Brief overview of research program in lay language:

Aminu Bello, MD, PhD, is a member of several professional organizations and consortia in nephrology.

His research interest is in global health, Indigenous kidney health research and remote/rural kidney care, and development of innovative care delivery platforms for optimal management of patients with kidney disease. He has supervised many graduate trainees and summer students in clinical epidemiology research. He is keenly interested in outcomes research towards improving quality of care among people with chronic diseases in Indigenous communities.

Principal Investigator: Dylan Burger, PhD
Senior Scientist and Associate professor

Institution and location: Kidney Research Centre, The Ottawa Hospital Research Institute, Ottawa, Canada

Brief overview of research program in lay language:

The Burger laboratory explores how chronic diseases including diabetes, hypertension, and kidney disease develop. We use knowledge gained from these studies to develop new treatments and tools to for early disease detection. In particular, we study "extracellular vesicles" or EVs. EVs are tiny pieces of cell that are released into the blood and urine.

Our laboratory has shown that changes to EVs in urine can identify kidney injury before current clinical tests. We have also shown that these EVs can actually contribute to kidney scarring. Projects in our lab are therefore focused on developing an EV-based test for early detection of kidney disease and on developing drugs that prevent EVs from causing kidney scarring.

Principal Investigator: Rahul Chanchlani, MD, MSc, FASN, FISN, FRCPC
Associate Professor, Division of Pediatric Nephrology

Institution and location: McMaster Children's hospital, Hamilton, ON

Brief overview of research program in lay language:

My name is Rahul Chanchlani and I am a pediatric nephrologist and clinician researcher at McMaster Children's hospital, Hamilton. My funded research program aims to address critical knowledge gaps in the field of pediatric hypertension using routinely collected healthcare data, particularly improving the screening of blood pressure (BP) among Canadian children at a primary care level.

Despite increasing HTN prevalence, only 25% of Canadian children have their BP regularly checked by primary care providers, resulting in severe under-diagnosis.

To address this gap, we are developing and validating a risk prediction tool to detect high BP among children using 5 well-defined longitudinal Canadian and UK-based birth cohorts.

Principal Investigator: Indra Gupta, MD
Pediatric Nephrologist/Clinician-Scientist

Institution and location: Research Institute of the McGill University Health Centre, Montreal

Brief overview of research program in lay language:

Congenital birth defects in kidney and urinary tract formation are the most common cause of kidney failure in children. My research is focused on understanding the genetic and environmental risk factors that result in these defects. We use cell lines, animal models and the genetic study of affected individuals to do this research.

Principal Investigator: Dr. Jagbir Gill
Transplant Nephrologist/Clinician Scientist

Institution and location: UBC Kidney Transplant Research Program, Vancouver, BC

Brief overview of research program in lay language:

I am a transplant nephrologist and clinician scientist in the UBC Division of Nephrology. My research areas of interest include access to kidney transplantation, specifically examining disparate access to transplantation by race/ethnicity, socioeconomic status, geography, and age, and other barriers to living and deceased organ donation. Key research methodologies include epidemiology, health services and health policy research, and quality and implementation.

Key areas of research in my group include:

1. **Examining sociodemographic disparities in living kidney donation**: This research is aimed at understanding disparities in living donation and has been important in informing policy to support living donation in disadvantaged populations.

2. **Developing strategies to improve access to living donor transplantation**: Building on my work examining sociodemographic disparities in living donation, I have developed a research program aimed at improving access to living donor kidney transplantation in Canada, anchored around a program of study aimed at implementing health services and health policy interventions to improve access to kidney transplantation for Indigenous populations (BRIDGE to Transplant Program). I have further expanded this work by applying the same research methodology to design, implement, and evaluate a strategy to expand living donor kidney transplantation in other racialized populations (the African/Caribbean/Black and South Asian) in collaboration with Health Canada.

3. **Transplant Tourism and Global Strategies to ensure ethical deceased donation**: Transplant tourism refers to the illegal and unethical practice of organ trafficking that has persisted for years in many countries. Efforts to curb this practice have been informed by research and policy initiatives, many of which have been led through our group. I have authored several publications relating to the outcomes and drivers related to the practice of transplant tourism and organ trafficking.

