



Centre for
Heart Lung Innovation
UBC and St. Paul's Hospital

2023 ANNUAL REPORT

Established in 1977 by Drs. James Hogg and Peter Paré, the HLI is a University of British Columbia Senate-approved research centre located within St. Paul's Hospital in downtown Vancouver.

The Centre is now led by Dr. Don Sin (Director) and Dr. Jordan Guenette (Associate Director).

81 Principal Investigators and Associate Members

31 Research Associates and Postdoctoral Fellows

53 Graduate Students

50 Undergraduate Students

10 Visiting Scientists

59 Support, Operations, and Administrative Staff

17 Research Assistants



\$12.9 M in external funding*

\$8.5 M Peer-Reviewed Grants

\$1.2 M Clinical Trials

\$1.7 M Contracts and Agreements

\$1.5 M Salary Awards



>50,000 ft²
laboratory and office space

9 Core Facilities

- Cardiovascular and Lung Tissue Biobanks
- Cellular Imaging and Biophysics
- Histology
- Molecular Phenotyping
- Tissue Culture
- Pre-clinical Services
- Digital Slide Scanning and Imaging
- Magnetic Resonance Imaging
- Freezer Program

*April 2023 to March 2024. Details in [Appendix A](#).
Total funding held at HLI: \$7.3 M

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DIRECTOR'S MESSAGE

In 2022, we set out on an ambitious 5-year plan to enable **“exceptional care through exceptional science” and specifically to “improve the heart and lung health of the people of British Columbia, Canada and throughout the world”** (<https://www.hli.ubc.ca>). How have we done so far?

One way of gauging the performance of a research centre is to measure the number of publications and their impact on the field. To this end, HLI has done remarkably well. In 2023, HLI labs published 343 papers in peer-reviewed journals receiving more than 1,700 citations to date. The publications occurred in the very best journals in the world, including *Nature* (2022 impact factor (IF), 65), *Nature Medicine* (IF 83), *Lancet* (IF 167), *Lancet Respiratory Medicine* (IF 76), *Lancet Global Health* (IF 34), *JAMA Internal Medicine* (IF 39), *European Heart Journal* (IF 39), *European Respiratory Journal* (IF 25), *American Journal of Respiratory and Critical Care Med* (IF 25), and *JAMA Cardiology* (IF 24).

Another way of measuring impact is through grant successes and the number of students who have been trained at HLI. Using these traditional metrics, HLI has been extremely successful. In 2023, HLI investigators garnered close to \$13 million in funding (with over 60% of the funding coming from peer-review granting agencies). This is a remarkable achievement given the contemporary state of funding in Canada where success rates for CIHR grants are generally less than 15% (compared to 2000 when it was 33%) and the total CIHR funding envelope for biomedical and clinical research is less than \$800 million/year¹.

Training the next generation of researchers has also been HLI's strength. Collectively, HLI labs trained 53 graduate students and 50 undergraduate students, along with 31 post-doctoral fellows (PDFs) and research associates as well as multiple visiting scholars in 2023. Importantly, these figures go against the current secular trend in the STEM (Science, Technology, Engineering and Math) student enrollment across Canada, which has been stagnant over the past 10 years². Student training is crucial for the survival of medical research in Canada, and currently, Canada has the second fewest scientists per capita among all OECD (Organization for Economic Cooperation and Development) countries in the world².

Impact on Patient Care

HLI investigators contributed to the publication of the Canadian Thoracic Society's Guidelines on (optimal) pharmacotherapy in COPD and the 2023 Global initiative for chronic Obstructive Lung Disease (GOLD) statement on best practices for COPD management throughout the world^{3,4}. They also co-published several guidelines on the care of patients living with interstitial lung disease (ILD) and patients who have combined COPD and ILD⁵⁻⁷. These new guidelines will enable optimization of care for the thousands of patients in British Columbia living with COPD and/or ILD. In cystic fibrosis (CF), Dr. Bradley Quon is the medical director of the CF Canada Accelerating Clinical Trials Network, which, in collaboration with international CF experts, outlined a novel process to catalyze new treatment discoveries in CF⁸. Dr. Mari DeMarco is leading a national effort to finding biomarkers for the early and accurate diagnosis of Alzheimer's disease, which will revolutionize the care for this devastating disorder that affects over 700,000 Canadians and is responsible for \$10 billion/year in health care expenditures⁹. Dr Pat Camp is leading a national, multidisciplinary team of clinicians, researchers, patient partners and health authority decision-makers called SPIRO, whose purpose is to improve access to and use of spirometry services in remote, rural and Indigenous communities in BC. There are other impactful stories of how HLI research is improving patient care; these can be found @ <https://www.hli.ubc.ca>. More to come in 2024.

Congratulations and Thank You

I'd like to thank the incredible staff at the HLI, who enable the success of our labs, trainees and programs. These include (but not limited to) our outstanding staff in: operations, finance, human resources, biobanking, grants support, GEM, molecular and cellular phenotyping, clinical research, maintenance and facilities, education/safety, microscopy, administration, computation and information technology and many more. You are the engine that makes HLI go (and go fast!). A special shout-out goes to the HLI Trainee Association (TAHLI), which has been incredible in enhancing the educational experience at HLI and making HLI a special place for all trainees.

I'd like to also thank Providence Research (PR), Faculty of Medicine (FoM) at UBC, and Providence Health Care (PHC), particularly Dr. Darryl Knight, PR President and VP of Research at PHC, and Dr. Rob McMaster, Executive VP of Research, UBC FoM, who have been unconditional in their support of the HLI over many years and enabled the Centre to be a leading translational unit in heart and lung disease in Canada. I also give thanks to the Faculty of Health Sciences at SFU, St. Paul's Foundation, CIHR and other funding agencies, who have provided financial support for all the labs at HLI. Together they have enabled HLI to grow and prosper during really challenging times for biomedical and clinical research in Canada.

Plans for 2024 and beyond

The HLI is committed to conducting research that is both innovative and impactful, pushing the boundaries of translational research. In 2024, the HLI will grow from strength to strength, adding 3 more labs (3-D cardiovascular bioprinting; CV Physiology; and functional MRI and data science) beyond the 7 we have already added in the past 5 years, bringing our total to more than 40 labs at HLI by the end of 2024. We will also officially start the process of designing the new labs at the CSRC (Clinical Support and Research Centre), which will be a state-of-the-art new building (370,000 square feet) on Station Street, directly adjacent and connected to the new St. Paul's Hospital. It will be the new home of HLI for the next 100 years!

Charles Kettering, a giant in the automotive industry, once said: ***"If you have always done it that way, it is probably wrong"***. Research is the key to innovation and innovation is the key to "doing things differently and for the better". HLI stands at the intersection of where ***"science meets patient care"*** and ***"science and compassion collide"***, and at the forefront of new innovations in the prevention and treatment of patients with heart and lung disease.

Yours sincerely,

Don D. Sin, MD
Director and the de Lazzari Family Chair at HLI
Tier 1 Canada Research Chair in COPD
Professor of Medicine, UBC



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2. Archer SD. Funding Science In Canada: How Two Decades Of Stagnant Grant Funding Has Rendered Canada Non-Competitive In The Biomedical Science And Medical Research Sector. Available at <https://deptmed.queensu.ca/dept-blog/funding-science-canada-how-two-decades-stagnant-grant-funding-has-rendered>
3. Agustí A, Celli BR, Criner GJ, et al. Global Initiative for Chronic Obstructive Lung Disease 2023 Report: GOLD Executive Summary. *The European respiratory journal* 2023; **61**(4).
4. Bourbeau J, Bhutani M, Hernandez P, et al. 2023 Canadian Thoracic Society Guideline on Pharmacotherapy in Patients With Stable COPD. *Chest* 2023; **164**(5): 1159-83.
5. Raghu G, Remy-Jardin M, Richeldi L, et al. Idiopathic Pulmonary Fibrosis (an Update) and Progressive Pulmonary Fibrosis in Adults: An Official ATS/ERS/JRS/ALAT Clinical Practice Guideline. *American journal of respiratory and critical care medicine* 2022; **205**(9): e18-e47.
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7. Cottin V, Selman M, Inoue Y, et al. Syndrome of Combined Pulmonary Fibrosis and Emphysema: An Official ATS/ERS/JRS/ALAT Research Statement. *American journal of respiratory and critical care medicine* 2022; **206**(4): e7-e41.
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9. Translating research into practice: Investigating the impact of Alzheimer's disease diagnostics in Canada (IMPACT-AD). Available at <https://www.impactad.org/>

Board of Directors

CEO

Providence Research

Faculty of Medicine



Centre for
Heart Lung Innovation
UBC and St. Paul's Hospital

Associate Director

HLI Director

Operations Director

HLI Executive Committee

Biobank Director/Committee

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BMCB

JHLB

Others

Smaller CV Biobanks

Smaller Pulm Biobanks

Other Smaller Biobanks

Molecular Phenotyping

Cellular Imaging

Preclinical Services/GEM

Tissue Culture Core

Histology

Clinical Research

Maintenance & Facilities

Safety/Education

Clinical Imaging/Security

Centre Administration

Scientific Review

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Communications

Recruitment & Retention

Partnerships

Equity, Diversity, Inclusion

Finance

Human Resources

Computation & Information Technology

Education Director

Education & Mentoring

Training, Education & Environment

HLI Trainee Association (TAHLI)



RESEARCH SPOTLIGHTS

IDENTIFYING CELLS THAT CAUSE INITIAL AIRWAY DESTRUCTION IN COPD

Previous research conducted at HLI by Dr. Tillie Hackett and her team found that by the time people are diagnosed with mild chronic obstructive pulmonary disease (COPD), more than 40 per cent of the smallest airways in the lungs are already destroyed. Now, they have identified the cells responsible for this small airway destruction and published these findings in the [American Journal of Respiratory and Critical Care Medicine](#).

COPD is the third leading cause of death worldwide. About 380 million people live with it globally and each day, they struggle simply to breathe. The disease is commonly associated with risk factors, such as smoking, exposure to air pollution, and genetic predisposition.

Understanding the cells involved in small airway loss can lead to more effective treatments for COPD patients, says Dr. Tillie Hackett, Professor at UBC and PI at HLI. “This is the closest we have come to finding a way to potentially prevent COPD,” says Dr. Hackett, who is also a Tier I Canada Research Chair in Asthma and COPD Lung Pathobiology.





Dr. Tillie Hackett

Using lung tissue samples donated by 40 COPD patients to the lung biobank at St. Paul's Hospital, Dr. Hackett and her team performed high-resolution imaging studies to investigate small airway disease at the single-cell level.

The authors found that in patients with COPD, there is a progressive loss of alveolar attachments that normally hold the small airways open. "Airways are like flexible pipes that bring air in and out of the lung, and the alveolar attachments are like cables that attach to the airway wall and hold it open," says Dr. Hackett. Without these attachments, the airways collapse and airflow is obstructed. This makes breathing difficult.

"By using these imaging techniques, we have been able to identify the specific cell types involved in the inflammatory response that destroys the small airways," says Dr. Steven Booth, first author of the publication and PhD student in Dr. Hackett's lab.

For the American Journal of Respiratory and Critical Care Medicine study, the authors created a single-cell "atlas" of COPD small airways using imaging mass spectrometry. This technology is the first of its kind in Western Canada and was in part funded by the St. Paul's Foundation. By using this equipment, every cell within a disease lesion can be studied all at once, whereas previously researchers could only look at one cell at a time. Dr. Booth says this technology now enables us to create a map of a disease lesion to understand which cells are causing the damage.

This article was first published in [The Daily Scan](#).



Dr. Steven Booth

'KETO-LIKE' DIET MAY BE LINKED TO INCREASED RISK OF HEART DISEASE

Low carb, high fat diets, also called keto diets, have been gaining popularity as a quick way to lose weight. It involves consuming very low levels of carbohydrates, like bread, rice, pasta, and other grains, and high levels of fat, to induce the body into a 'ketogenic' state, using fats instead of carbohydrates as the primary energy source.

However, a recent study by Dr. Iulia Iatan, MD, PhD, and physician scientist at the Healthy Heart Program and Centre for Heart Lung Innovation and a postdoctoral fellow under the supervision of Dr. Liam Brunham, showed that a keto-like diet may be associated with increased risk of cardiovascular events such as chest pain, blocked arteries, heart attack, and stroke. Dr. Iatan used data from the UK Biobank, and identified 305 individuals who reported consuming less than 25% of daily calories from carbohydrates, and more than 45% of calories from fats. This is in contrast with strict keto diets that consist of less than 10% carbohydrates and 60-80% in fats.

Compared to individuals who reported a more balanced diet, those on a keto-like diet had higher levels of LDL cholesterol, or "bad" cholesterol, which is a known risk factor for heart disease. After more than 10 years of follow-up, 9.8% of people on a keto-like diet experienced a new cardiac event, such as artery blockage, heart attack, stroke and peripheral arterial disease, compared to 4.3% of those on a standard diet, representing more than a doubling of cardiovascular risk.



Dr. Iulia Iatan

"The findings suggest that people who are considering going on a low carb, high fat diet should be aware that doing so could lead to an increase in their levels of LDL cholesterol. Before starting this dietary pattern, they should consult a health care provider. While on the diet, it is recommended they have their cholesterol levels monitored and should try to address other risk factors for heart disease or stroke, such as diabetes, high blood pressure, physical inactivity and smoking." -- Dr. Iulia Iatan, first author on the study

However, not everyone responds to these diets in the same way, and the data relied on an individual's self-report of their dietary patterns at one point in time, which does not capture information about dietary changes over time. As an observational study, these findings cannot definitively prove that keto-like diets directly cause cardiovascular disease, but highlights the need for further research to understand the risks and benefits of these diets.

This study was presented as a late breaking [abstract](#) at the American College of Cardiology Conference, and has been reported on the [CNN](#).

BIOMARKERS FOR LONG COVID DIAGNOSIS



The aftermath of COVID

Between 5-50% of COVID-19 survivors are estimated to develop long-COVID (LC), which includes diverse symptoms that can last months after the initial SARS-CoV-2 infection. These symptoms can involve the entire body, including the respiratory, neurological, cardiovascular, and gastrointestinal systems, and can be debilitating, greatly affecting the quality of life of individuals with LC and their families. Although the symptoms are well described, the cause of LC remains unclear, and consequently, many patients are undiagnosed and not properly treated. Identification of LC-specific biomarkers is therefore paramount to improving diagnosis and clinical management of the syndrome.

Understanding the current literature

Estefanía Espín, a Ph.D. student in Dr. Scott Tebbutt's lab, and a Mitacs Accelerate intern at the PROOF Centre of Excellence, undertook a scoping review to describe the molecular and cellular biomarkers identified to date with potential use for diagnosis or prediction of LC. A scoping review is a way to present an overview of the large and diverse body of literature surrounding long-COVID research. This [review](#) was published in eBioMedicine, part of the Lancet Discovery Science series.

