

Faculty Of Health Sciences | School of Medicine

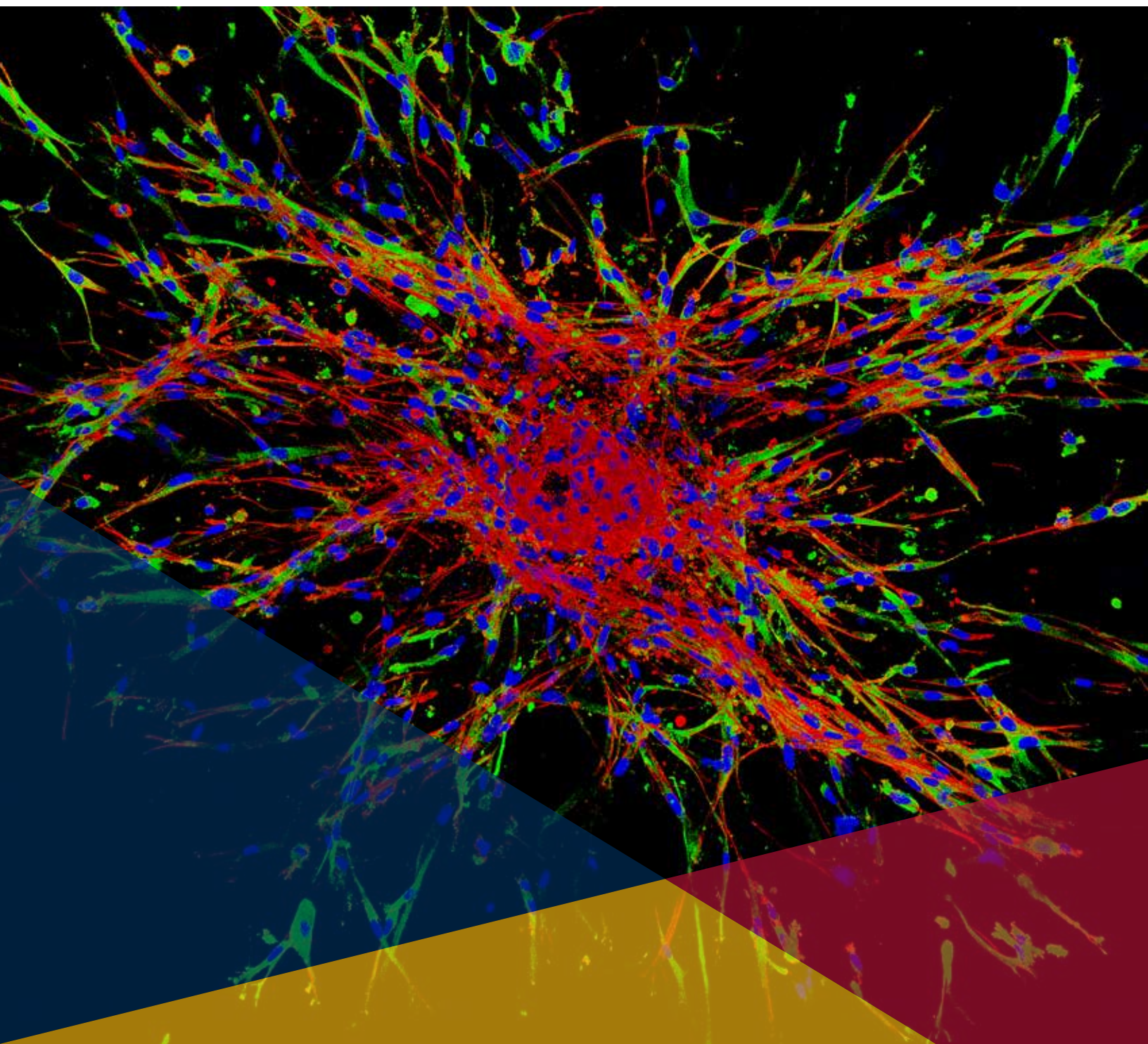


Queen's
UNIVERSITY

DEPARTMENT OF

Medicine 2019

Queen's CardioPulmonary Unit (QCPU)





The Queen's CardioPulmonary Unit (QCPU) is an \$8 million dollar, 8000 square foot research facility that is focused on a Bench-to-Bedside philosophy with emphasis on heart, lung, blood and vascular diseases. QCPU was funded by a Canadian Foundation for Innovation (CFI) grant and opened in 2017 with Dr. Stephen Archer as the founding scientific director and Clarrie Lam as manager (currently, Brooke Ring-Snetsinger). QCPU is comprised of a state-of-the-art basic science research facility that is complemented by an onsite Kingston Health Sciences Center (KHSC) satellite Echocardiography clinic with clinical trials research capacity. Built on existing institutional investments by Queen's University, QCPU enhances existing links between clinical and basic investigators at Queen's and fosters new collaborations between researchers in other faculties and at other universities. QCPU is funded by the Department of Medicine, the Faculty of Health Sciences (FHS) and through cost recovery for services provided. QCPU's mission includes growing the extramurally funded research enterprise for the Department of Medicine and FHS at Queen's University.

Housed within the Bioscience Complex, located in the heart of Queen's campus, QCPU is within close proximity to the School of Medicine Building, KHSC and other key departments within FHS. QCPU embodies research excellence and will ensure that Queen's University is recognized internationally as a center for translational research.