Principal Investigator: Oraly Sanchez-Ferras, PhD
Professeure Adjointe/Assistant Professor

Institution and location: Université de Sherbrooke, Quebec

Brief overview of research program in lay language:

As a new researcher, my goal is to understand how cells develop and organize to form the kidneys. During early kidney development, renal progenitor cells transform and reorganize to create a pair of nephric ducts. These ducts must elongate through collective cell migration toward the back of the embryo to initiate the formation of the kidneys. While these events are

well documented, the mechanisms that govern cell fate decisions and collective migration during kidney formation remain poorly understood.

My research program aims to uncover how cell behaviors, interactions, and movements drive kidney development and how disruptions in these processes contribute to diseases such as Congenital Anomalies of the Kidney and Urinary Tract (CAKUT) and cancer. Using cutting-edge techniques like fluorescent mouse models, single-cell analysis, spatial transcriptomics, live imaging, and CRISPR/Cas9 gene editing, my team focuses on three main projects:

1. Investigating collective cell migration during kidney development.

2. Identifying key genes and mechanisms underlying CAKUT, with a focus on transcription factors like Tfap2 and Gata3.

3. Exploring the shared mechanisms between nephric duct development and cancer invasion, particularly in metastatic kidney cancer.

This research will advance our understanding of kidney development and disease, enabling more precise diagnoses and personalized treatments for CAKUT. It will also lead to the discovery of biomarkers for tracking kidney cancer progression and identifying promising therapeutic targets for invasive cancers, directly impacting public health.

Principal Investigator: Tomoko Takano, MD, PhD
Senior Scientist,
Professor, Department of Medicine

Institution and location: Research Institute of the McGill University Health Centre, Montreal

Brief overview of research program in lay language:

Our laboratory aims to understand what causes protein leakage into the urine (proteinuria). Proteinuria is not only a hallmark feature of chronic kidney disease but also an indicator for progression to kidney failure. Also, in the disease form called nephrotic syndrome, heavy proteinuria causes body swelling, necessitating aggressive treatments with many side effects.

We use cultured cells, animal models, and blood samples from affected individuals to dissect what causes proteinuria and what are the responsible molecules and pathways. By doing so, our ultimate goal is to identify better biomarkers of the disease and identify novel therapeutic target, so that the affected individuals can receive personalized and specific treatment, rather than blind and non-specific one they are receiving now.

Principal Investigator: Greg Hundemer, MD MPH
Assistant Professor/Nephrologist

Institution and location: Ottawa Hospital

Brief overview of research program in lay language:

My clinical research program has two key focuses. The first is studying the impact of excess aldosterone (a hormone that tells the kidneys to hold onto salt) on the development of high blood pressure, cardiovascular disease, and kidney disease. The second is using artificial intelligence computer technology to improve prediction of kidney disease progression. I am a prior KRESCENT Awardee and have active research funding from a number of organizations including the Canadian Institutes of Health Research and the Kidney Foundation of Canada. I also hold the Lorna Jocelyn Wood Chair for Kidney Research at the Ottawa Hospital. I have abundant experience in mentoring students and trainees in kidney research.

Principal Investigator: Alex Gregorieff
Assistant Professor/Scientist

Institution and location: Research Institute McGill University Health Centre, Montreal, Quebec

Brief overview of research program in lay language:

Defining the mechanisms underlying renal tubule regeneration during acute kidney injury.

The decline lasting days to weeks in kidney function, known as acute kidney injury (AKI), is a major cause of hospitalizations and a frequent complication arising in patients in intensive care units. AKI is a major risk factor for developing chronic kidney disease (CKD), characterized by permanent fibrosis, systemic inflammation and progressive azotemia. Progression from AKI to CKD is thought to occur as a consequence of incomplete repair of the tubular epithelium. However, the mechanisms underlying maladaptive repair remain poorly understood. In collaboration with Dr. Tomoko Takano, a nephrologist at the RI-MUHC, we have exploited models of AKI by ischemic-reperfusion in mice and organoids to uncover novel regulators implicated in these processes. The summer project will include gaining experience with genetically engineered mouse models and organoid cultures. This project is funded by an NSERC Discovery Grant awarded in 2022.