Conducted using the Joanna Briggs Institute (JBI) Methodology for Scoping Reviews, Espín, and colleagues, including Dr. Chengliang Yang at HLI, performed a search in the MEDLINE and EMBASE databases, as well as in the grey literature for original studies, published until October 5th, 2022, reporting biomarkers identified in participants with LC symptoms (from all ages, ethnicities, and sex), with a previous infection of SARS-CoV-2.

Potential biomarkers for long-COVID

In total, 23 cohort studies were identified, involving 2163 LC patients [median age 51.8 years, predominantly female sex (61.10%), white (75%), and non-vaccinated (99%)]. A total of 239 candidate biomarkers were identified, consisting mainly of immune cells, immunoglobulins, cytokines, and other plasma proteins. The candidate biomarkers compiled in the review point to LC resulting from an uncontrolled immune response, triggered by the initial viral infection, and

characterized by specific immune signatures.

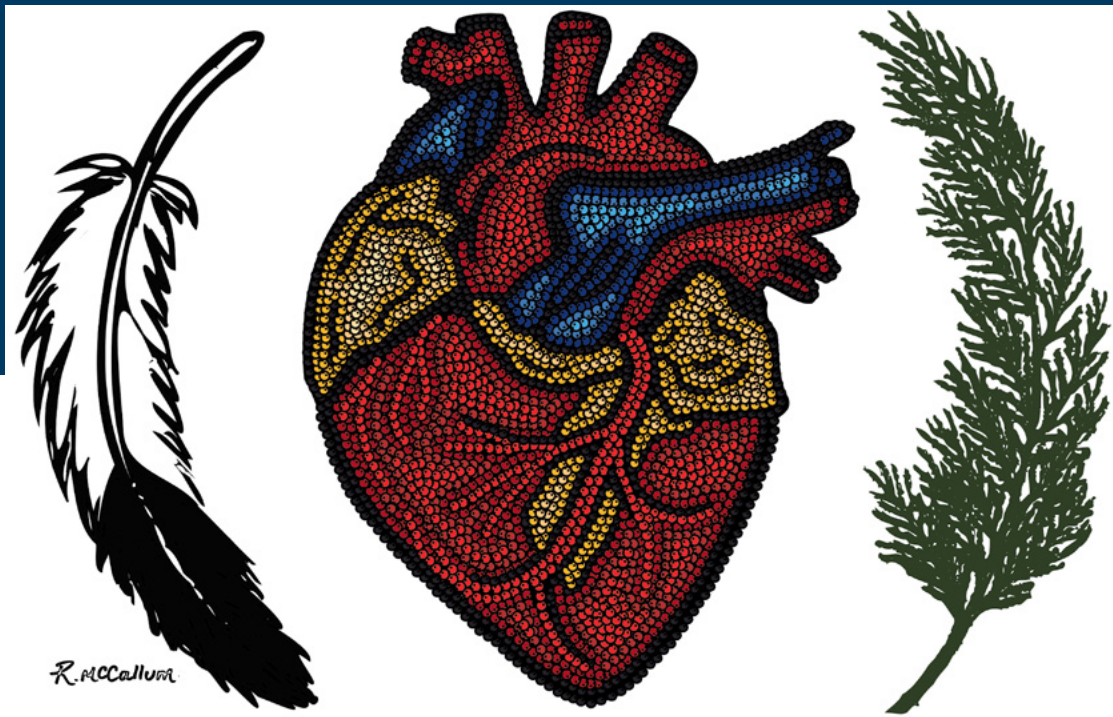
“An optimal biomarker should be objectively quantifiable, sensitive and specific, easily adapted into routine clinical practice, and detectable in easily accessible specimens. The pool of candidate biomarkers reported in my review were detected in blood samples and therefore could be established in quantifiable assays for clinical practice.” -- Estefanía Espín.

Next steps

Given the large number of biomarkers identified, more work is needed to identify those which could be used to stratify risk at SARS-CoV-2 infection onset, confirm LC diagnosis, and/or identify subsets of patients for specific interventions. This is work that Estefanía will continue during her Ph.D. project.

“As I continue my Ph.D. project, I will conduct qualitative research to inquire about the perspectives of long-COVID patients and clinicians about their needs in biomarkers research. Thus, the scoping review together with the qualitative research will allow me to have a complete landscape about LC biomarkers resulting in a relevant clinical question to be answered by biomarker development from molecular and cellular data.”





ESTIMATING THE PREVALENCE OF HIGH CHOLESTEROL IN INDIGENOUS POPULATIONS

The dangers of high cholesterol

High cholesterol, also known as hypercholesterolemia, is a common condition defined by high levels of cholesterol called LDL-cholesterol in the body. Familial hypercholesterolemia (FH), which occurs when high cholesterol is caused by genetics, affects around 1 in 350 people worldwide, making it one of the most common inherited conditions affecting the heart and blood vessels. Elevated cholesterol can significantly increase the risk of developing heart disease.

Studying high cholesterol in Indigenous populations

Indigenous populations have higher rates of heart disease compared to non-Indigenous populations; however, it is not clear how much high cholesterol contributes to this burden. To address this, Rylan McCallum, an Indigenous graduate student in the UBC Experimental Medicine Program (supervised by Dr. Liam Brunham), conducted a study to estimate the prevalence of high cholesterol in Indigenous populations in Canada, the United States, Australia, and New Zealand. A review of 3961 articles yielded no studies in the literature reporting the prevalence of genetic high cholesterol (FH), and only one article reporting the prevalence of severe hypercholesterolemia in Indigenous populations.

Compiling data from all of these studies, the team found that the overall prevalence of high cholesterol in Indigenous populations was 28.9%, which means approximately 1 in 3 to 1 in 4 Indigenous individuals had high cholesterol. In North America, the prevalence was 24.3%, while in Australia it was 40.0%. These findings demonstrate that high cholesterol is very common in Indigenous communities and may contribute to the high rates of heart disease they experience.

What's next?

“These findings show there is a clear gap in research on FH and severe hypercholesterolemia in Indigenous populations around the world. The next steps in our research are to further investigate how high cholesterol and heart disease impacts Indigenous communities and to push for the inclusion of Indigenous patients in medical registries and clinical trials that may help optimize screening and treatment of high cholesterol in Indigenous populations.” -- Rylan McCallum.

This study was published in [JACC: Advances](#) with an accompanying [editorial](#).





Dr. Ana Hernandez Cordero

DRS. ANA HERNANDEZ CORDERO AND YASIR MOHAMUD RECEIVE CIHR REDI AWARD

The launch of the CIHR Research Excellence, Diversity, and Independence (REDI; pronounced "ready") Early Career Transition Award was designed to facilitate the transition of promising researchers who self-identify as Black or racialized women into independent research faculty positions in Canadian academic, health system and research institutions. The competition sought to address underrepresentation in Canadian faculty, and is directly aligned with the Government of Canada and Tri-agency priorities to address systemic racism, sexism, and discrimination in Canadian institutions.

And now, two of HLI's postdoctoral fellows, **Dr. Ana Hernandez Cordero** and **Dr. Yasir Mohamud**, have received the award and will each be receiving up to \$660,000 to support their training to become independent investigators over the next 3-6 years!

The REDI award will provide salary support for the next few years of their postdoctoral training, as well as matching funds that can be leveraged towards their independent research program.



Dr. Yasir Mohamud

What is your research about?

Ana: The current focus of my research is on epigenetic aging, a marker of biological age, and its relationship with Chronic Obstructive Pulmonary Disease (COPD) in People Living with the Human Immunodeficiency Virus (HIV). My findings have shown for the first time that the lungs of people living with HIV and COPD are characterized by age acceleration. More recently, my work has focused on whether other modifiable environmental factors (such as exercise and cannabis smoking) can affect epigenetic aging and change the risk of age-related diseases. As an independent researcher, the REDI award will allow me to continue pursuing my interests in investigating the epigenetic and molecular regulation of aging and the impact of aging in the development and progression of complex chronic diseases. I will apply a computational approach to multiple Canadian cohorts to advance the current knowledge on aging in a way that reflects the diversity of the Canadian population.

Yasir: As an early career investigator, my research is focused on establishing a translational virology program that leverages my unique expertise in molecular virology and cell biology to explore novel and effective therapeutic strategies against RNA viruses which are broadly responsible for the world's greatest pandemics. My current research interest is to better understand how cardiotropic viruses, such as coxsackievirus B3, cause heart failure in at-risk individuals. Additionally, my research will explore the interactions between everyday viral infections and chronic illnesses of the aging population, with relevance to cardiovascular and neurodegenerative diseases, eventually expanding to include other emerging viral pathogens, such as coronaviruses.

How will this award help you transition to an independent academic career after your postdoctoral training?

Ana: In the short term my goal is to continue building a strong foundation and track record in the aging field so that I can establish an independent laboratory after my postdoctoral training. The support of the REDI award will be central to continuing my training at the UBC Centre for Heart Lung Innovation, a world-renowned research institution. In the next few years, I expect to grow my professional network, establish myself as a field expert by advancing the field of aging in the context of health and human disease, and start securing funding for my independent research lab.

Yasir: With the support of the CIHR REDI Award, I see myself transitioning to an early career academic position within the next 2-3 years. The REDI Award will provide me with the necessary mentorship support, networking and leadership opportunities, and initial start-up funds to help establish my independent laboratory in Canada. I am eager to embark on this next phase of my academic career, transitioning to independence and making significant contributions to both health research and education in Canada.

How do you see this new CIHR initiative addressing underrepresentation in Canadian faculty?

Ana: As a racialized woman in biomedical sciences, I recognize the current underrepresentation of racialized groups in research and academia, and its negative impact on public health. Through the support of the CIHR REDI award, racialized young researchers, such as myself, have a unique opportunity to help close this gap to fully reflect the interests of Canadians. In my view, initiatives that promote the recruitment of underrepresented faculty through tangible actions (mentorship, networking, and matching funds), such as the CIHR REDI award and our own UBC Black Faculty Cohort Hiring Initiative, are contributing to increased representation of Black faculty and other racialized groups across Canadian universities. Recognizing the importance of different voices, perspectives, backgrounds and the rich experiences and contributions that diverse people can offer, I am dedicated to studying the under-researched aspects of tobacco smoking: sex, gender, and racialized groups, such as Indigenous, as well as LGBTQ+ communities. As I build my laboratory, I aim to implement practices to promote EDI and to create a safe, inclusive, and creative environment. I will encourage the free flow of ideas in a constructive and respectful manner, and promote continuing EDI education within my research team in order to overcome individuals' unconscious biases, amongst other approaches.

Yasir: In recent years, I have seen a visible effort and commitment to addressing systemic inequities at Canadian institutions through thoughtful and strategic initiatives. Among these, the CIHR REDI program promises to have a strong and meaningful impact in addressing inequity by providing support to those most underrepresented in our academic communities. As an underrepresented individual, I have faced unique challenges and obstacles in my academic journey but I am grateful to say that the research environments where I have worked have been inclusive towards all and provided support to diverse trainees. I'm proud to see UBC and the Centre for Heart Lung Innovation working together with initiatives, such as the CIHR REDI program, to recruit and retain underrepresented researchers like myself. Building on the success of this program, I believe we have the tools and support to build a diverse and thriving research environment not only for students and trainees but also early career researchers and young investigators seeking to establish independent research programs. Although we face many challenges as early career researchers (for example, access to funding and research space), I believe our commitment to EDI initiatives will bring together a diverse group of thinkers and leaders that can share unique perspectives in addressing the obstacles ahead. For this reason, I hope to build an inclusive research team that values and promotes diversity in my future independent lab.

40 PRINCIPAL INVESTIGATORS

Michael Allard
Pascal Bernatchez
John Boyd
Liam Brunham
Pat Camp
Chris Carlsten
Denise Daley
Mari DeMarco
Del Dorscheid
Gordon Francis
David Granville
Jordan Guenette
Ilker Hacihaliloglu
Tillie Hackett
James Hogg
Graeme Koelwyn
Andrew Krahn
Zachary Laksman
Jonathon Leipsic
Janice Leung
Honglin Luo
Paul Man
Bruce McManus
Kelly McNagny
Peter Paré
Brad Quon
James Russell
Chris Ryerson
Andrew Sandford
Stephanie Sellers
Chun Seow
Don Sin
Amrit Singh
Wan-Cheng Tan
Scott Tebbutt
Andrew Thamboo
Stephan van Eeden
Keith Walley
Ying Wang
Decheng Yang

41 ASSOCIATE MEMBERS

Jamil Bashir
Philipp Blanke
Emily Brigham
Sammy Chan
Karen Cheung
Colin Collins
Ed Conway
Harvey Coxson
Raouf Dridi
James Dunne
Jeremy Hirota
Iulia Iatan
Andrew Ignaszewski
Kevin Keen
Miranda Kirby
Ismail Laher
Chi Lai
Scott Lear
Samuel Lichtenstein
John Mancini
Stephen Milne
Yannick Molgat-Seon
Ed Moore
Raymond Ng
Ma'en Obeidat
Emmanuel Osei
Simon Pimstone
Alan Rabinowitz
Jonathan Rayment
Fabio Rossi
Mohsen Sadatsafavi
Robert Schellenberg
Michael Seidman
Bill Sheel
Peter Skaarsgard
Stacey Skoretz
Steven White
Pearce Wilcox
David Wood
Jian Ye
Xuekui Zhang

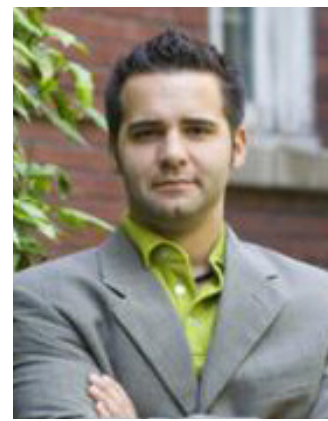


Dr. Michael Allard
mike.allard@pathology.ubc.ca

Dr. Allard's program focuses on adaptation of the heart to physiological states, such as endurance exercise and pathological processes, like hypertension, that result in cardiac hypertrophy.

Dr. Pascal Bernatchez
Pascal.Bernatchez@hli.ubc.ca

Dr. Bernatchez's research program is aimed at the dynamic interplay between blood vessel homeostasis and chronic diseases such as hypertension and atherosclerosis.

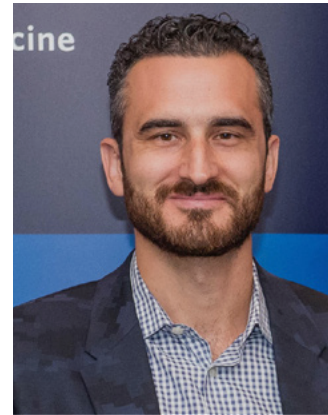


Dr. John Boyd
John.Boyd@hli.ubc.ca

Dr. Boyd's clinical research program is focused on defining and reversing the elements of the host response that causes sudden organ failure during severe infection.