CLINICAL SATELLITE UNIT

08

Number of echocardiograms (ECHO) per day

QCPU opened its clinic doors on February 4th, 2019 as an official KHSC Satellite. For the past year, QCPU's clinic has performed 8 echocardiograms (ECHO) per day, which has significantly reduced the wait times for ECHOs in the Kingston and surrounding area. The clinic is home to 1 full time receptionist and 2 sonographers; and all clinical images are linked and stored on the Xclera server at KHSC. Since mid-summer of 2019, the QCPU clinic became the site for central booking for all local ECHOs. This year (2020) will see clinical services expand into using contrast agents for ECHO, which again will have a positive impact on patient waitlists. In addition, we are looking forward to reporting on several exciting research projects currently underway at our clinic. QCPU has a unique partnership with KHSC which allows 25% of the imaging capacity for use in clinical research studies. This partnership provides KHSC with state-of-the-art imaging facility, and our researchers with access to the services of expert sonographers and ongoing maintenance of the equipment.

TRANSLATIONAL RESEARCH UNIT

04

Number of scientists on staff at QCPU

This portion of QCPU is staffed by 4 scientists and is comprised of 5 different laboratories including:

- Physiology and experimental therapeutics
- Molecular and cellular imaging
- Cell culture and cytometry
- Genomics, transcriptomics and molecular medicine
- Mass cytometry and proteomics

The centre offers faculty across the university access to state-of-the-art equipment, much of which exists only within QCPU. Notably, our model is innovative in that services are provided for faculty by QCPU's scientists on a cost-recovery basis. Examples of key equipment include:

- MILabs Tri-modality micro-CT/SPECT/PET nuclear imaging platform
- Illumina NextSeq550 Sequencing for next-generation sequencing services
- Sony SH800 flow cytometer and sorter
- Leica SP8 confocal and super-resolution microscope upgraded with 2-photon laser
- MultiPep RSi peptide array technology
- Fluidigm Helios/Hyperion mass cytometer
- XCelligence cell culturing system

05

Number of laboratories within QCPU

BY THE NUMBERS

QCPU was established as a cost-recovery funding model. We provide Queen's researchers with the experience and access to cutting-edge technology to bring their research to the next level.

10

Currently, QCPU boasts 10 SuperUsers, defined as users who purchase service in blocks of 208 (SuperUser A plan) or 104 (SuperUser B plan) hours/year

24

We serve 24 research groups across 10 departments, 3 faculties and 3 universities.

60

QCPU scientists have assisted or mentored over 60 trainees, including research staff, medical students, post-doctoral fellows, graduate students and undergrads.

05

QCPU is also home base for 5 Translational MEDicine (TMED) graduate students, 3 Post-docs, 2 QCPU research scientists and 2 Translational Institute of Medicine (TIME) scientists.

03

We host 3 graduate student courses, i.e., BMED828, TMED801 and TMED811.

18

QCPU has contributed to 18 publications in the past year

USER LISTS (PI, DEPARTMENT)

USER TYPE	PRINCIPAL INVESTIGATOR	DEPARTMENT
SuperUser	Stephen Archer	Medicine
SuperUser	David Lillicrap	Pathology & Molecular Medicine
SuperUser	Mark Ormiston	Biomedical and Molecular Sciences / Surgery
SuperUser	Don Maurice	Biomedical and Molecular Sciences
SuperUser	Paula James	Medicine / Pathology & Molecular Medicine
SuperUser	Stephen Vanner	Medicine / Gastroenterology
SuperUser	Alan Lomax	Medicine / Gastroenterology
SuperUser	David Reed	Medicine / Gastroenterology
SuperUser	James Rutka	Surgery / University of Toronto
SuperUser	Robert Siemens	Urology
SuperUser	Amer Johri	Medicine
SuperUser	David Maslove	Medicine / Critical Care
User	Chandra Tayade	Biomedical and Molecular Sciences
User	Lois Mulligan	Pathology & Molecular Medicine
User	Peter Davies	Biology / Biomedical and Molecular Sciences
User	Stephen Pang	Biomedical and Molecular Sciences
User	Kevin Stamplecoskie	Chemistry
User	Neil Renwick	Pathology & Molecular Medicine
User	Charles Graham	Biomedical and Molecular Sciences
User	Martin Petkovich	Biomedical and Molecular Sciences
User	Michael Adams	Biomedical and Molecular Sciences
User	Richard Oko	Biomedical and Molecular Sciences
User	Kurt Prins	Medicine / University of Minnesota
User	Parin Chaivisuthangkura	Medicine / Center of Excellence for Animal, Plant and Parasite Biotechnology Srinakharinwirot University, Bangkok, Thailand
User	William G. Bendena	Biology

SUPERUSER PROFILES



Dr. Stephen Archer

Dr. Archer is a CIHR and CRC Tier 1 funded cardiologist and physician scientist. He is the scientific director of QCPU, his research focus is on defining molecular mechanisms of oxygen sensing, defining mechanisms of disordered mitochondrial metabolism and dynamics and development of mitochondrial metabolic therapies for pulmonary hypertension (PH) and cancer.



Dr. David Lillicrap

Dr. Lillicrap is a CIHR and CRC Tier 1 funded researcher. His research explores the molecular aspects of blood coagulation to improve the diagnosis and treatment of patients with bleeding disorders. Dr. Lillicrap and his research team are

using a combination of molecular technologies to improve the understanding of common inherited bleeding disorders, such as hemophilia and von Willebrand disease and to identify cures.