Principal Investigator: Caroline Lamarche, MD MSc
Clinician Scientist/Transplant Nephrologist

Institution and location: Centre de recherche de l'Hôpital Maisonneuve-Rosemont, Montréal, Québec

Brief overview of research program in lay language:

My research program aims to optimize immune function among patients in nephrology with the objective of reducing their mortality and morbidity. I am a clinician-researcher specialized in transplantation, and I operate a fundamental immunology laboratory. As part of this internship, I propose to conduct two projects, therefore. The first, a clinical project, aims to evaluate the impact and necessity of treating subclinical borderline rejection among kidney transplant recipients. It will consist of conducting a case review and drafting a journal article on the subject. The second, an immunology project, will analyze the impact of regulatory T-lymphocytes on the heart of mice with renal failure. It will consist of performing microscopy (marking and image acquisition) and will be part of a larger study.

Principal Investigator: Dr. Casimiro Gerarduzzi
Associate Professor/Senior Researcher

Institution and location: Université de Montréal, Centre de recherche de l'Hôpital Maisonneuve-Rosemont (CR-HMR), Montreal, Quebec.

Brief overview of research program in lay language:

Focuses on understanding kidney scarring (fibrosis) and its molecular causes. Studies how proteins regulate tissue repair and contribute to kidney damage. Aims to identify new diagnostic markers and therapies for chronic kidney disease. Seeks to improve treatments to prevent or reduce kidney damage for better patient outcomes.

Dr. Casimiro Gerarduzzi's lab employs various advanced methods to study kidney fibrosis and tissue repair. Here's a summary of the techniques used:

- Molecular Biology Tools:
  - Gene expression analysis to identify biomarkers associated with fibrosis.
  - Protein quantification methods (e.g., Western blot, ELISA) to study key regulators.
- Cell Culture Models:
  - Fibroblast and epithelial cell cultures to mimic fibrosis in vitro.
  - Co-culture systems to investigate cell-cell interactions in kidney tissue.
- Histological and Imaging Techniques:
  - Tissue staining (e.g., Masson's trichrome) to visualize and quantify fibrosis in kidney samples.
  - Advanced microscopy for detailed cellular and tissue-level analysis.
- Animal Models:
  - Use of murine models to replicate kidney injury and study scarring mechanisms in vivo.
- Bioinformatics and Systems Biology:
  - Computational analysis to integrate gene and protein data and identify regulatory networks.
- Therapeutic Testing:
  - Screening of compounds and therapeutic candidates for anti-fibrotic activity in preclinical models.

These methods allow the lab to gain insights into the mechanisms of kidney fibrosis and develop potential interventions.

Principal Investigator: Amira Abdelrasoul, PhD, PEng, FEIC
Associate Professor

Institution and location: University of Saskatchewan

Brief overview of research program in lay language:

Our research program focuses on advancing kidney health through the development of innovative models of the glomerular basement membrane (GBM), a critical component of the kidney's filtration system. The GBM plays an essential role in filtering waste products from the blood and maintaining the survival and function of kidney cells, including endothelial cells and podocytes. Damage to the GBM caused by oxidative stress, inflammation, or other factors can lead to kidney disease and failure. This groundbreaking platform enables us to simulate blood flow and observe its real-time effects on kidney cells, assess cell survival, attachment stability, and regeneration under dynamic and controlled conditions, and study cellular responses to injury to identify factors influencing repair, movement, and survival. By integrating engineered GBM matrices with kidney cells, we aim to uncover critical insights into how GBM damage influences kidney health. The knowledge gained from this research will pave the way for improved dialysis treatments and novel therapies to support patients with kidney failure.