Dr. Liam Brunham
liam.brunham@ubc.ca

Dr. Brunham's research focuses on understanding how genetic variation contributes to abnormalities in lipid levels and risk for cardiovascular disease as well as response to medications.



Dr. Pat Camp
Pat.Camp@hli.ubc.ca

Dr. Camp's research focuses on improving health outcomes of people with chronic lung disease, with a particular focus on Indigenous lung health.

Dr. Chris Carlsten
carlsten@mail.ubc.ca

Dr. Carlsten's clinical and research interests centre on occupational airways disease, including the effects of inhaled exposures on asthma induction and exacerbation.



Dr. Denise Daley
Denise.Daley@hli.ubc.ca

Dr. Daley studies how inherited genetic variants and environmental exposures interact to modify the risk for developing diseases.

Dr. Mari DeMarco
mari.demarco@ubc.ca

Dr. DeMarco's research group specializes in the discovery, design and implementation of protein-based diagnostics for neurodegenerative disorders and beyond.





Dr. Michael Allard
Del.Dorscheid@hli.ubc.ca

Dr. Dorscheid leads an active research group investigating the role of the airway epithelium in the genesis of inflammatory airways diseases.

Dr. Gordon Francis
Gordon.Francis@hli.ubc.ca

Dr. Francis's research involves understanding the mechanisms of cholesterol accumulation in atherosclerosis and how to remove it to prevent coronary heart disease and stroke.



Dr. David Granville
David.Granville@hli.ubc.ca

Dr. Granville researches vascular injury, inflammation and remodeling in the context of atherosclerosis, transplant vasculopathy, atherosclerosis, and ischemia and reperfusion injury.

Dr. Jordan Guenette
Jordan.Guenette@hli.ubc.ca

Dr. Guenette's research program aims to better understand the physiological factors that limit exercise tolerance across the spectrum of health and chronic respiratory disease.



Dr. Ilker Hacihaliloglu
Ilker.Hacihaliloglu@ubc.ca

Dr. Hacihaliloglu develops AI learning methods for processing medical image data on neurosurgery, liver disease, orthopedic surgery, lung disease, and interventional radiology.

Dr. Tillie Hackett
Tillie.Hackett@hli.ubc.ca

Dr. Hackett's research program focuses on the disruption of normal repair processes within the epithelial-mesenchymal trophic unit of the lung.



Dr. James Hogg (Emeritus)
Jim.Hogg@hli.ubc.ca

Dr. Hogg maintains an active research program focused on the inflammatory process in the lung, with particular reference to the structure and function of the lungs in COPD.

Dr. Graeme Koelwyn
Graeme.Koelwyn@hli.ubc.ca

The Koelwyn lab applies knowledge translation and omics to understand how heart, lung and oncologic diseases communicate with each other through immune-specific mechanisms.





Dr. Andrew Krahn
akrahn@mail.ubc.ca

Dr. Krahn investigates the genetic causes of arrhythmias, sudden cardiac arrest, syncope and implantable arrhythmia devices.

Dr. Zachary Laksman
zlaksman@mail.ubc.ca

Dr. Laksman's research focus is on the genetic basis for diseases of the heart muscle, heart rhythm, and causes of sudden cardiac death.



Dr. Jonathon Leipsic
jleipsic@providencehealth.bc.ca

Dr. Leipsic's program is at the forefront of advanced imaging for structural heart disease, researching acute myocardial infarction, sudden cardiac death, and COPD exacerbations.

Dr. Janice Leung
Janice.Leung@hli.ubc.ca

Dr. Leung is studying the clinical outcomes, manifestations, and underlying mechanisms of HIV-associated chronic obstructive pulmonary disease.



Dr. Honglin Luo
Honglin.Luo@hli.ubc.ca

The focus of Dr. Luo's research program is to define the molecular and pathogenetic determinants of virus-host interactions in enterovirus-induced cardiac and neurodegenerative diseases.

Dr. S.F. Paul Man (Emeritus)
Paul.Man@hli.ubc.ca

Dr. Man's research expertise is in clinical trials and translational research, particularly in COPD, and AIDS/HIV.



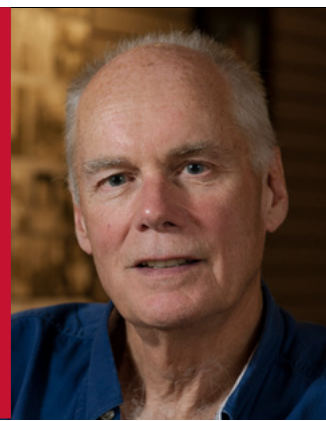
Dr. Bruce McManus (Emeritus)
Bruce.McManus@hli.ubc.ca

Dr. McManus studies heart allograft rejection; its mechanisms, detection, and monitoring, as well as issues related to enteroviral damage of myocardium as a pathway to heart failure.

Dr. Kelly McNagy
kelly@brc.ubc.ca

Dr. McNagy's research program is focused on hematopoietic stem cell biology and their implications in chronic allergy, asthma, and other inflammatory diseases.



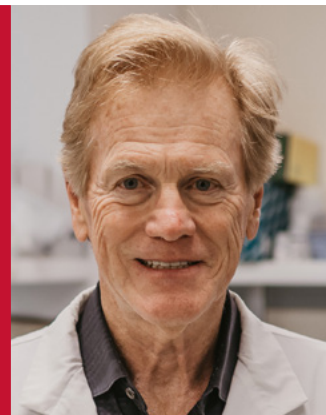


Dr. Peter Paré (Emeritus)
Peter.Pare@hli.ubc.ca

Dr. Paré's research expertise is in the pathophysiology and genetics of asthma and COPD, having studied the genetic control of gene expression in the lung and blood of COPD patients.

Dr. Bradley Quon
Bradley.Quon@hli.ubc.ca

Dr. Quon's research is dedicated to developing tools to diagnose and monitor conditions that complicate the lives of individuals living with cystic fibrosis.



Dr. James Russell
Jim.Russell@hli.ubc.ca

Dr. Russell does his research on randomized controlled trials in patients with septic shock and COVID-19, their biomarkers, and the interaction of diabetes and sepsis/septic shock.

Dr. Chris Ryerson
Chris.Ryerson@hli.ubc.ca

Dr. Ryerson's research focuses on the diagnosis, management, and prognostication of pulmonary fibrosis.



Dr. Andrew Sandford
Andrew.Sandford@hli.ubc.ca

The focus of Dr. Sandford's research is the genetic basis of obstructive lung disease. He identifies genetic risk factors for the development of asthma, peanut allergy, and COPD.

Dr. Stephanie Sellers
Stephanie.Sellers@hli.ubc.ca

Dr. Sellers' research focuses on valvular heart disease and bioprosthetic heart valve degeneration as well as the development of new imaging techniques for cardiovascular disease.



Dr. Chun Seow
Chun.Seow@hli.ubc.ca

Dr. Seow's research focus is on the mechanical function, ultrastructure and biochemistry of airway and vascular smooth muscle in health and disease.

Dr. Don Sin
Don.Sin@hli.ubc.ca

Dr. Sin's research is geared towards biomarker discovery in COPD and related conditions such as lung cancer, ischemic heart disease and stroke.





Dr. Amrit Singh
amrit.singh@hli.ubc.ca

Dr. Singh's research focuses on the identification of biomarkers for heart and lung disease such as asthma and heart failure using high throughput biological ("omics") datasets.

Dr. Wan-Cheng Tan
Wan.Tan@hli.ubc.ca

Dr. Tan's research interests include the prevalence, mortality and risk factors of hospitalization in COPD and the implementation of asthma guidelines.



Dr. Scott Tebbutt
Scott.Tebbutt@hli.ubc.ca

Dr. Tebbutt's research program is focused on the molecular and cellular understanding of inflammatory disorders of the lung, allergic rhinitis, heart failure, and neonatal vaccinology.

Dr. Andrew Thamboo
researchdirector@stpaulssinuscentre.com

Dr. Thamboo's research interests span the areas of unified airway hypothesis, upper airway physiology, office-based rhinology, personalized medicine, and outcomes research.



Dr. Stephan van Eeden (Emeritus)
Stephan.vanEeden@hli.ubc.ca

Dr. van Eeden's research program focuses on the mechanisms of lung inflammation caused by infection and inhalation exposures, particularly cigarette smoking and air pollution.allergy, and COPD.

Dr. Keith Walley
Keith.Walley@hli.ubc.ca

Dr. Walley translates basic discoveries into clinical practice in the ICU, investigating organ failure during sepsis and the impact of genotype on patient outcomes in systemic inflammatory states.



Dr. Ying Wang
Ying.Wang@hli.ubc.ca

Dr. Wang's research is focused on studying cell-cell and cell-microenvironment interactions to determine why diseased cells accumulate in the atherosclerotic lesions and methods of their removal.

Dr. Decheng Yang (Emeritus)
Decheng.Yang@hli.ubc.ca

Dr. Yang's research programs focus on the molecular biology and pathogenesis of coxsackievirus B3 (CVB3)-induced myocarditis.



ASSOCIATE MEMBERS



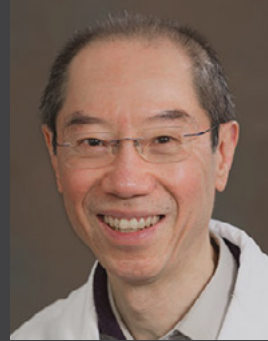
Dr. Jamil Bashir
Surgery, UBC



Dr. Philipp Blanke
Radiology, UBC



Dr. Emily Brigham
Medicine, UBC



Dr. Sammy Chan
Medicine, UBC



Dr. Karen Cheung
Biomedical
Engineering, UBC



Dr. Colin Collins
Urologic Sciences,
UBC



Dr. Ed Conway
Medicine, UBC



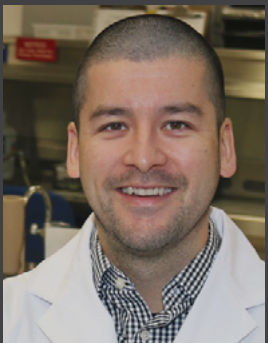
Dr. Harvey Coxson
Boehringer
Ingelheim



Dr. Raouf Dridi
Quantum
Computing



Dr. James Dunne
Medicine, UBC



Dr. Jeremy Hirota
Medicine,
McMaster



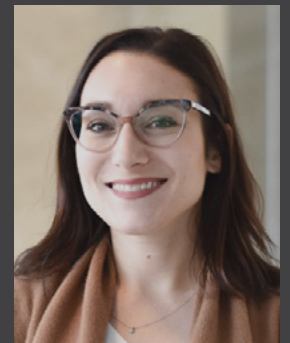
Dr. Iulia Iatan
Healthy Heart,
UBC



Dr. Andrew Ignaszewski
Medicine, UBC



Dr. Kevin Keen
Mathematics,
UNBC



Dr. Miranda Kirby
Physics, Toronto
Metropolitan





Dr. Ismail Laher
Anesthesiology,
UBC



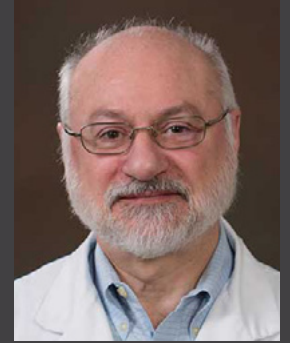
Dr. Chi Lai
Pathology, UBC



Dr. Scott Lear
Health Sciences,
SFU



**Dr. Samuel
Lichtenstein**
Surgery, UBC



Dr. John Mancini
Medicine, UBC



Dr. Stephen Milne
Medicine and
Health, U. Sydney



**Dr. Yannick
Molgat-Seon**
U. Winnipeg



Dr. Ed Moore
Physiology, UBC



Dr. Raymond Ng
Computer Science,
UBC



Dr. Ma'en Obeidat
Novartis



**Dr. Emmanuel
Osei**
Biology, UBCO



**Dr. Simon
Pimstone**
Medicine, UBC



**Dr. Alan
Rabinowitz**
Cardiology, UBC



**Dr. Jonathan
Rayment**
Pediatrics, UBC



Dr. Fabio Rossi
Biomedical
Engineering,
UBC



Dr. Mohsen Sadatsafavi
Pharmaceutical Sciences, UBC



Dr. Robert Schellenberg
Medicine, UBC



Dr. Michael Seidman
UHN



Dr. Bill Sheel
Kinesiology, UBC



Dr. Peter Skaarsgard
Surgery, UBC



Dr. Stacey Skoretz
Audiology, UBC



Dr. Steven White
Pathology, UBC



Dr. Pearce Wilcox
Medicine, UBC



Dr. David Wood
Medicine, UBC



Dr. Jian Ye
Surgery, UBC



Dr. Xuekui Zhang
Mathematics, UVic

41 Associate Members

12 Institutions in Academia and Industry

18 Departments and Specialities



PI GRANTS

AWARDED IN 2023

Canada Foundation for Innovation

Dr. Honglin Luo (Co-Project Leader)
Transformative and disruptive systems immunology

CIHR/CCNA Knowledge Translation and Exchange Program

Dr. Mari DeMarco
On-demand continuing medical education on Alzheimer's CFS biomarkers

CIHR Project Grant

Dr. Jordan Guenette
Physiological and morphological mechanisms of increased dyspnea in females with COPD

Dr. Janice Leung
Accelerated lung aging in people living with human immunodeficiency virus

Dr. Honglin Luo
Innate immune mechanisms of viral myocarditis: Role of the cytosolic DNA-sensing pathway

Dr. Kelly McNagny
Development and functional diversity of innate lymphoid cells
Podocalyxin's role in tumor invasion, metastasis, and immune evasion
Engineering next-generation self-amplifying RNA therapeutics encoding bispecific T cell engager (BiTE) antibodies for treatment of ovarian cancer

Health Innovation Funding Investment Award

Dr. Janice Leung
Understanding mechanisms of respiratory impairment in people living with human immunodeficiency virus using optical coherence tomography

Dr. Scott Tebbutt
Plasma metabolomic biomarkers for detecting heart allograft acute rejection

Heart and Stroke Foundation

Dr. Honglin Luo
Innate immune mechanisms of viral myocarditis

Ministry of Health

Dr. Mari DeMarco
A blood test for Alzheimer's disease

National Institutes of Health

Dr. Tillie Hackett (subaward; UBC PI)
UCSF Asthma and Allergic Diseases Cooperative Research Centre

NSERC Discovery Grant

Dr. Ilker Hacihaliloglu
On-Device continual learning methods for point of care ultrasound

Dr. Amrit Singh
Integrative methods for single cell multiomics

Precision Health Catalyst Grant

Dr. Ying Wang
Who will benefit from colchicine to reduce heart attacks? Characterizing the baseline inflammation status of patients with coronary atherosclerosis

Stem Cell Network

Dr. Zachary Laksman

Development of high-throughput assays to stratify cardiotoxic drug risk by sex and genotype