Dr. Mark Ormiston

Dr. Ormiston is a young investigator who is funded by CIHR and a Tier 2 CRC. He serves on the management board of QCPU. He studies how impairment of a specific immune cell Natural Killer (NK) cells may be critical to development of pulmonary hypertension and how targeting these cells may offer a new avenue for treatment. His team also works on techniques to isolate and genetically modify patient-derived stem cells, with the ultimate goal of creating tailored immune cell therapies that can reverse the vascular changes that affects the lungs of patients with pulmonary arterial hypertension (PAH).

Dr. Don Maurice

Dr. Maurice is a CIHR funded researcher and serves on the management board of QCPU. The Maurice Lab studies the role of cyclic nucleotide (cAMP and cGMP) compartmentalization and cyclic nucleotide signaling in human arterial endothelial cells and arterial smooth muscle cells. Since virtually all cells are

either directly or indirectly influenced by cAMP and or cGMP, this pathway represents a potential therapeutic target in multiple cardiovascular diseases, such as atherosclerosis and restenosis, and is also important for angiogenesis.

Dr. Stephen Vanner

Dr. Vanner is a CIHR funded researcher and is the scientific director of the Gastrointestinal Diseases Research Unit (GIDRU) and the Translational Institute of Medicine (TIME). Dr. Vanner has expertise in gastrointestinal motility disorders. He has an established translational research program that examines mechanisms underlying pain signaling and motility in the gastrointestinal tract, relevant to irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD).



Dr. Paula James

Dr. James is the director of our TMED graduate program. Her primary research interest is focused on investigating the genotype/phenotype interactions in patients with von Willebrand disease and Hemophilia. She studies the molecular genetic basis of these inherited bleeding disorders and is also heavily involved in clinical investigation of patients with these diseases. The James lab has a focus on

SUPERUSER PROFILES

the quantitation of bleeding symptoms in women with von Willebrand disease and on understanding the relationship between bleeding scores and the molecular basis of disease.



Dr. Alan Lomax

Dr. Lomax is a CIHR funded researcher. His lab investigates how interactions between the microbiota, nervous system and the immune system can contribute to symptom generation in inflammatory bowel disease. His lab also investigates the regulation of neurogenesis in the enteric nervous system.

Dr. David Reed

Dr. Reed is a young investigator. His clinical interest is in gastrointestinal motility disorders. His research interest is how the interaction of luminal factors (e.g. dietary components) with stress or the microbiota modulates pain signaling and motility in disorders such as irritable bowel syndrome.

Dr. James Rutka

Dr. Rutka is a CIHR and CRC funded researcher and is Chair of the Department of Surgery at the University of Toronto. His laboratory has focused on two areas

of related research regarding astrocytomas (malignant brain tumors: 1) Cytoskeletal: matrix interactions, and 2) Cell cycle control mechanisms. In the first project, he studies the role of the astrocyte-specific intermediate filament, glial fibrillary acidic protein, in astrocytoma morphology and signaling pathways. In the second, he studies the effects of cyclin dependent kinase inhibitors on human astrocytoma tumorigenicity.

Dr. Robert Siemens

Dr. Siemens is the head of the Department of Urology at Queen's University. His research focus is on urological oncology. His research endeavors have led to novel observations of the role of the tumour microenvironment and its interactions with the oncogenic drivers of malignant progression, with a specific interest in translating these findings to clinically effective cancer immunotherapy approaches.



Dr. Amer Johri

Dr. Johri is a mid-career researcher funded by the Heart and Stroke Foundation. He serves on the management board of QCPU. He is also founder and director of the Cardiovascular Imaging Network at Queen's (CINQ). His research interests

include 3D echocardiography, quality control in the echo lab, interventional echocardiography, and Hand-Held Cardiac Ultrasound. He also has extensive experience in echo-guided CRT optimization and TEE-guided percutaneous aortic valve replacement (TAVI). Dr. Johri's current research interests include the investigation of carotid intimal medial thickening as a surrogate to diagnose vulnerable coronary artery atherosclerotic plaques.



Dr. David Maslove

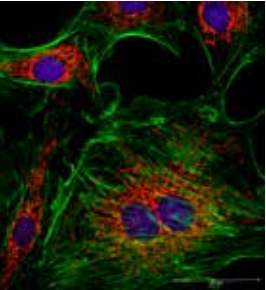
Dr. Maslove is an NSERC-funded young investigator and Clinician Scientist with the Department of Medicine and Critical Care Department. His research focuses on informatics, genomics, and the use of biomedical Big Data to address current challenges in Critical Care Medicine. The Maslove's lab leverages the power of randomization in a clinical trial of vitamin C in sepsis in order to ask: Are there molecular subtypes of sepsis that portend a positive response to treatment, and why do certain subtypes respond to vitamin C better than others?

“ As a regular user of this facility, in which we have conducted a range of research studies, I can state unequivocally that many of the successful research outcomes that we have achieved in the past two years would have been impossible without access to the high-end equipment available through the QCPU.

The availability of this equipment along with the input and contributions of the experienced scientists that operate and maintain this infrastructure makes the QCPU an invaluable core resource for researchers engaged in state-of-the-art biomedical science on this campus. It’s continued support should be a major priority for this research-intensive Faculty and Institution.”

DR. DAVID LILLICRAP
(Pathology & Molecular Medicine)

QCPU PROFILES



Dr. Stephen Archer

**Head, Department of Medicine,
Scientific Director, QCPU**
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Dr. Stephen Archer is physician scientist and graduate of Queen's University (Meds '81). He is a practicing cardiologist who specializes in the care of patients with various forms of pulmonary hypertension. His other interests include strategies for improving cardiovascular care, and training the next generation of physician-scientists. In his spare time he enjoys spending time with family and is an avid hockey player, guitarist and coffee drinker.