Project Opportunities for Summer Students

This project offers a **highly engaging, hands-on research experience** that aligns with the KRESCENT Summer Studentship Program goals:

1. **Cutting-Edge Research**: Students will work on our innovative GBM-on-a-chip system, applying advanced bioengineering techniques and studying live-cell interactions under simulated blood flow conditions.
2. **Skill Development**: Students will gain valuable experience in dynamic cell culture systems, biomaterials engineering, cell survival assays, and data analysis—essential skills for future research careers.
3. **Clear Project Outcomes**: The structured project will involve evaluating cell behavior and regeneration, with clear deliverables that can contribute to presentations or publications in kidney research.
4. **Mentorship and Career Growth**: Our program prioritizes student development through direct mentorship, guidance, and collaboration with a highly qualified research team. Students will be encouraged to explore career opportunities in kidney research while gaining insights into real-world applications of scientific discoveries.

Commitment to Inclusion and Cultural Safety

Our team is dedicated to fostering a **culturally safe, inclusive, and supportive training environment** for all students. As part of the KRESCENT program, we will:

- Undergo **anti-racism, anti-oppression**, and **Indigenous cultural safety training** as required.
- Provide mentorship tailored to the student’s learning needs and career aspirations.

- Ensure a respectful and collaborative space where students from **Black and Indigenous communities** can thrive and succeed.

We believe that empowering students to participate in cutting-edge kidney research will not only enhance their skills but also contribute to **increasing representation** of underrepresented groups in the field of kidney health. Our goal is to inspire and support the next generation of kidney researchers while advancing treatments that improve patient outcomes.

By participating in this program, students will play an integral role in advancing **innovative kidney research**, contributing to discoveries that address critical issues in dialysis treatments and kidney disease.

Principal Investigator: Dr. Ana Konvalinka
Nephrologist/Clinician Scientist

Institution and location: University Health Network, Toronto

Brief overview of research program in lay language:

Dr. Ana Konvalinka (MD, PhD, FRCPC) is a Clinician Scientist and Transplant Nephrologist at the University Health Network in Toronto. She is an Associate Professor at the University of Toronto and a Senior Scientist at Toronto General Hospital Research Institute. Dr. Konvalinka is the director of the Multi-Organ Transplant biobank for kidney, pancreas, and liver transplant programs at the Ajmera Transplant Centre.

In addition to providing care to adult kidney transplant patients, Dr. Konvalinka leads a vibrant and innovative basic and translational research program, with a focus on identifying molecular mechanisms and novel therapeutic targets for native and transplant kidney disease. She utilizes systems biology approaches and proteomics to enhance the understanding of mechanisms, derive novel markers and identify therapeutic targets for kidney disease. Her research program focuses on three main areas, with the overarching goal of preventing premature kidney graft loss:

1. Antibody mediated rejection – the lab is using molecular approaches to study patients' kidney biopsies and concomitant blood and urine to understand the precise mechanisms that may drive injury in patients.
2. Ischemia reperfusion injury is the type of injury that harms the kidney at the time of transplant. Dr. Konvalinka's lab is studying ways to repair the kidneys at the time of transplant and is investigating how mechanisms of injury differ in males and females.
3. Kidney scarring (fibrosis) – the lab is testing whether specific proteins and sugars measured in urine can indicate the degree of scarring in the kidney.

Principal Investigator: Tom D. Blydt-Hansen (he/him), MDCM, FRCPC
Associate Professor of Pediatrics, Director, Multi-Organ Transplant Program

Institution and location: University of British Columbia, BC Children's Hospital

Brief overview of research program in lay language:

My research program is focused on improving clinical outcomes in children who have had a kidney transplant. I lead the solid organ transplant research program, at the BC Children's Hospital Research Institute. There are two facets to our research. The first is translational, to bring new technology to bear on improving monitoring of kids with a transplant. This includes evaluating their risk for inflammation/injury in the kidney such as rejection, in order to guide when we should be doing a biopsy. Successful implementation of such technology should lead to better long term graft survival and the potential to tailor immune suppressant medications, so that we can minimize their use to avoid side effects while ensuring that the kidney transplant is safe. The second aspect is improving the quality of life experienced by young transplant recipients, with now a good understanding that a major impact on QOL is the accumulation of trauma experiences leading up to transplant and subsequently. These are often medical traumas to do with operations, ICU stays, dialysis and painful medical procedures. Our program is using multiple modalities to both understand what contributes to those experiences, and how young people are accessing support – to identify how we may improve those supports and design interventions that build resiliency and promote post-traumatic growth.