St. Paul's Foundation Enhanced Patient Care Fund

Bruce McManus Cardiovascular Biobank

Improving self-management of heart failure

UBC Reserach Facility Support Grant

Dr. Liam Brunham

Molecular Phenotyping Core Laboratory

Dr. Chun Seow

Cellular Imaging and Biophysics Core

UBC Seminar Series Fund

Dr. Chun Seow & Ivan Leversage

Friday Seminar Series

PI AWARDS

Dr. Kelly McNagny

Canadian Society for Immunology 2023 Investigator Award

Dr. Ying Wang

Canadian Society of Atherosclerosis, Thrombosis and Vascular Biology Stewart Whitman New Investigator Award

Department of Pathology and Laboratory Medicine: Research and Discovery Award

Dr. Zachary Laksman

St. Paul's Hospital Faculty Research Award

Dr. Stephanie Sellers

Department of Medicine Martin Hoffman Award of Excellence in Research

Dr. Honglin Luo

2023 Distinguished Achievement Award - Excellence in Basic Science in Research

Dr. Gordon Francis

UBC Division of Endocrinology & Metabolism Fellowship Program - Outstanding Teaching Award





In 2023,

HLI PIs published

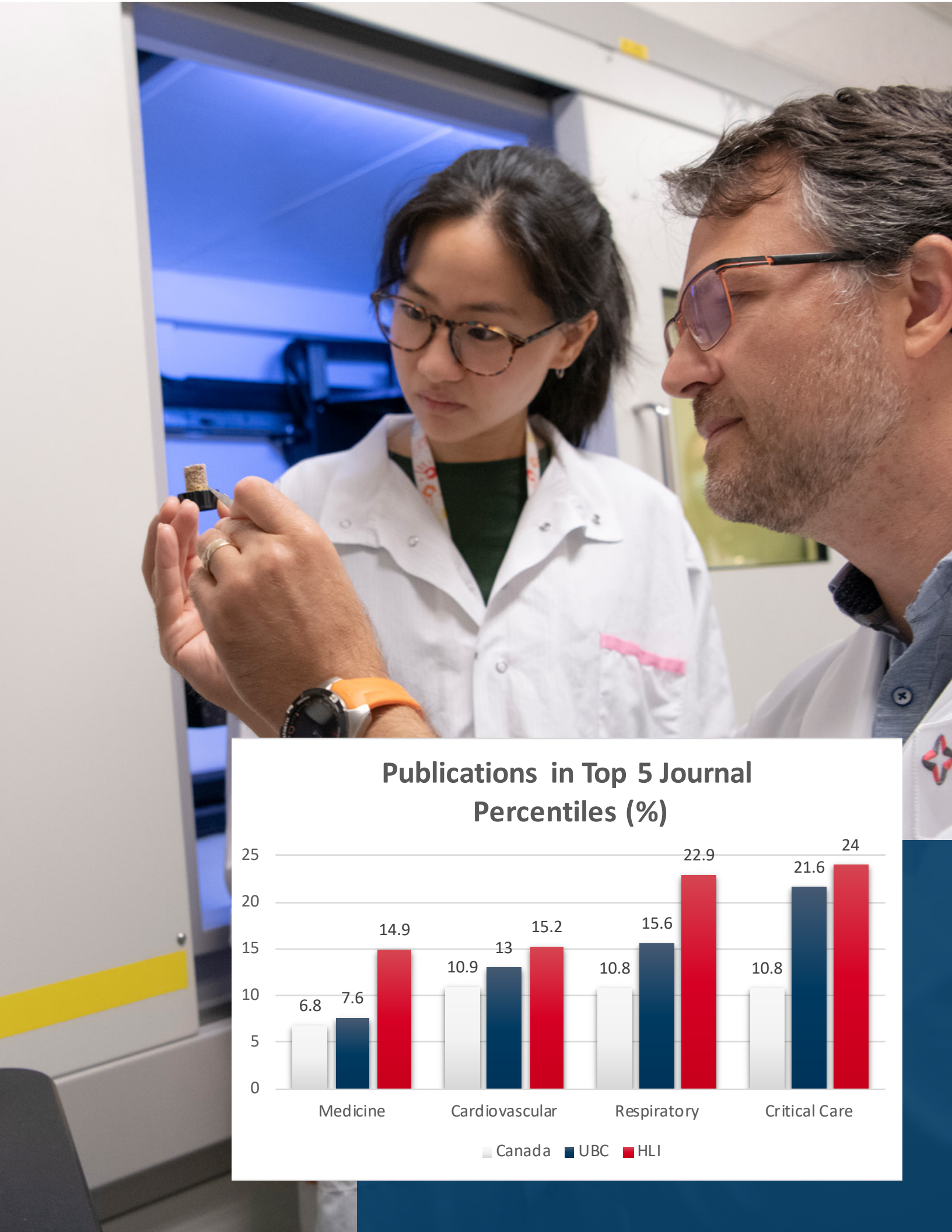
343 Peer-reviewed journal articles, together receiving

1,729 Citations*

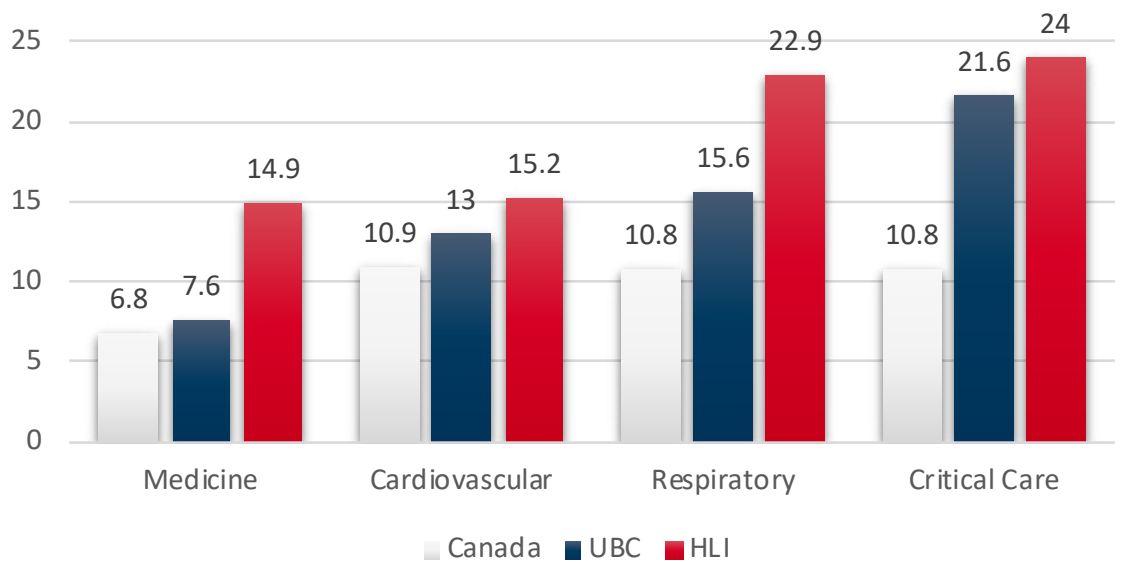
In 2023, HLI researchers published more frequently in top journals compared to UBC and Canadian researchers, and were cited

2.74 times more than the average paper in the field.*

* Data obtained from SciVal. Comparisons were made using Field-Weighted Citation Impact (on 7/30/2024). Full list of publications in [Appendix B](#).



Publications in Top 5 Journal Percentiles (%)



KNOWLEDGE TRANSLATION



HLI DAY 2023



This past year, HLI celebrated 46 years of excellence in science. In 2023, the inaugural HLI Day was held to recap the past, celebrate the present, and anticipate the future of our centre. As HLI approaches its 50th birthday, we plan on organizing HLI Day every two years.

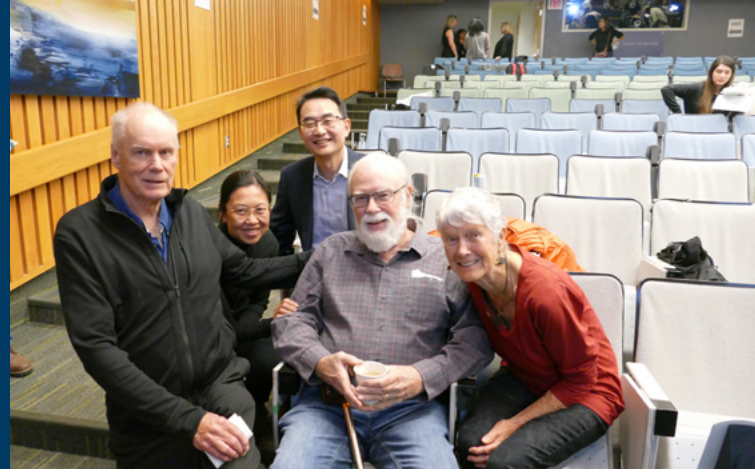
In 1977, Dr. Jim Hogg, accompanied by Dr. Peter Paré, was recruited from McGill University to UBC to start the Pulmonary Research Laboratory. In his talk, Dr. Paré rolled back the years, telling the audience: “I marveled at [Dr. Hogg]’s courage. I was reluctant to follow him, but then he said ‘Stick with me kid, and you’ll be farting through silk!’” The rest was history; the beginning of 30 years of collaboration and friendship.

At HLI, we pride ourselves in being a centre that bridges the gap between basic science and clinical knowledge, which would not be possible solely through the efforts of our PIs. Lisa Baile, another founding member of the Pulmonary Research Laboratory, compared HLI to the tip of an iceberg: “HLI would not be where it is today without the solid foundation of excellence provided by its support staff,” she said, “it is what’s underneath the iceberg that keeps it afloat and visible.”

That connection from top to bottom at HLI is why many staff consider themselves “lifers” who wish to stay at the centre for as long as possible. Dr. Gurpreet Singhera, registry manager of the Bruce McManus Cardiovascular Biobank with over 23 years of experience at HLI, explains that it is because of our culture of camaraderie: “It’s that family feeling, that sense of belonging, and on top of that, we are contributing to the greater scientific good.”



HLI DAY 2023



In addition to our PIs and staff, much of HLI’s work consists of providing opportunities for education and training for our students and trainees. The HLI Trainee Association, established in 2018, has since organized new scholarships, awards, events, and the Mentorship Program to enhance the academic experience for students, giving them opportunities to flourish and connect in ways that were previously unavailable. Students and trainees have now taken the reins on organizing our annual HLI Research Day, with knowledge translation at the forefront of their priorities. In conjunction with the EDI Committee, the Trainee Association has also worked to support students’ mental wellbeing, with plans for an online resource hub and self-governing collective model on the horizon.

Over the next decade, the HLI looks to put the centre in a position to take advantage of the top advances in health innovation to phenotype and treat diseases. Using the evolution of the St Paul’s Hospital building as an example, Dr. Tillie Hackett stressed that adaptability is key to HLI’s future.

“Science is best done when we have an open mind,” she said. “It’s important to listen to others. Don’t be afraid to have your ideas challenged.”

At the turn of the 20th century, colour revolutionized the film industry. The technology had its sceptics and believers, but in the end, those who failed to keep up faded from the spotlight.

Dr. Hogg was a believer, and he still is, in the future of health care.

“Let’s just dream in Technicolor.”



DESIGNING, DELIVERING, AND EVALUATING A KT TRAINING PROGRAM

In 2021, the Centre for Heart Lung Innovation (HLI) and its partners from Providence Health Care (PHC) and the University of British Columbia (UBC) created a new training initiative for graduate students and postdocs in health research. Supported by UBC funding, the program aimed to equip students with the basic tools and skills to engage and communicate with anyone who could benefit from knowledge of their research. This would allow students to properly design, implement, and translate their research into real-world practices.

Throughout 2022, this new Knowledge Translation and Mobilization (KTM) Training program consisted of webinars and workshops, a Three Minute Thesis (3MT) Competition in the Health category, a Patient & Public Forum, and presentation coaching sessions. Trainees developed the know-how to describe their work in lay terms, engage and partner with stakeholders, interact with patient and public groups to solicit feedback on their research projects, and create a knowledge translation and mobilization plan to publicize their findings for non-scientific audiences.

“It has been an incredible journey collaborating with trainees, faculty, patients, health system partners, HLI, and UBC to co-design, deliver, and evaluate this unique KTM program. The training has underscored the importance and value of engaging patients and other partners, as well as creating opportunities to foster a KTM culture in trainee environments. This initiative has shown great potential for building KTM capacity at HLI and beyond.” – Gurprit Randhawa, KTM Program Coordinator

“The KTM training program was a remarkable opportunity to expound the vital role of engaging patients and other non-academic stakeholders through all parts of the research process. It was incredible to not only deliver seminars, coaching and a three-minute thesis competition, but also to evaluate the

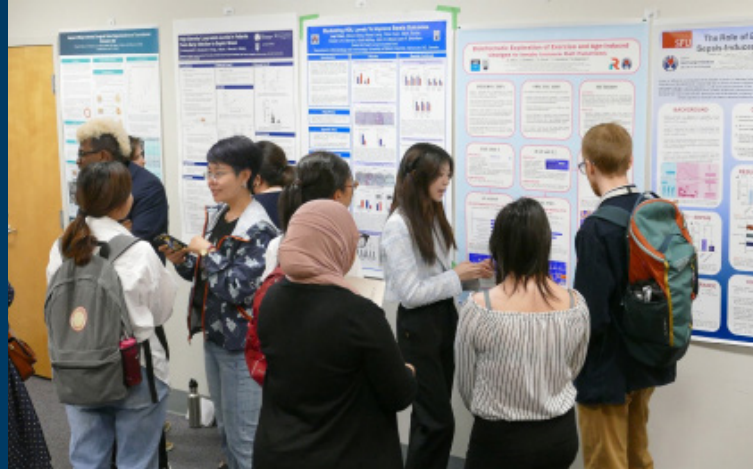


Dr. Gurprit Randhawa



Juma Orach

RESEARCH DAY 2023



Each summer, HLI welcomes undergraduate, co-op, and high school students to explore cardiovascular and pulmonary research. For many students, this program provides an invaluable first-time opportunity to learn practical laboratory techniques and to take a first step toward a career as a scientist. Towards the end of the summer period, students are given an opportunity to showcase their novel research in front of a scientific and general audience.

This year, the Trainee Association at the Centre for Heart Lung Innovation (TAHLI) again hosted the annual Research Day on August 19th at the Cullen Theatre in St. Paul's Hospital ([full article](#)). With over 100 people in attendance, 12 students presented their project in oral format and 36 showed their project in poster format. Ten students also took on the novel challenge of giving knowledge translation rapid fire talks, which involved condensing their research project into a one-minute oral presentation. There was a wide range of research topics ranging from cardiovascular health, exercise and sepsis, and mechanisms of viral myocarditis to lung fibrosis treatments and better understanding of lung disease.