Dr. Archer directs a CIHR-funded research lab, where he and his associates study basic mechanisms of oxygen sensing in the vasculature. He investigates the role of mitochondria, both as oxygen sensors and regulators of cell proliferation and apoptosis. His research focuses on exploring cellular and molecular mechanisms of oxygen sensing and mitochondrial metabolism and dynamics. He also develops experimental therapeutics for pulmonary hypertension and cancer.

After training at the Royal Columbian Hospital in BC and the Minneapolis Veteran Affairs Medical Center he joined the faculty at the University of Minnesota in 1988. He spent a decade on faculty and attained the rank of Professor under the guidance of his mentor and friend, Dr. E.K. Weir. He then served as Chief of Cardiology at the University of Alberta (1998-2007) and Chair of Cardiology and Harold Hines Jr Professor at the University of Chicago (2007-12). Dr. Archer then returned to Queen's University as the Head of Medicine and Program Medical Director for Kingston Health Sciences Center (KHSC; includes Hotel Dieu Hospital, Kingston General Hospital, and Providence Care).

Dr Archer is the founder and Scientific Director of the Queen's CardioPulmonary Unit (QCPU) a \$8 million dollar, 8000 square-foot research facility, with a Bench-to-Bedside philosophy. QCPU is designed to support faculty and trainees who perform heart, lung, blood and vascular research. QCPU is comprised of a state-of-

the-art basic science research facility that is complemented by an onsite KHSC satellite clinic with clinical trials research capacity.

He has over 300 publications and his H-index is 94, with over 36,000 citations. He has mentored over 60 trainees, many of whom are leaders in science and medicine. His translational cardiovascular research has been recognized with numerous awards, including being elected as a Fellow of the Royal Society of Canada and being awarded Distinguished Scientist Awards from the American Heart Association and American College of Cardiology. He received the AFMC President's Award for Exemplary National Leadership in Academic Medicine in 2019 and was named the Chicago American Heart Association Coeur d'Or recipient in 2013.

Brooke Ring-Snetsinger

**Manager, Facilities & Operations QCPU,
Research Scientist at QCPU**
ringb@queensu.ca

Brooke has 10 years of research experience specializing in molecular biology, cytometry, microscopy and laboratory management.

She graduated with a BSc. Hons In Biochemistry and Molecular Medicine and MSc. in Life Sciences from Trent University. She managed a virology laboratory at Trent University and taught Virology and Infectious Diseases before coming to Queen's University in 2012.

She worked as the research assistant for clinician-scientist, Dr. Michael Rauh in Pathology and Molecular Medicine. Prior to joining QCPU she provided lab management for multiple research labs in the Pathology department, including the Queen's Laboratory for Molecular Pathology (QLMP). She has expertise running confocal microscopy, flow cytometry, NanoString Technology and Next-Generation Sequencers.

In 2019, she became the Manager of Operations and Facilities at Queen's CardioPulmonary Unit (QCPU) under scientific director, Dr. Stephen Archer. Brooke oversees operation of both the KHSC satellite clinic's daily operations, as well as, the state-of-the-art research centre. She not only lends her strong background in lab management to QCPU, but her significant bench experience as a Research Scientist, aiding in the Genomics, Molecular Imaging and Cytometry labs.

Dr. Charlie Hindmarch

**Assistant Professor, Scientific Operations Director,
Translational Institute of Medicine (TIME)**
c.hindmarch@queensu.ca

Dr. Charlie Hindmarch is Associate Professor (Adjunct) of Medicine and Director of the Genomics, Transcriptomics, and Molecular Medicine laboratory within Queen's CardioPulmonary Unit (QCPU).



(above) QCPU; Dr. Charlie Hindmarch (Genomics Scientist), Dr. Stephen Archer (Scientific Director), Brooke Ring-Snetsinger (Manager Of Operations), Dr. Elahe Alizadeh (Nuclear Imaging Scientist), and Dr. Patricia Lima (Microscopy And Flow Cytometry Scientist)

Dr. Hindmarch is also Scientific Operations Director for the new Translational Institute of Medicine (TIME).

Dr. Hindmarch graduated in 2001 with a BSc in Marine Biology in 2002 (University of Plymouth), in 2003 with an MSc in Biochemical Pharmacology (University of Soton) and in 2009 with a PhD in Neuroscience and Endocrinology (University of Bristol). Following his PhD, Hindmarch held two consecutive Postdoctoral Fellowships in University of Bristol, and the role of Senior Research Associate. Dr Hindmarch has previously held visiting Professorships at the University of Malay (Malaysia) and at the Federal Rural University of Rio de Janeiro (Brazil). Dr Hindmarch has been at Queen's University since early 2016 and currently has 42 published papers with an h-index of 17.