At the end of the day, the following trainees were recognized for their outstanding presentations:

Peter D. Paré High School Student Award - **Anna Kovtunenکو**

Poster Presentations

1st Place - **Christopher Yuen**

2nd Place - **Tucker Reed, Fatemeh Aminazadeh**

3rd Place - **Sarah Bradwell**

Rookie - **Janette Chen**

Oral Presentations

1st Place - **Zeren Sun**

2nd Place - **Aileen Hsieh**

3rd Place - **Maria Elishaev**

Rookie - **Samuel Leung**

Knowledge Translation Rapid Fire Presentation People's Choice - **Wendy Hwang**



BIOBANK OUTREACH



The two major HLI biobanks: the Bruce McManus Cardiovascular Biobank (BMCB) and the James Hogg Lung Biobank (JHLB) have been particularly focused on public engagement as a part of HLI's commitment to community engagement.

On April 13th, the BMCB and JHLB hosted an educational outreach session for students of Douglas College, providing a comprehensive understanding of tissue biobanking and its essential role in advancing cutting-edge research in cardiovascular and lung diseases. The session highlighted the significance of collaborative efforts between academia and the medical community, emphasizing the need to bridge the gap for the betterment of health care.

The following week, the first High School Student Science Week of the year was held, and students were provided a tour of the different laboratories and core facilities within HLI, including the BMCB and JHLB. They also participated in various hands-on lab activities, as well as a meet-and-greet with the graduate students at the centre.

Sylvia, the grandmother of Katrina Besler (an MD/Ph.D. candidate in Dr. Gordon Francis's lab), visited the BMCB on July 25th to observe the collection of human hearts preserved for research purposes. Her curiosity centered on examining diseased hearts, particularly those diagnosed with coronary artery disease (CAD) as she is a caregiver for a family member with CAD. The visit offered her a simplified comparison between healthy and diseased hearts, enlightening her on the disparities. The experience inspired her to pledge for the advocacy of organ donation and underscored the critical need for human tissue in cardiovascular research. Sylvia's excitement for her granddaughter's work was infectious, and her visit opens up the possibility to arrange for more enthusiastic members of the public to tour our facilities in the future.



BIOBANK OUTREACH



Several of the BMCB's heart & valve specimens were showcased at the Society of Cardiovascular Computed Tomography (SCCT)'s annual meeting in Boston, USA from July 27th-30th, with Dr. Stephanie Sellers presenting a talk titled "Structural valve deterioration: CT, PET, and histopathology". Dr. Gurpreet Singhera, along with Dr. Sellers and Althea Lai also facilitated the "HANDS ON HEARTS" session in this meeting. Founded in 2005, the SCCT is the international professional society devoted exclusively to cardiovascular computed tomography, with members from over 85 countries.

On November 1st, which was Take Our Kids to Work Day, Grade 9 visitors got the chance to take a close-up look at the human hearts at the BMCB. Also in November, the fall edition of the High School Student Science Week was held. With HLI's efforts on community outreach, particularly to young scientists with our training programs, these events highlight the fruits of that labour, showcasing HLI as a forward-thinking institution with eyes on the next generation.

Below are a few quotes from the participants from the fall High School Student Science Week:

"This week was really unique, it was big for all of us, we learned life-specific skills, and it gave us a variety of interests we can pursue and follow in our future careers." — Ricardo Ferraz, Grade 12

"I really enjoyed looking at the hearts and lungs. It was a really interesting experience being able to touch them and also see the types of diseased lungs." — Eugenie Yuen Ching Ho, Grade 12

"One of my favourite labs was the biobanking lab, where we touched the hearts and it was really cool." — Polina Arendarenko, Grade 11



PODCASTS FOR KNOWLEDGE DISSEMINATION

Launched in 2020, the [LungFIT podcast](#) is about all things related to pulmonary rehabilitation (PR), which is a multi-disciplinary intervention for people with chronic lung disease. Dr. Pat Camp, a physical therapist and HLI principal investigator, started the LungFIT podcast as a way to disseminate evidence about the efficacy of pulmonary rehabilitation, and help translate lab findings into clinical practice. Podcast topics also include helpful information and tips for healthcare providers working in pulmonary rehabilitation. Topics include:

- upcoming research
 - clinical updates on assessment, tests, and tools
 - journal clubs
 - interviews with PR experts
 - tips on how to improve your program
-



Dr. Pat Camp

Dr. Mari DeMarco is a researcher at the University of British Columbia concerned with how the diagnoses of neurodegenerative diseases can be improved by discovering and using biomarkers. Her lab aims to create better tools for the timely diagnosis of Alzheimer's disease, frontotemporal degeneration, and related disorders and make these tools easily accessible to those that need them.

In this [podcast episode](#), Dr. DeMarco talks about the use of the amyloid beta peptide and tau biomarkers in dementia and specifically Alzheimer's disease and the results of the clinical management arm of the IMPACT-AD study. Biomarker testing enabled optimization of care, and for patients and families, a timely and more confident diagnosis was highly valued in preparing for the future.

Learn more: www.impactad.org/resources



Dr. Mari DeMarco

WILDFIRES AND AIR POLLUTION: HOW DO THEY AFFECT LUNG HEALTH?

As wildfires become regular occurrences throughout many areas of Canada, exposure to wildfire smoke is becoming a long-term, chronic exposure. Smoke can irritate the eyes and airways, leading to coughing, wheezing, and exacerbations of other diseases like asthma, heart attacks and strokes. As climate change leads to more extreme weather events like dust storms and heatwaves, patients with chronic lung disease are especially susceptible to further worsening of their health.

In a [Daily Scan article](#), Dr. Don Sin, Director of HLI, discusses how the gasses and particles in air pollution contribute to and worsen chronic obstructive pulmonary disease (COPD).

“The acute effects [on COPD] are largely mediated by the gases, but the long-term and even more insidious components of air pollution are driven by these particles,” says Dr. Sin. “These particles can get inside the respiratory tract, inside the lungs, and stay there – not just for a few days, but weeks, months, sometimes years and decades – and can cause disruption to the normal immune system of the lung.”

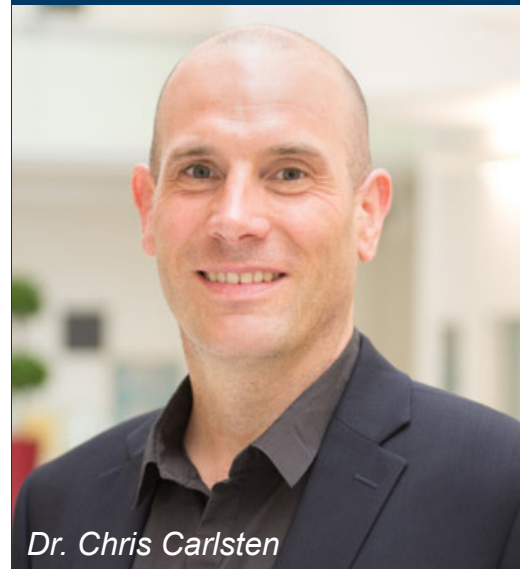
Dr. Chris Carlsten, head of Respiratory Medicine at UBC and HLI PI, spoke to [The Globe and Mail](#) about how speculation on the chronic health effects of smoke exposure has been mostly based on studies on traffic-related pollution.

“That’s sort of both reasonable and also, at the same time, potentially problematic. It’s reasonable because traffic-related pollution and fire smoke have a lot in common, but they also have a lot that’s not in common.” - Dr. Carlsten

For example, the gases in traffic-related pollution are usually a greater concern, but the high concentration of particles close to a wildfire are much more concerning for those who are exposed to wildfire smoke. The composition of the air pollution also changes as the smoke moves away from its original source. This suggests that studies specifically studying wildfire smoke are needed to truly understand its effects on health.



Dr. Don Sin



Dr. Chris Carlsten

PIONEERING NEW TREATMENTS FOR SEPSIS

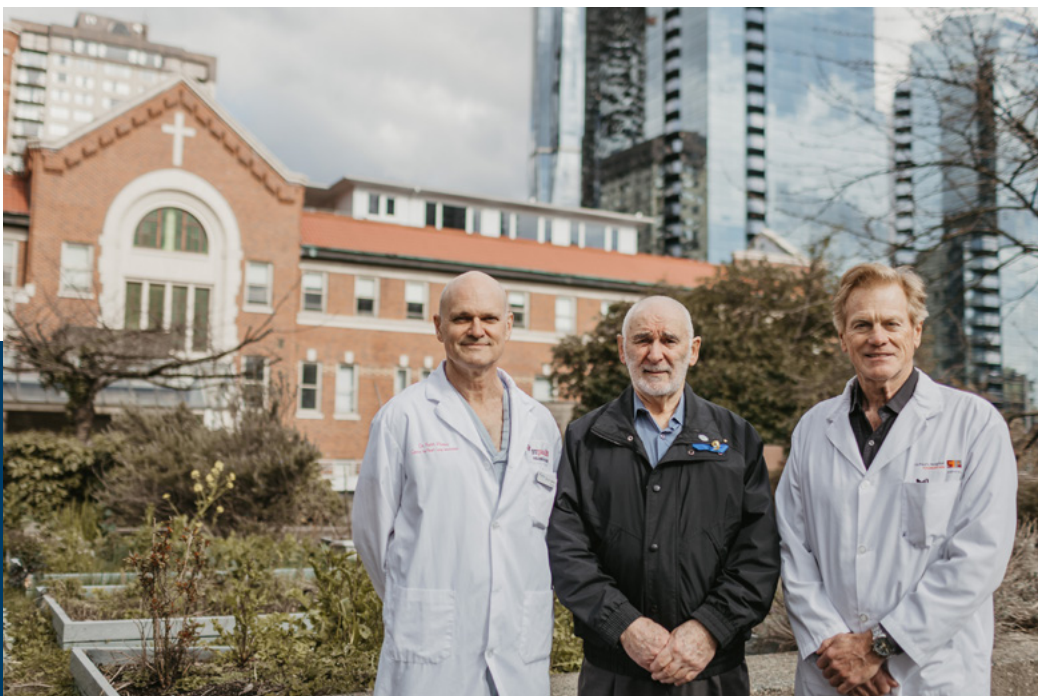
Sepsis is the number one cause of death worldwide, resulting from an uncontrolled response to infection. Sepsis can lead to widespread organ failure and eventually death. Due to its association with COVID-19, the condition has been getting more attention.

In the 2023 issue of [Promise Magazine](#), Dr. Jim Russell and Dr. Keith Walley spoke about their research into new treatments for sepsis.

“We were the first in the world to discover that people with a defect in their PCSK9 gene have a better survival rate,” Dr. Russell says. “And our discovery led to others doing a recent trial of a PCSK9 inhibitor showing significantly decreased mortality of acute COVID-19.”

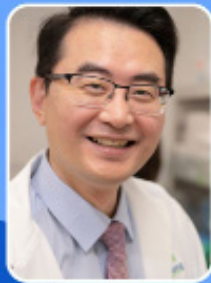
PCSK9 inhibitors are currently used for heart disease and stroke, but Drs. Walley and Russell's research shows that it could also be helpful for treating sepsis. Dr. Russell is the top ranked septic shock researcher in the world, and Dr. Walley is also a global leader in septic shock research, and recent recipient of the Order of Canada. Together, they have seen over 10,000 ICU patients with sepsis in their careers.

“We have a really wonderful collaboration because Dr. Russell’s clinical trials often arise from ideas in the lab,” Dr. Walley says. “Over the last 35 years, what we’ve accomplished has changed global sepsis practices and improved survival rates.”



Don Sin, MD MPH

Director & the De Lazzari Family Chair, HLI, St. Paul's, PHC.
Professor of Medicine, UBC
Canada Research Chair in COPD



Dr. Sin is the Director of HLI and has been ranked Canada's leading COPD expert by Expertscape! The Sin lab aims to reduce hospitalization and mortality in patients with chronic obstructive pulmonary disease (COPD).

Key areas of research:

- Characterizing the cell types found in COPD
- Evaluating the microbiome of airways

J. Proteome Res. 2023 Dec 4
PMID: 38048423

HLI's Contributors:



Dr. Chris Carlsten



Dr. John Boyd



Dr. Keith Walley



Dr. Jim Russell

ARE YOU A GRADE 11-12 STUDENT IN VANCOUVER INTERESTED IN BIOLOGICAL SCIENCES?

APPLY TODAY!

FALL '23 HIGH SCHOOL STUDENT WEEK (NOV 20-24TH)

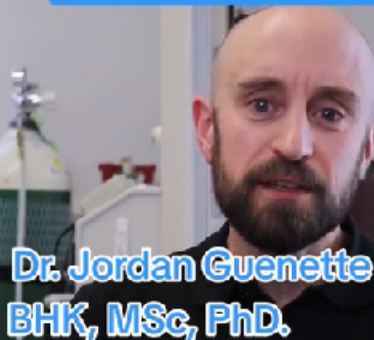
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NOV 6TH, NOON (PST)

WHAT YOU WILL GET

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- ELIGIBILITY TO APPLY FOR TWO-MONTH SUMMER SCHOLARSHIP



Impact of sex differences in respiratory research



SOCIAL MEDIA

In 2023, HLI's social media presence saw a boost with the arrival of Communications Co-op Student Shu Sasaki. With active engagement on social media platforms, including X (formerly Twitter), Facebook, Instagram, and LinkedIn, HLI's accounts made a total of 147 posts, garnering over 40,000 impressions, 1,600 reactions, 85 shares, and an average post engagement rate of 8.77%. According to Hootsuite analysis, other accounts in the health sector only have an average post engagement rate of roughly 2%, suggesting that although our audience is small, they are passionate and willing to engage with our content.

Over the past year, HLI's social media launched four different series of posts, all of which have seen good engagement and contributes to the uniformity of our brand. These include the Researcher Spotlights, which are graphics highlighting each PI and their key areas of research; the Original Research Features, which are digestible summaries of research articles that our PIs have contributed to; the High School Student Science Week mini-campaign, which raised awareness of our biannual program; and the Interview Series, where we had short video interviews of various people around the centre giving background on the work that they do at HLI.

In order to continue HLI social media's upward trend as observed over the course of 2023, the centre is making use of our close-knit community. Social media is a social game, and as more of HLI's staff and students become active engagers of our posts, it increases the chances of their wider circles showing interest, which in turn continues to expand our reach. Aside from the four series showcased above, other posts featuring photos or video of the people at HLI have shown to be popular.

A woman in a white lab coat is looking through a Nikon microscope. In the background, a man is looking at a computer monitor. The scene is set in a laboratory or classroom.

EDUCATION



TRAINEE AWARDS & SCHOLARSHIPS

awarded in 2023

Fatemeh Aminazadeh (Hackett)
CIHR/Canadian Lung Association
Studentship

Alec Campbell (Ryerson)
CPFF Robert Davidson Fellowship

Rachel Eddy (Sin)
CIHR Travel Award
International Society for Magnetic
Resonance in Medicine

Maria Elishaev (Wang)
Department of Pathology Graduate
Award
UBC 4 Year Fellowship

Estefanía Espín (Tebbutt)
UBC 4 Year Fellowship
MITACS Accelerate
Faculty of Medicine Publication Award

Olivia Ferguson (Guenette)
Governor General's Gold Medal -
Master's
CANTRAIN-CCTP Studentship

Firoozeh Gerayeli (Sin)
ATS Abstract Scholarship

Hacina Gill (Sellers)
CIHR CGS-D

Gillian Goobie (Hackett & Ryerson)
CIHR Fellowship

Tony Guo (Dorscheid)
CIHR CGS-M

Cyril Helbling (DeMarco)
CCNA Trainee Research Support
Program
Parkinson Switzerland

Ana Hernandez Cordero (Leung)
CIHR REDI Award
BC Lung Foundation Lung Health
Research Grant

Aileen Hsieh (Hackett)
CIHR CGS-D



TRAINEE AWARDS & SCHOLARSHIPS

awarded in 2023

Linda Lapp (Tebbutt)

MSHR Research Trainee Award

Clarus Leung (Sin)

MSHR Research Trainee
Canadian Lung Association Fellowship
Dr. J. Mark Fitzgerald Fellowship
Award

Hattie Luo (Laksman)

Faculty of Medicine Graduate Award

Yasir Mohamud (Luo)

CIHR REDI Award

Jeremy Parker (Laksman)

Stem Cell Network Travel Award

Carli Peters (Leung)

CIHR/Canadian Lung Association
Fellowship

Débora Petry-Moecke (Camp)

ATS Abstract Scholarship

Jobanjit Phulka (Laksman)

CIHR Travel Grant

Mohammad Salmanpour (Hacihaliloglu)

MITACS Accelerate

Justin Turner (Camp)

CIHR/Canadian Lung Association Allied
Health Research Fellowship
RHSC Travel Award
Metis Nation British Columbia STEM
Scholarship

Nicol Vaizman (Brunham)

CANTRAIN-CCTP Studentship

Dragos Vasilescu (Hogg)

Parker B. Francis Fellowship

Denitsa Vasileva (Daley)

CIHR Travel Award

Alyson Wong (Ryerson)

Carraresi Early Career Clinician
Investigator Award
CIHR/CLA Respiratory Effects Long COVID
Grant
UBC FoM New Faculty Research Award

Eric Xiang (Francis)

UBC 4 Year Fellowship
Canadian Lipid Vascular Summit Travel
Grant

William Yip (McNagny)

MITACS Accelerate



INTERNAL AWARDS

For HLI trainees who will be presenting at a local, national or international meeting, or engaging in activities that enhance trainee education beyond traditional travel awards:

James Hogg Award

Geoffrey Nonis (Koelwyn)

Keith Wu (Hackett)

Raveen Badyal (Dunne & MPCL)

Xindi (Cindy) Wang (Bernatchez)

Peter Paré Award

Débora Petry-Moecke (Camp)

Lauren Forgrave (DeMarco)

Bruce McManus Award

Meng Wang (DeMarco)

Katrina Besler (Francis)

For young researchers who have demonstrated excellence in basic scientific and/or clinical research:

Bob Schellenberg Rookie of the Year

Olivia Ferguson (Guenette)

Cornelis van Breemen Outstanding Young Investigator

Aileen Hsieh (Hackett)

James C. Hogg Outstanding Young Investigator

Chengliang Yang (Tebbutt)

Alexandra Kerjner Technician Award

For HLI technicians or managers who have made continued contribution with the highest level of technical skill, work ethic, enthusiasm in mentoring and team spirit

Fanny Chu

Stuart Greene Award

For an HLI employee whose outstanding service, patience, and cooperativeness as a team player have made a major impact to the success of the HLI mission

Ivan Leversage

Keith Walley Trainee Mentorship Award

For PIs, postdocs, or others who have gone above and beyond to support, mentor, and/or advocate for trainees at a centre-wide level

Yasir Mohamud





OPERATIONS

BRUCE MCMANUS

CARDIOVASCULAR BIOBANK

The BMCB has taken several initiatives to modernize its infrastructure over the past year. Our primary goals have been to help BMCB staff build expertise and improve our support for research and education.

HQP update: Ms. Coco Ng was successfully recruited as full-time staff with support from UBC Research Facility Support Grants (RFSGs) led by Drs. Wang, Hackett, and Laksman.

Finance: The BMCB has implemented a plan for cost recovery and received an Enhanced Patient Care grant to support our upcoming patient engagement activities, including open house tours. A UBC RFSG allows us to replace and upgrade equipment in BMCB, the Histology Core, and IT.

REB update: We have merged our two REB protocols from 2005 into one upgraded version that aligns with current UBC REB guidelines. This transition has streamlined the biobank's ethics approval process and created new opportunities for: 1) collecting paired blood and tissue samples to support biomarker studies; 2) re-contacting patients for follow-up studies; and 3) conducting genetic research for cardiovascular disease.

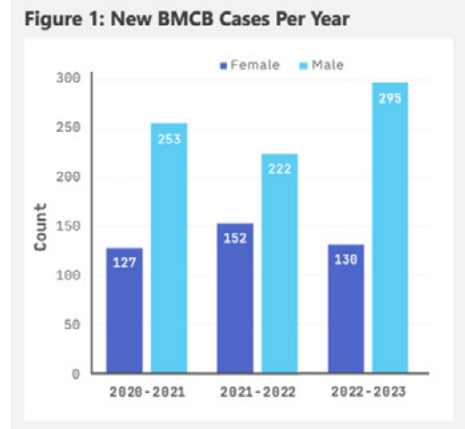
Data management: The BMCB has created a histology image archive, with substantial support from Dr. Chi Lai, who assessed several hundred images. This archive will enable remote access for users/collaborators to select samples based on histological categorization. We also developed an OpenSpecimen template to digitize our former manual inventory, recorded across 12 physical notebooks. To date, we have digitized 50% of these hard copies and are reorganizing the physical locations of archived samples. Next year, we expect to publish our OpenSpecimen inventory online to increase the visibility of archived samples. Research users will be able to access our catalogs of de-identified samples and search the online inventory in the future.



BRUCE MCMANUS

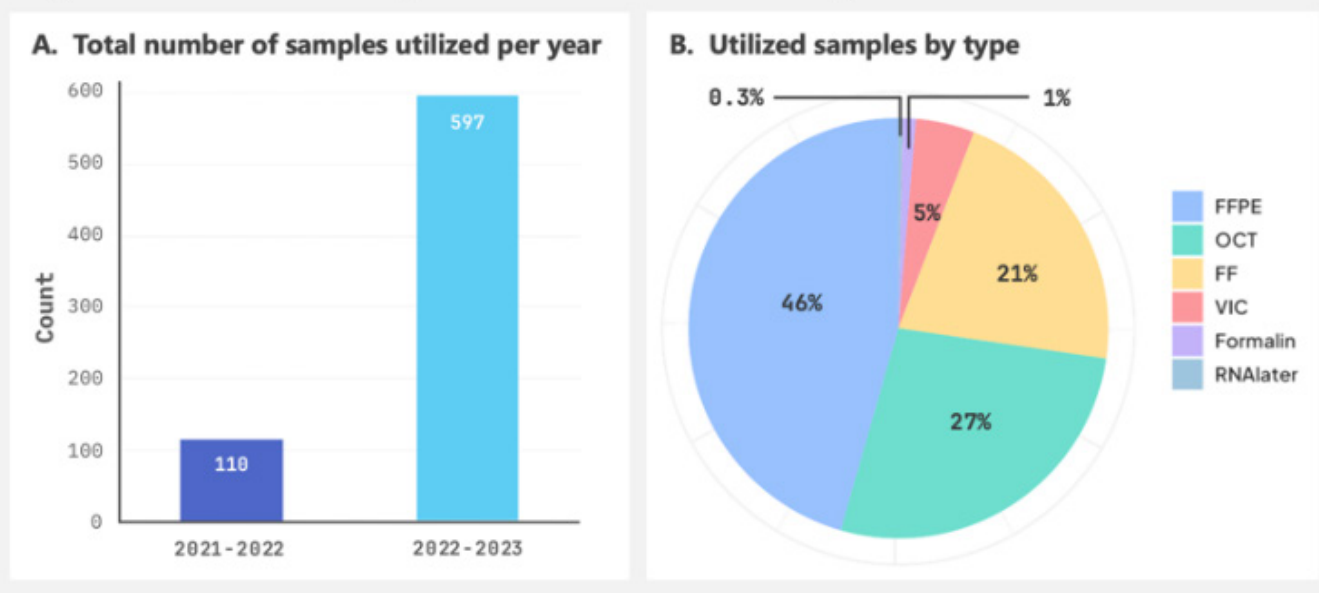
CARDIOVASCULAR BIOBANK

Biobanking activities and sample utilization: Our signature cohort of explanted hearts has reached a 96% consent rate, thanks to the efforts of Dr. Gurpreet Singhera. Additionally, we have adopted a more targeted, fit-for-purpose approach to banking surgical samples. Our biobanking activities have also steadily recovered since the pandemic, indicating a strengthened collaboration with healthcare providers at PHC. Furthermore, the biobank's sample utilization has increased by **443%** since 2022.



Outreach Activities: For the BMCB's educational and outreach endeavours, the team hosted 21 tours. In addition to the regular tours, we hosted graduate student tours (PATH501) and surgeon resident tours. To assess the biobank's knowledge translation (KT) impact, BMCB student Tiffany Chang developed and implemented a KT questionnaire for high school student tours. Results have shown that the BMCB tours effectively corrected misconceptions about cardiovascular disease, enhance awareness for early intervention and traditional sex/gender bias in cardiovascular research. Additionally, the BMCB was invited to participate in the "Health Innovation Series" of St. Paul's Foundation and to give research talks at several forums, including the St. Paul's surgical residents research round, the Ottawa Heart Institute, and the Canadian Lipid & Vascular Summit 2023. We aim to actively expand our network and foster collaborations with external users in 2024.

Figure 2: BMCB Sample Utilization Summary



CELLULAR IMAGING AND BIOPHYSICS CORE

Under the scientific direction of Dr. Dragos Vasilescu and led by Core Manager Dr. Aaron Barlow, the Cellular Imaging and Biophysics Core (CIB) is a multi-user facility that supports research groups within the HLI, providing access to cutting-edge imaging technology and expertise. Featured instruments include the Zeiss LSM 880 confocal microscope with super-resolution and multiphoton capabilities, the Nikon XTH 225-ST high-resolution microCT scanner, and the EVOS 5000 fluorescent microscope. These services provide scientists at the HLI with critical data for understanding the mechanisms of disease. The CIB has had a busy year, featuring a variety of critical upgrades and repairs, several major ongoing projects across all instruments and some significant publications.

Highlights include:

The CIB was able to secure funding for several key repairs and upgrades this year. With support of Dr. Chun Seow, the core applied for and received a UBC Research Facility Support Grant (\$13,230) that will be used to replace the argon laser of the confocal microscope. The old laser had reached the end of its working life and was having difficulty in maintaining sufficient power for experiments. With the generous support of a CFI grant from Dr. Ying Wang, the core also purchased a new 25x lens for the confocal microscope to provide an intermediate range option between our existing lenses.

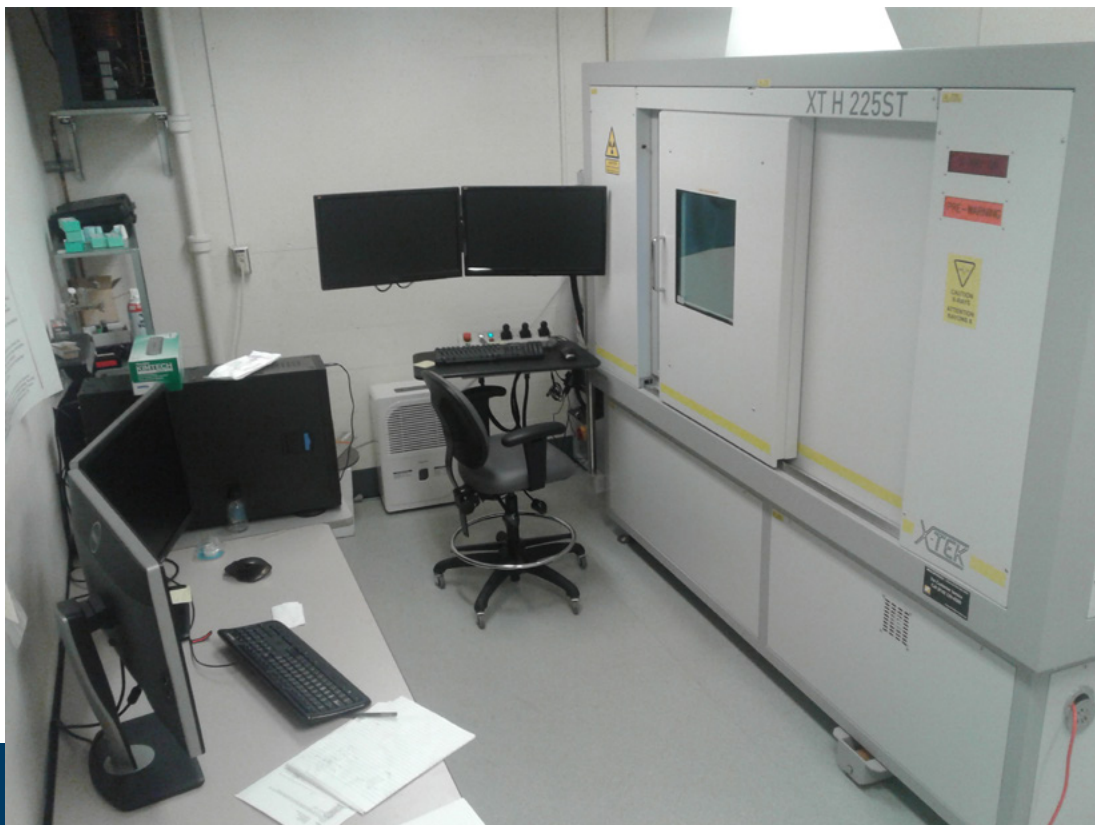


CELLULAR IMAGING AND BIOPHYSICS CORE

The microCT scanner was used in two major projects that required scanning frozen or FFPE lung tissue samples. First, the CIB continues its ongoing work with the Sin lab who has developed an emphysema pig lung model (*Journal of Applied Physiology*, Impact Factor 3.53) supported by an industry partner (IKOMED). This project has greatly assisted with the CIB's financial position, and the Core has a healthy contingency in the event of any major failures. In addition, the CIB has been continuing its ongoing collaborations with the Hackett lab, with studies focused on airway remodeling in asthma and COPD patients using our unique FFPE imaging protocol. These projects alone accounted for nearly 400 samples totaling over 800 hours of scanning time (*American Journal of Respiratory and Critical Care Medicine*, Impact Factor 24.7).