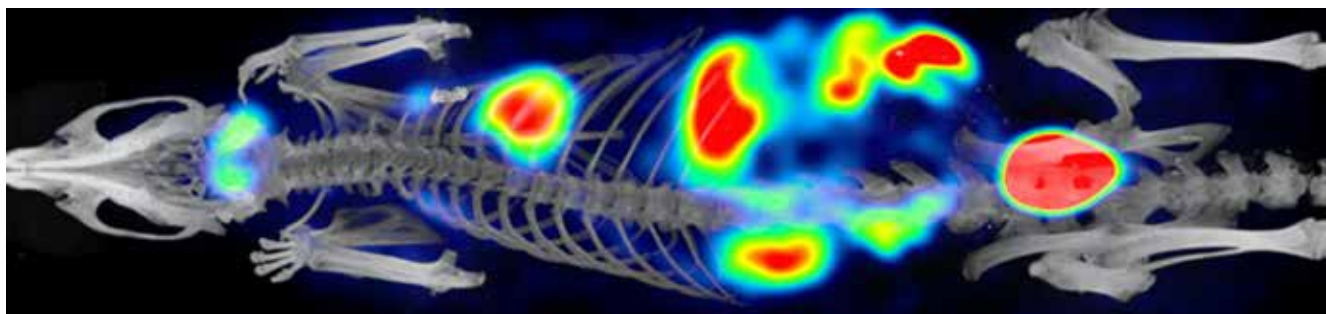
Dr Hindmarch is Director of the Genomics, Transcriptomics and Molecular Medicine laboratory at QCPU where he is responsible

for Next Generation Sequencing and bioinformatics. Dr Hindmarch also runs the mass cytometer (Cytometric Time of Flight; CYTOF) which is a high throughput proteomic tool that can resolve up to 50 antibodies in both cell suspension and in tissue (using laser ablation).

Dr. Elahe Alizadeh

**Assistant Professor, Adjunct,
Imaging & Radiation Physics Specialist**
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Elahe Alizadeh graduated with a BSc. in Applied Physics and an MSc. in Medical-Radiation Physics Program, both from Amirkabir University of Technology, Tehran, Iran. She then obtained her PhD in Nano-Bio-Physics from the University of Innsbruck, Austria. In



2010, she joined Prof. Sanche's lab at the Department of Radiobiology (at Université de Sherbrooke, QC, Canada) as a postdoctoral research fellow; where she designed and constructed a new X-ray apparatus to investigate the radiation damage on DNA complexed with radio-sensitizing chemo-therapeutic agents for chemoradiation therapy. Her achievement was recognized with the Radiation Research Society Jack Fowler Award in 2013 as an outstanding research in medical physics / radiobiology.

In January 2016 she joined the Department of Medical Imaging (University of Saskatchewan) to establish a pre-clinical research program for developing novel radiopharmaceuticals combining both therapeutic and diagnostic capabilities. She was managing the imaging facility with a μ PET/SPECT/CT scanner and a radio-chemistry lab. She was also a member of the Occupational Health Committee at the Saskatchewan Cyclotron Centre (Centre Sylvia Fedoruk Canadian Centre for Nuclear Innovation) and obtained the Radiation Safety Officer (RSO-1) certificate from the Radiation Safety Institute of Canada in May 2018.

Since July 2018, Elahe is conducting the nuclear imaging facility located at the QCPU. She is responsible for the coordination and performance of pre-clinical imaging projects using tri-modality μ PET/SPECT/CT scanner (VECTOr⁴CT from MILabs; Utrecht, Netherlands). She also oversees the quality assurance and troubleshooting of radiation equipment. She is also a member of the Canadian Radiation Protection Association (CRPA) and serves as a member of the Queen's Radiation Safety Committee in the Department of Environmental Health and Safety.

Dr. Patricia Lima

**Assistant Professor, Adjunct,
Molecular Imaging & Cytometry Specialist**
pdal@queensu.ca

Dr. Lima is a scientist and an Assistant Professor (Adjunct) at the QCPU. She is QCPU's Molecular Imaging and Cytometry Specialist

and provides scientific assistance for over 30 ongoing research projects. Driven by the philosophy of "Let's get this done and get it right", Dr Lima is well known by her competence, organization skills and scientific knowledge. She co-supervises graduate students focusing on the development of their scientific skills and critical thinking. At QCPU, Dr. Lima directs the Imaging Lab (housing the super-resolution SP8 Leica MP and confocal microscope) and the Culture and Cytometry Lab (a fully equipped risk level 2+ facility with a cell sorter and an enclosed culture system).

Dr. Lima graduated with a degree in Biological Sciences and obtained her Ph.D. in one of the top Universities in Brazil – UNICAMP in collaboration with Queen's University. She has focused her graduate studies in Reproductive Immunology, specifically looking into the regulatory mechanisms of Natural Killer cells (NK) during pregnancy and the role of these cells in complications such as miscarriages and preeclampsia. During her postdoctoral training (Queen's University and Ottawa Hospital Research Institute), Dr. Lima narrowed her research interest to study the immunological and metabolic aspects of women's health particularly focusing on diabetes during pregnancy and infertility-driven by endocrine and metabolic disorders such as Polycystic Ovarian Syndrome. Over the years, Dr. Lima has accumulated relevant publications and several awards recognizing the excellence of her research. Currently, she has two major research interests: 1) the immunological aspects of pulmonary hypertension, specifically macrophage polarization and inflammasome activation and 2) the phenotyping of neutrophils in risk stratification and prognostics of sepsis.

Aside from science, Dr. Lima dedicates her time giving back to the community. She is also a volunteer firefighter at Athens Fire Department where she is a member of the executive and training team. She also leads yearly the Muscular Dystrophy Canada fundraising for research ("The Boot Drive"). At Queen's, Dr. Lima is the founder of the Women in Science at Queen's (WiSQ), which is popular amongst scientists of diverse fields, genders and professional levels. The group is funded by Queen's Inclusive Community Funding and has the support of several departments at Queen's.