The CIB has continued its ongoing collaborations with the cardiology groups of Dr. Stephanie Sellers and Dr. John Webb to assess the merit of various valve-in-valve transcatheter heart valve configurations. Using microCT imaging the group measured calcium deposition in explanted valves, and second harmonic generation through the confocal microscope to determine collagen integrity in transcatheter heart valve leaflets. These collaborations have resulted in several publications in *JACC Cardiovascular Interventions* (Impact Factor 24.094) and *Eurointervention* (Impact Factor 7.728).

The CIB provides ongoing service to a broad spectrum of users throughout the HLI, serving approximately 30 regular users spread across 13 research groups, and provides training and research support to numerous new users each year. The CIB also supports HLI's community outreach programs by providing demos and tours for donors, high school student groups, visiting scientists and community members.



FACILITIES AND MAINTENANCE

The Maintenance Department had an eventful year. Several of our researchers were able to consolidate their inventories of frozen samples, allowing us to remove 3 of our aging units from our “fleet” of freezers. This process will continue over the next few years as we anticipate our move into the new CSRC.

The summer saw the need for our machine shop to be relocated within the hospital, which arose from the need to expand patient treatment areas. While the new space is smaller, it remains sufficient to work on projects and repairs effectively. In November, after a long search, we were able to add a new member to the department. The new technician, Andy Diewald, will play an important role in identifying future equipment for the new CSRC Lab, while also responding to help requests processed by the ticket system.

An unusual cold snap in late December and early January had an adverse effect on some of our rooftop equipment. The change in weather not only affected the Centre’s equipment but also the hospital and many businesses in the Lower Mainland. While almost all of the repairs have been completed, long lead times and very busy service providers necessitate that some less urgent repairs get completed in the next reporting period.



HEALTH AND SAFETY

In 2023, the Centre provided the flexibility for individuals to participate in seminars either online or in-person. Attendance at in-person social events saw a significant increase, reflecting growing participation and engagement.

The Safety Committee's training videos on handling liquid nitrogen were widely acclaimed, prompting requests for distribution from the Faculty of Medicine Safety Committee and other interested parties. Plans are underway for the creation of additional safety videos, further enhancing safety training efforts. These videos have also been shared with UBC Risk Management for wider dissemination.

Additionally, the Centre's Safety team received a request from the Faculty of Medicine to serve as the onsite Joint Occupational Health and Safety Committee (JOSCH) for all UBC Research Centers at St. Paul's Hospital. The inaugural meeting was scheduled for January 2024.

As part of our ongoing safety initiatives, the Centre hosted a Safety Glasses Fair towards the end of 2024 to promote the use of eye protection. The event was a resounding success, and popular eyewear choices are now available at the HLI store.



HISTOLOGY CORE

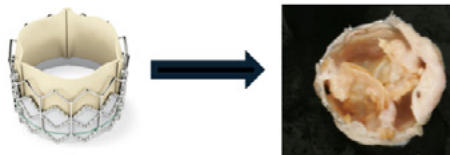
The Histology Core provides researchers access to services, which are generally too expensive, complex or specialized for core users to cost-effectively provide and sustain themselves. These include:

- State-of-the-art research services and analyses
- Instruments and technology
- Technical expertise, training and education

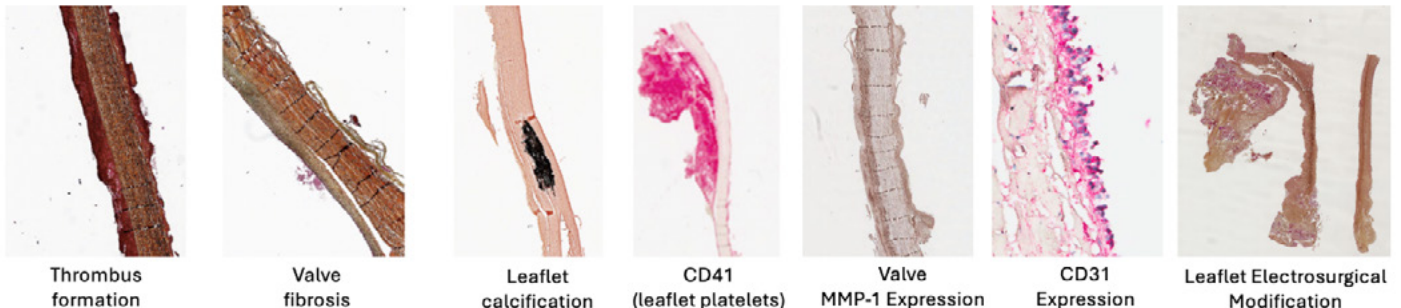
The Core is widely available to many researchers to conduct their research activities, irrespective of their administrative affiliation and with no requirement for collaboration or co-authorship. Amrit Samra is the Histology Core facility manager and is an expert in histological techniques. She has been a critical part of HLI for over twenty years. Over the past year, the Core has been involved in some notable collaborations.

The Cardiovascular Translational Lab (PI Dr. Stephanie Sellers) primarily focuses on the mechanisms of bioprosthetic heart valve degeneration, investigating new methods of detecting valve degeneration, and designing and evaluating new interventional treatment approaches for valvular disease. The Core has played a crucial role in facilitating assessment of features of transcatheter valve degeneration, such as thrombus formation, inflammation, matrix metalloproteinase expression, and calcification. Dr. Sellers' lab could then validate new positron emission markers for detecting valvular disease, and evaluate the impact of intervention on valve disease and bioprosthetic valve durability. The expertise in immunohistochemistry and histology aided them in many research projects, ensured quality, and helped facilitate collaborations on an international scale.

Transcatheter Valve Degeneration



Histopathological Evaluation

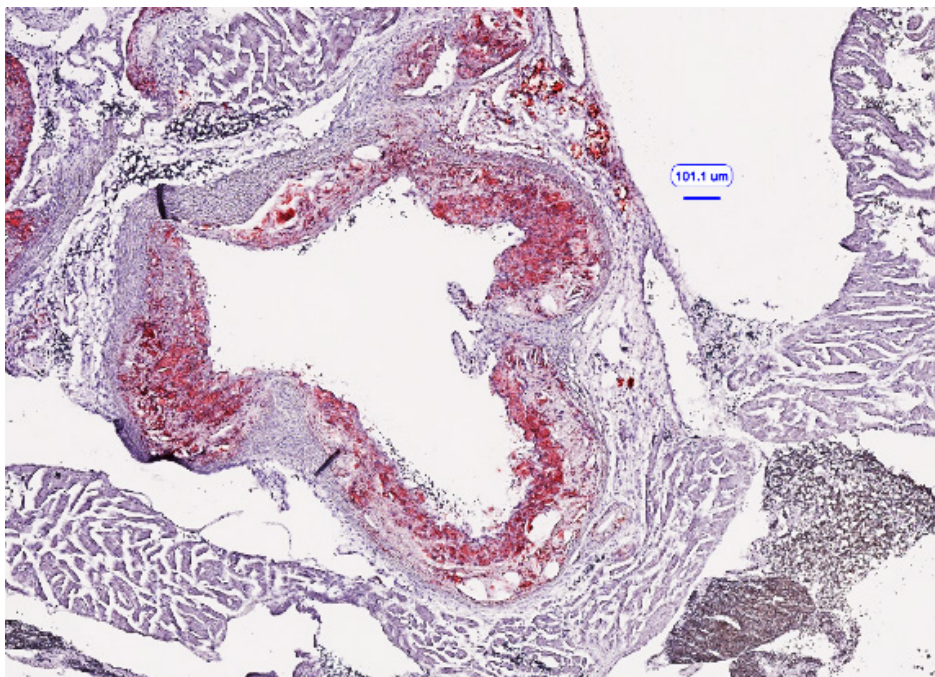


HISTOLOGY CORE

Dr. Yasir Mohamud, a postdoctoral fellow in Dr. Honglin Luo's lab, worked with the Core in 2023 to study heart specimens from the Bruce McManus Cardiovascular Biobank (BMCB). He is focussed on uncovering the mechanisms behind viral-induced heart failure. The Core has played an important supporting role in his studies. By identifying how viruses damage the heart, his lab aims to discover targets for novel treatments that could repair and recover heart function post-infection. His work promises to advance our understanding and treatment of viral heart diseases, potentially offering new hope beyond transplantation.

Dr. Ying Wang's research focusses on integrating histological features with the molecular traits of human tissue specimens to find drug targets and biomarkers for cardiovascular disease. This past year the Core supported her research program by creating a histology inventory of human specimens in the BMCB, the largest explanted heart biobank in North America. The Core modernized the digital inventory of the biobank, opening opportunities for collaboration and knowledge translation. In this reporting year, the histology inventory helped Dr. Wang, now Director of the BMCB, to attract 1) more than \$600K in external operating funds as principal investigator; 2) collaboration with three national research groups and two international groups; and, 3) four new HQP to her research program. The histology inventory also supports education of patients, healthcare providers, students, and the general public, who are invited to open house tours of the BMCB on a regular basis. The histology images exhibited proved to be an effective tool to correct the common misconceptions about cardiovascular disease. This knowledge translation initiative led to a Patient Care Enhancement Grant awarded to the biobank in 2023.

The Core has also been absolutely critical for Katrina Besler, an MD/PhD student in Dr. Gordon Francis' lab. She was able to conduct scientifically rigorous hypothesis testing and collect beautiful, publication-quality images with the equipment and services of the Core, and in particular Amrit's technical expertise and advice in methods development. The Core saved her lab significant costs and time, and expanded the scope of experiments they are able to conduct.



JAMES HOGG LUNG BIOBANK

2023 has been a busy year for the James Hogg Lung Biobank (JHLB). JHLB is continuing its mission to support the advancement of respiratory research through the inventory of biospecimens and associated clinical data to enable researchers to understand both the pathology and molecular determinants of lung disease. Over the last year, 3,190 lung tissue specimens and associated clinical data were provided not only to researchers at the Centre for Heart Lung Innovation but also to the University of Tasmania, the University of California at San Francisco, the University of North Carolina, and Ikomed Technologies, resulting in seven research publications.

We are currently preparing for an industry contract, which will be the largest study supported by the JHLB to date. It will utilize 90,000 individual samples acquired from 1,000 patient donors to the lung biobank, supporting multi-omic analysis of chronic obstructive pulmonary disease (COPD). To facilitate this project, we have been improving the storage and labelling of our frozen sample inventory to facilitate more time-efficient sample retrieval and tracking. We have recently acquired new equipment including updated label printers and a laminar flow biosafety cabinet, which will enhance our biobanking efficiency. Further, we have enhanced the phenotyping of patients within the biobank. Our database has been expanded and improved in the past year with the support of HLI's IT Department. We have added many additional data fields to diagnoses, co-morbidities, and occupation exposures of our donors, and improved the user interface of our Lung Biobank database.

Over the last year, the JHLB has been involved in several large collaborations to provide researchers with biospecimens to be used with current imaging and molecular technologies. In particular, one study using tissue from the JHLB was the first to use Imaging Mass Spectrometry to generate a single-cell atlas of small airway loss in patients with COPD. The study, led by the HLI's Dr. Hackett, was selected for the American Journal of Respiratory Critical Care and Medicine Special Issue "From Conundrum to Cures, Pioneering Breakthroughs in Chronic Obstructive Pulmonary Disease Research". The JHLB has also been active in supporting the biotech company Ikomed with their preclinical models of COPD, including tissue processing, imaging and histology. The past year also saw the addition of another donor site and we received our first organ donation from Royal Jubilee Hospital in Victoria.



JAMES HOGG LUNG BIOBANK

Publications supported by the James Hogg Lung Biobank from the past year:

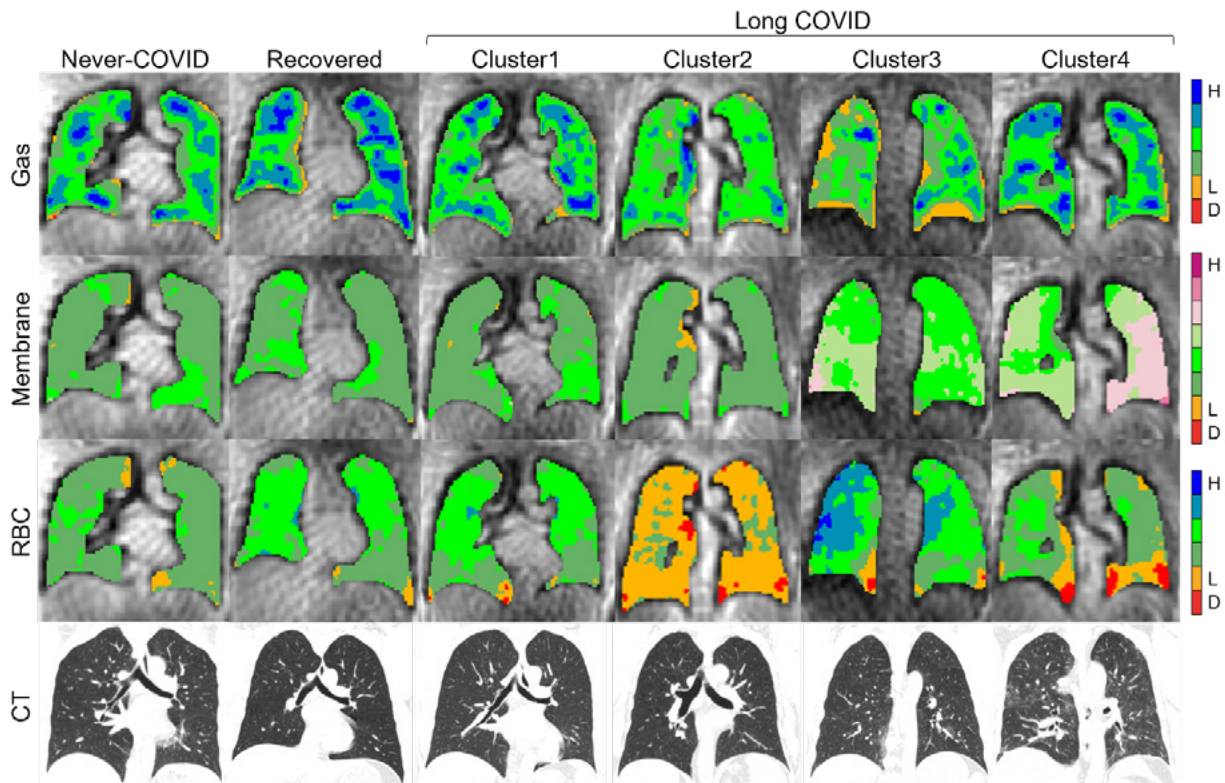
1. Shahzad AM, Lu W, Dey S, Bhattarai P, Gaikwad AV, Jaffar J, Westall G, Sutherland D, Singhera GK, Hackett TL, Eapen MS, Sohal SS. Platelet Activating Factor Receptor and Intercellular Adhesion Molecule-1 Expression Increases in the Small Airway Epithelium and Parenchyma of Patients with Idiopathic Pulmonary Fibrosis: Implications for Microbial Pathogenesis. *J Clin Med*. 2024 Apr 6;13(7):2126. doi: 10.3390/jcm13072126. PMID: 38610892; PMCID: PMC11012432.
2. Eapen MS, Lu W, Dey S, Chia C, Hardikar A, Hassan MI, Bhattarai P, Gaikwad AV, Das S, Hansbro PM, Singhera GK, Hackett TL, Sohal SS. Differential expression of mast cells in the small airways and alveolar septa of current smokers and patients with small airway disease and COPD. *ERJ Open Res*. 2024 Mar 18;10(2):00579-2023. doi: 10.1183/23120541.00579-2023. PMID: 38500797; PMCID: PMC10945381.
3. Gaikwad AV, Eapen MS, Dey S, Bhattarai P, Shahzad AM, Chia C, Jaffar J, Westall G, Sutherland D, Singhera GK, Hackett TL, Lu W, Sohal SS. TGF- β 1, pSmad-2/3, Smad-7, and β -Catenin Are Augmented in the Pulmonary Arteries from Patients with Idiopathic Pulmonary Fibrosis (IPF): Role in Driving Endothelial-to-Mesenchymal Transition (EndMT). *J Clin Med*. 2024 Feb 19;13(4):1160. doi: 10.3390/jcm13041160. PMID: 38398472; PMCID: PMC10888973.
4. Bhattarai P, Lu W, Hardikar A, Dey S, Gaikwad AV, Shahzad AM, Chia C, Williams A, Singhera GK, Hackett TL, Eapen MS, Sohal SS. Endothelial to mesenchymal transition is an active process in smokers and patients with early COPD contributing to pulmonary arterial pathology. *ERJ Open Res*. 2024 Feb 12;10(1):00767-2023. doi: 10.1183/23120541.00767-2023. PMID: 38348240; PMCID: PMC10860200.
5. Brake SJ, Lu W, Chia C, Haug G, Larby J, Hardikar A, Singhera GK, Hackett TL, Eapen MS, Sohal SS. Transforming growth factor- β 1 and SMAD signalling pathway in the small airways of smokers and patients with COPD: potential role in driving fibrotic type-2 epithelial mesenchymal transition. *Front Immunol*. 2023 Jun 26;14:1216506. doi: 10.3389/fimmu.2023.1216506. PMID: 37435075; PMCID: PMC10331458.
6. Booth S, Hsieh A, Mostaco-Guidolin L, Koo HK, Wu K, Aminazadeh F, Yang CX, Quail D, Wei Y, Cooper JD, Paré PD, Hogg JC, Vasilescu DM, Hackett TL. A Single-Cell Atlas of Small Airway Disease in Chronic Obstructive Pulmonary Disease: A Cross-Sectional Study. *Am J Respir Crit Care Med*. 2023 Aug 15;208(4):472-486. doi: 10.1164/rccm.202303-0534OC. PMID: 37406359.
7. Tajima Y, Seow CY, Dong SJ, Tsutsui M, Cheung CY, Welch I, Mowbray L, Imlach B, Hildebrandt R, Apperloo K, Ryomoto B, Goodacre E, Myrdal C, Machan L, Wolff K, Elizur E, Vasilescu DM, Sin DD. Development of a unilateral porcine emphysema model induced by porcine pancreatic elastase. *J Appl Physiol (1985)*. 2023 Nov 1;135(5):1001-1011. doi: 10.1152/jappphysiol.00801.2022. Epub 2023 Sep 28. PMID: 37767558.