“ We have used the microscopy and cell sorting infrastructure at QCPU for a variety of studies in the lab, including isolating and imaging endothelial cells from the lungs of genetically modified mice, as well as the purification of specific immune cell populations from human blood. The availability of these resources, along with the trained scientists who operate this equipment, has been instrumental to ongoing research in nearly every major project in our lab. We currently have two manuscripts in revision (*Arteriosclerosis Thrombosis and Vascular Biology, Journal of Immunology*) that were greatly enhanced through the use QCPU services.”

DR. MARK ORMISTON
(Biomedical & Molecular Sciences)

NOTABLES



(top) **Patrick Deane** (Principal of Queen's University) and **Dr. Patricia Lima** (Microscopy And Flow Cytometry Scientist)
(above) Joint meeting between QCPU and the Ottawa Health Research Institute (OHRI) in September 2019

HIGHLIGHTS

Select Science Feature Article

In a December 2019 article in *Select Science*, QCPU Researchers were in the spotlight to explain how their new core facility and its cutting-edge flow cytometry and cell sorting technology is accelerating cardiopulmonary research. Cardiopulmonary diseases represent a significant health burden for many countries around the world. It is therefore vital to accelerate research that leads to new therapies to treat these diseases. In this article, QCPU's Scientists talked about capabilities of core facilities and how studying endothelial dysfunction, mitochondrial biology, and specific gene mutations is improving the understanding of the molecular factors influencing diseases of the lung vasculature, such as pulmonary arterial hypertension (PAH).

Genomics study: PrawnSeq – QCPU Sequenced the Giant freshwater Prawn

Pasookhush, P., Dr. Hindmarch, C., Sithigorngul, P. *et al.* Transcriptomic analysis of *Macrobrachium rosenbergii* (giant fresh water prawn) post-larvae in response to *M. rosenbergii* nodavirus (MrNV) infection: de novo assembly and functional annotation. *BMC Genomics* 20, 762 (2019). <https://doi.org/10.1186/s12864-019-6102-6>

In collaboration with the Department of Biology at Queen's University, **Dr. Hindmarch** worked with Dr. Pasookhush in Thailand in order to perform an RNA sequencing project. Dr. Pasookhush's group wanted to understand the giant fresh water prawn's (an economically important species) immune response during the post-larval stage when they are susceptible to infection from a debilitating environmental virus. Furthermore, they wanted to provide bio-rationale targets to help contain and restrict disease outbreak. They ran into a major limitation where there is no reference genome for this species. Dr. Pasookhush under the supervision of Dr. Hindmarch used de novo transcriptome assembly and annotation so that the experimental groups could be compared. This study went from prawn-to-publication in under 1 year.

Career Development

QCPU also is committed to their scientists' career development and putting QCPU on a national and international stage. This past year, all 3 of our PhD scientists travelled nationally and abroad to present their work and strengthen both their professional and QCPU abilities. In June, Dr. Patricia Lima attended the National Canadian Light Microscopy Course at the University of Calgary. Dr. Elahe Alizadeh travelled to the Utrecht, Netherlands in November to attend the MILabs User meeting, as well as, take part in advanced training for data analysis. In December, Dr. Lima travelled to Brazil to present at the Federal University of Sao Paulo to discuss QCPU achievements in molecular imaging and cytometry; and Dr. Charlie Hindmarch went to Cordoba, Argentina to give a lecture at the Ferreyra Institute on the state-of-the-art technology platforms such as Illumina's Next-Generation Sequencers and Fluidigm's Hyperion/Helios mass cytometer.

VISITORS AT QCPU IN THE PAST YEAR

Dr. Joe Hill

(Circulation Editor and Chief)

Dr. Stephen Collins

(Professor of Medicine at McMaster University;
Guest of Honour at TIME symposium)

Roseann O'Reilly Runte

(CEO and President of CFI)

Board members of the W.J. Henderson Foundation

(Health Research Charity)

Patrick Deane

(Principal of Queen's University)



Women in Science at Queen's University (WiSQ)

Women in Science Queen's (WiSQ) is Queen's University's second Employee Resource Group funded by a Inclusive Community Fund (ICF) provided by the Human Rights and Equity Office.

Founded by Dr. Patricia Lima, adjunct assistant professor in the Queen's Cardiopulmonary Unit (QCPU), she was looking to help other women as they explore and build upon their careers at Queen's while at the same time helping foster equity within science. WiSQ goals include promoting discussions about gender bias in science; incentivizing the active participation and leadership of women; and establishing a visible, equitable, diverse and inclusive community promoting the development and retention of women across all scientific disciplines.

WiSQ became official in 2019, its monthly seminars were attended by 15-40 people per session. Now in its second year WiSQ is ready to host 10 monthly seminars of guest lectures, including a variety of topics to discuss issues of equity, career development, and work-life balance. We also plan to hold more external events with hopes of being able to connect with more community women's groups. Please follow us on Twitter (@womeninscience6) to find out about our events or add our group (Women in Science at Queen's – WiSQ) to your outlook calendar.



COURSES, EVENTS, GRANTS & PUBLICATIONS



(left) QCPU
trainee office

COURSES AND EVENTS AT QCPU

BMED828 – Advances Histology and Staining Technique: (Dr. Stephen Pang, Dr. Yat Tse, Jeff Mewburn and Dr. Patricia Lima) – Winter 2019. QCPU provides a 1-hour lecture on practical applications of confocal and 2-photon microscopy, followed by an in-lab session with the fluorescent-tagged tissue samples.

TMED801 – Profession in Medicine: (Dr. Paula James) – Fall 2019. This course immerses students in the professional learning environment of Medicine.

TMED811 – Next-Generation Sequencing: (Dr. Charlie Hindmarch) – Winter 2019. This course teaches students the theoretical and practical basis of high-throughput genomics and transcriptomics.

Joint Vascular Biology Research Day between the Ottawa Hospital Research Institute (OHRI) and QCPU – Organized by Dr. Ormiston and QCPU. This is an

annual event that showcases each center's current research and achievements. The event took place on September 10th and attendance was approximately 60 people

Research in Progress Meetings (RIPMs) are a highly popular monthly meeting hosted by Dr. Mark Ormiston.

EXTERNAL GRANTS (submitted)

IMPACT – Canadian Cancer Society
Mitochondrial Drp1 receptor proteins MiD49 and MiD51 are epigenetically upregulated in lung cancer: a novel mitochondrial-targeted approach to cell cycle regulation and cancer therapy. (Das Gupta, Chen, Hindmarch and Archer)

ADDF – Alzheimer Drug Discovery Foundation

Targeting Dynamin-Related Protein 1 (Drp1)-Mediated Mitochondrial Fission in Alzheimer's Disease: Therapeutic Potential of Novel Drp1 GTPase Inhibitors.

(Wu, Hindmarch, Archer)

CIHR

Dysregulation of TET2 and DNMT3A promotes pulmonary arterial hypertension (PAH) through altered DNA methylation and inflammation: A new mechanism of PAH. (Rauh, Archer, Potus & Hindmarch)

Role of trained immunity in the response to BCG immunotherapy of bladder cancer. (Graham, Seimens, Burman, Cotechini, Hindmarch, Jackson, Koti, Pare)

Heart And Stroke

A Transcriptomic Investigation of the Role of Sex in Right Ventricular Failure in Pulmonary Arterial Hypertension. (Archer, Hindmarch, Potus, Alizadeh, Xiong)

INTERNAL GRANTS (submitted)

TIME Grants

Virtual Histology of Atherosclerotic Plaque by a Novel 3D-Guided Ultrasound Tool for

Atherosclerosis Risk Detection (VAN-GUARD). (Johri, **Hindmarch**, **Lima** & Cook)

Transcriptomic Analyses of the Response to Stimulation in Type 1 von Willebrand Disease BOECs: Evaluation of the Hemostatic Stress Response as Disease Modifier. (James, Renwick & **Hindmarch**)

Psychological stress-food antigen triggers IBS symptoms via loss of oral tolerance. (Reed, Ormiston, Craig & **Hindmarch**)

Multimodal molecular phenotyping for subtype discovery in septic shock: Translational extension of a randomized trial. (Maslove, **Lima**, **Hindmarch**)

Spear Grants

Uncovering A New Immunological Player in Pulmonary Hypertension: M2 macrophage metabolism promotes adverse pulmonary vascular remodeling. (Maurice and **Lima**)

Validating multimodality microCT/PET/SPECT for Assessment of Right Ventricular Function and Metabolism in Experimental Pulmonary Hypertension. (Archer and Alizadeh)

SEAMO-AFP

TIMEKeeper: A Comprehensive Cardiovascular Biobank Linked to Clinical and Outcomes Data to Support Implementation of Personalized Medicine through Translation Research. (**Archer**, **Vanner**, **Hindmarch**, **Potus**, **Lima**)

PUBLICATIONS SUPPORTED BY QCPU

Submitted: Prins, Kurt W., et al. "Hypochloremia Is a Noninvasive Predictor of Mortality in Pulmonary Arterial Hypertension." *Journal of the American Heart Association*.

Submitted: Dasgupta, Asish, et al. "An epigenetic increase in mitochondrial fission by MiD49 and MiD51 regulates the cell cycle in cancer: Diagnostic and therapeutic implications." *The FASEB Journal*.

Tian, Lian, et al. "Epigenetic Metabolic Reprogramming of Right Ventricular Fibroblasts in Pulmonary Arterial Hypertension: A Pyruvate Dehydrogenase

Kinase-Dependent Shift in Mitochondrial Metabolism Promotes Right Ventricular Fibrosis." *Circulation Research* (2020).

Potus, François, et al. "Novel Mutations and Decreased Expression of the Epigenetic Regulator TET2 in Pulmonary Arterial Hypertension." *Circulation* (2020).

Prins, Kurt W., et al. "Hypochloremia Is a Noninvasive Predictor of Mortality in Pulmonary Arterial Hypertension." *Journal of the American Heart Association* 9.5 (2020): e015221.

Dasgupta, Asish, et al. "An epigenetic increase in mitochondrial fission by MiD49 and MiD51 regulates the cell cycle in cancer: Diagnostic and therapeutic implications." *The FASEB Journal* (2020).

Wu, Danchen, et al. "Identification of novel dynamin-related protein 1 (Drp1) GTPase inhibitors: Therapeutic potential of Drpitor1 and Drpitor1a in cancer and cardiac ischemia-reperfusion injury." *The FASEB Journal* (2020).

Piao, Lin, et al. "Temporal Differences in the Cardioprotective Effects of Cardiomyocyte Specific Genetic Ablation of the Mitochondrial Fission Factor Dynamic Related Protein 1." *Circulation* 140.Suppl_1 (2019): A15597

Bonnet, S., et al. "Clinical value of non-coding RNAs in cardiovascular, pulmonary, and muscle diseases." *American Journal of Physiology. Cell physiology* 318.1 (2020): C1.

Xiong, Ping Yu, et al. "Biventricular increases in mitochondrial fission mediator (MiD51) and proglycolytic pyruvate kinase (PKM2) isoform in experimental group 2 pulmonary hypertension-novel mitochondrial abnormalities." *Frontiers in cardiovascular medicine* 5 (2019): 195.

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ABSTRACTS

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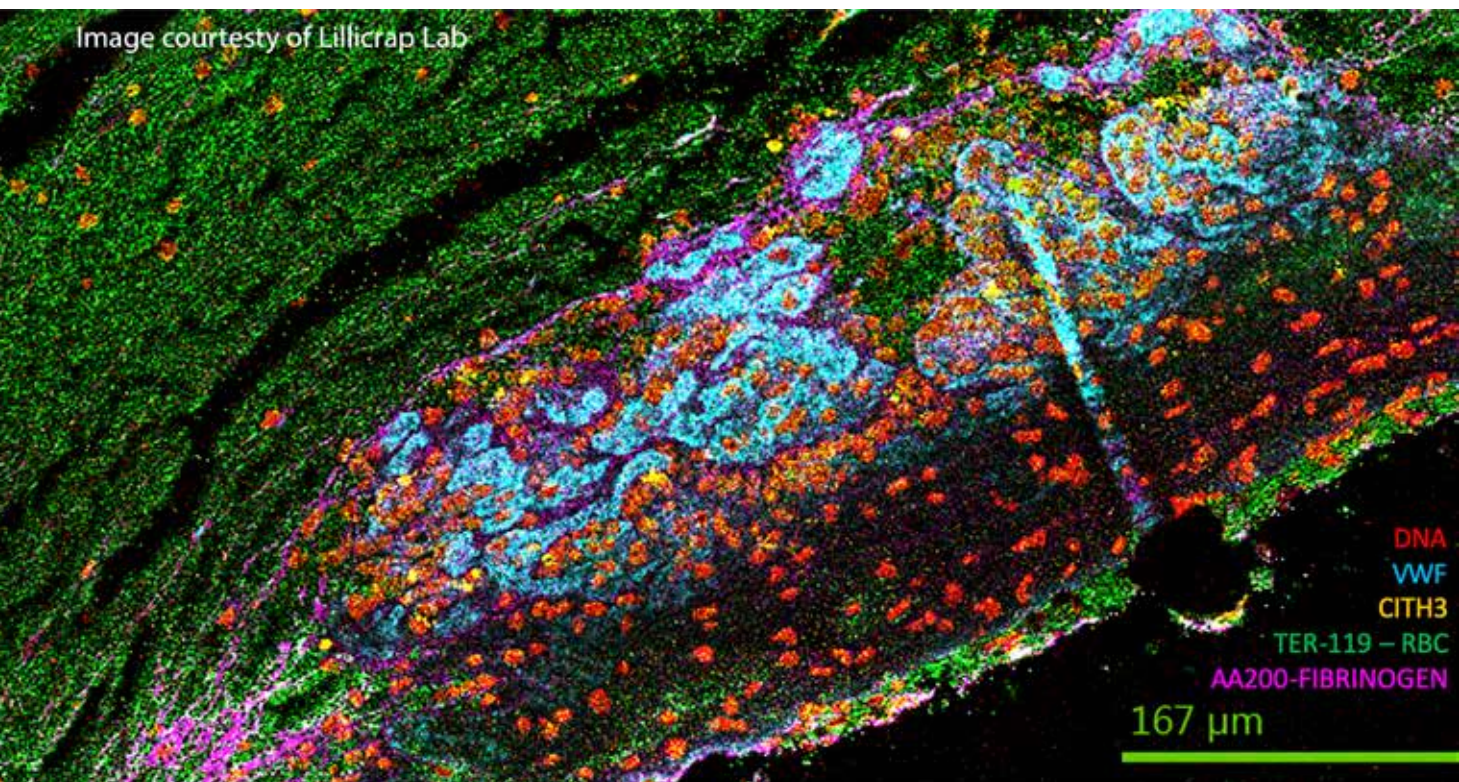
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What is on the horizon for QCPU?

Our main goal is to establish ourselves as the Tier 1 medical research facility at Queen's University. In 2020, we hope to become recognized as an official institute, with the objectives of establishing research excellence by continuing to conduct leading edge research that captures both national and international recognition, creating significant impact. QCPU is dedicated to the enhancement of local, national and international collaboration, and we hope to see an expanse of our metrics of success including increasing our publications, funding and research partnerships, and expanding our interdisciplinary and multi-faculty research while engaging in more community outreach and knowledge translation.



“ Over the past year, the Graham Lab has worked closely with the QCPU to generate preliminary data for a CIHR project grant. The state-of-the-art facilities and scientists at the QCPU are top-tier and together have provided our lab with the opportunity to explore and pursue novel and innovative research. In particular, with the technical and scientific expertise of Dr. Charlie Hindmarch, we have developed a 22-marker panel using the Hyperion Imaging System to interrogate the tumour immune microenvironment in non-muscle invasive bladder cancer. We anticipate that this panel will be useful for evaluating in situ immune contexture across a variety of normal and pathological tissues. We have also utilized the Sony SH800 cell sorter with Dr. Patricia Lima for a number of projects and continue to work closely with Dr. Hindmarch as we carry out proteomic and genomic experiments. Notably, Dr. Hindmarch has provided exceptional technical and scientific support throughout all of our ongoing projects with the QCPU and is highly dedicated to seeing projects through to completion.”

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