MAGNETIC RESONANCE IMAGING CORE

The MRI core has been operating since November 2021 and has supported seven clinical studies for long COVID, cannabis smoking, vaping, COPD, cystic fibrosis and HIV. Across these studies, over 300 participants have been enrolled and completed hyperpolarized xenon MRI to measure pulmonary ventilation, gas exchange, and/or lung microstructure. The 3T scanner is now further equipped with a quantitative myocardial perfusion package for cardiac MRI research applications.

Our MRI results thus far showed that >60% of patients with pulmonary long COVID demonstrate aberrant gas exchange at the level of the alveolar membrane versus capillary red blood cells, despite normal pulmonary function tests. This work has been published in the [European Respiratory Journal](#), and representative ^{129}Xe gas exchange images in long COVID subgroups are shown below. Further analyses are ongoing in cannabis smoking, vaping and cystic fibrosis and have been submitted or accepted for presentation at 2024 international conferences. The core maintains a range of flexible vest radiofrequency coils and a quality control phantom, to accommodate a range of patient sizes and improve image quality. The MRI core also supports paired chest CT acquisition for advanced structure-function pulmonary phenotyping.

HLI is one of ~25 centres worldwide with hyperpolarized xenon gas MRI capabilities, and cardiac MRI capabilities on the system are expanding. Research time on the MRI scanner remains available, and new studies with MRI endpoints are always welcome. HLI PIs have prioritized use of this research time for studies dedicated to heart and lung health and disease. We also remain engaged with the New St. Paul's and CSRC discussions to ensure continuity and minimal disruption of the MRI core with the transition to the new building.



MOLECULAR PHENOTYPING CORE LAB

In line with their commitment to education and outreach, the MPCL actively engaged with the community through initiatives such as HLI's High School Student Science Week and the national Take Our Kids to Work Day. Students were engaged with hands-on learning experiences that encompassed white blood cell identification through staining and cell visualization on a microscope. As well, students were able to operate various technology available in the facility. Participation in events like these facilitate exposure to scientific practices and career paths, inspiring the next generation of researchers.

The MPCL was also successful in receiving a UBC Research Facility Support Grant (RFSG) thanks to the leadership and support from Dr. Liam Brunham. This grant played a significant role in supporting repairs to a heavily utilized piece of equipment, our flow cytometer analyzer which is used for the characterization and enumeration of single cell suspensions. They were also successful at receiving BioTalent funding to support a full-time undergraduate student placement for 8 months.

Throughout 2023, the MPCL's dedication to advancing scientific knowledge and expertise was exemplified by their co-authorship of three impactful manuscripts.

Circulating cytokine levels in systemic sclerosis related interstitial lung disease and idiopathic pulmonary fibrosis.

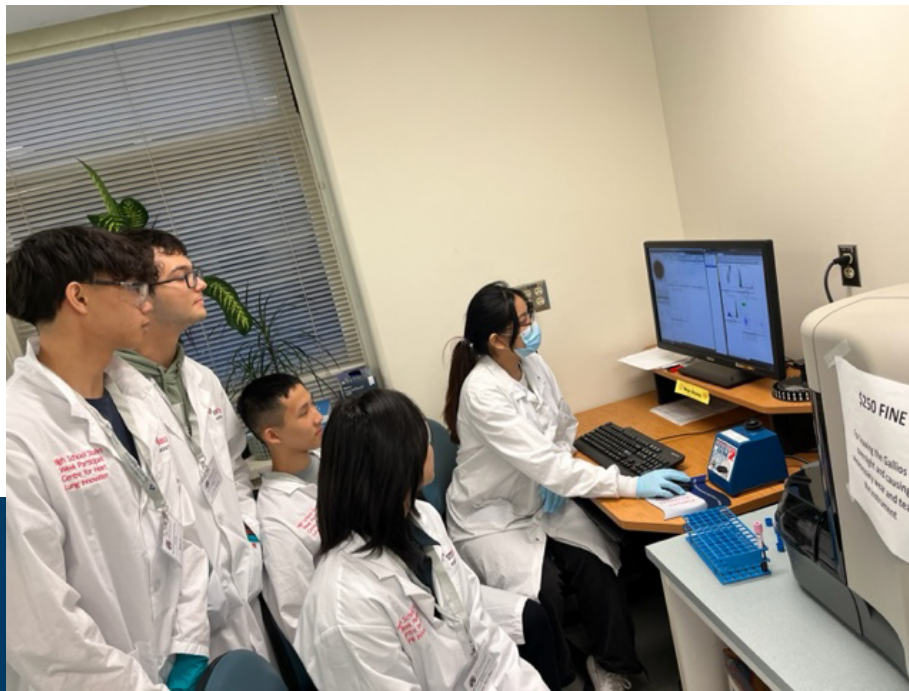
Zheng B, Keen KJ, Fritzier MJ, Ryerson CJ, Wilcox P, Whalen BA, Sahin B, Yao I, Dunne JV. *Sci Rep.* 2023 Apr 24;13(1):6647. doi: 10.1038/s41598-023-31232-4.

Increased Classical Monocytes in South Asian Compared with White Caucasian Individuals at Risk for Coronary Atherosclerosis.

Hosseini F, Franco C, Whalen BA, Taylor CM, Sellers SL, Khan N, Kaila K, Baaney K, Farkouh M, Gupta M, Verma S, Ramanathan K. *Can J Cardiol.* 2023 Nov;39(11):1584-1586. doi: 10.1016/j.cjca.2023.07.028. Epub 2023 Jul 28.

Regulation of MicroRNA Expression in Scleroderma and Idiopathic Pulmonary Fibrosis: A Research Study.

Badyal R, Whalen BA, Singhera GK, Sahin B, Keen KJ, Ryerson CJ, Wilcox P, Dunne JV



MOLECULAR PHENOTYPING CORE LAB

In 2023, the Molecular Phenotyping Core Lab (MPCL) attended the 36th Annual Congress of the International Society for Advancement of Cytometry, held in Montreal, Quebec. This conference served as an unparalleled forum for the exchange of scientific breakthroughs and technological innovations in cytometry science and engineering. Through engaging presentations, workshops, and discussions, our team gained invaluable insights into emerging trends and cutting-edge technologies. The event also provided a unique opportunity for Shared Resource Labs (SRLs) to network, collaborate and learn from each other. By staying abreast of these developments, the MPCL remains equipped to leverage cutting-edge tools and platforms to meet the evolving needs of the research community.

The MPCL also assisted with the comprehensive evaluation of two automated cell isolation systems: Stemcell Technologies' Robosep™ and Miltenyi's autoMACS® NEO. The objective was to evaluate the systems based on time efficiency and cell recovery/purity/viability compared with manual techniques. Through rigorous assessment, valuable insights were gained which has enhanced laboratory workflows. This evaluation underscores our commitment to advancing research methodologies and optimizing resource utilization within our facility

Over the last year, the MPCL provided crucial technical support to two sizeable research endeavours. Firstly, under Dr. James Russell's leadership, they provided the Luminex multiplex immunoassay system along with their technical expertise to investigate thromboinflammation in COVID-19 infection. This project required the analysis of 46 cytokines and 11 coagulation factors from 282 human plasma samples. Secondly, the MPCL provided technical support for Dr. Andrew Krahn's sequencing projects, which required DNA extraction from over 400 human blood samples from the Hearts in Rhythm Organization (HiRO) Biobank. These contributions, among many others, have significantly advanced the understanding of disease mechanisms.



PRECLINICAL SERVICES

The Preclinical Services Team, also known as Genetically Engineered Models (GEM) staff, have had a busy year with coordinating facility infrastructure repairs and involvement with the facility design for the Clinical Support Research Centre. The team contributed technically to a variety of research projects in the following areas: sepsis, amyotrophic lateral sclerosis (ALS) disease, Marfan syndrome, muscular dystrophy, oncology and myocarditis. The team of five, led by Claire Smits, ensured that animal welfare was maintained throughout.

The team hosted the Canadian Association of Laboratory Animal National Exams once again, facilitating successful certification for a number of technicians across BC.



TISSUE CULTURE CORE

The Tissue Culture (TC) Core is dedicated to maintaining primary patient-derived cells and secondary cell lines, serving as a fundamental resource for numerous research projects at HLI. Samples processed within the Core are utilized in wet labs and analyzed in various HLI cores, such as MPLC, Imaging, and Histology, contributing to comprehensive data interpretation for publications.

Throughout May and June 2023, the TC Core undertook a centre-wide initiative to enhance its training protocols through in-person sessions. The goals of the initiative were to ensure strict adherence to established HLI-TC Core procedures among all users, and to uphold rigorous standards of research integrity and safety across all activities conducted within the TC Core. Concurrently, a specialized subcommittee consisting of Claire Smits, Teddy Chan, and Gurpreet Singhera diligently worked to update TC Core Standard Operating Procedures (SOPs). By leveraging open discussions with users, a collaborative effort facilitated the refinement process, thereby ensuring that SOPs remain contemporary and efficacious in guiding research practices within the TC Core.

Keeping up with our HLI training mandate, the TC Core conducted four orientation sessions to provide foundational training to new students and staff. Special emphasis was placed on liquid nitrogen handling training to ensure the safe transportation of samples between floors, promoting a culture of safety within the facility. As part of routine maintenance procedures, biosafety cabinets within the TC Core underwent certification by an accredited company in May 2023.

Acknowledging the need for a dedicated bacterial culture workspace, an interim workspace was established to support new bacterial projects. This initiative ensures that projects are conducted safely and efficiently outside of the dedicated TC Core space, addressing the evolving research requirements of HLI. A dedicated bacterial culture lab has been planned for the new CSRC.

The TC Core actively supported HLI's mentorship mandate by organizing three training sessions for grade 11/12 students. Additionally, visiting scientists were trained in basic cell culture techniques, fostering collaboration and knowledge exchange within the research community. At year-end, the Core achieved self-sustainability by distributing the total cost among all users. Looking ahead, it will foster increased collaborations while continuing to offer project support and training initiatives.



TRAINEE ASSOCIATION

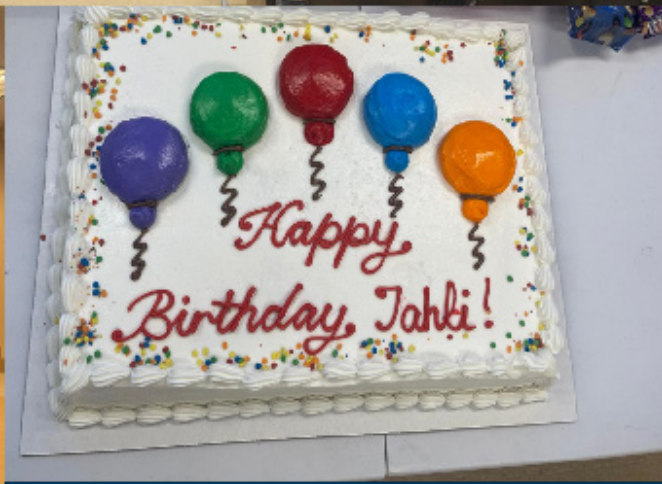
In October TAHLI went through a restructuring, Naomi Potter and Katrina Besler stepped down as co-chairs. Firoozeh V. Gerayeli and Sunaina Chopra have since transitioned to the role of Chair and Administrative Chair of TAHLI.

TAHLI hosted the following events:

- Ice breaker session in the fall to welcome the new trainees and co-ops to HLI.
- Our second annual Donation drive, collecting clothes for shelters.
- Annual Christmas party in December
- In December, we also announced Dr. Yasir Mohamud as the Keith Walley mentorship award winner

Upcoming events for 2024 include:

- 3-session machine learning workshop with Dr. Saquib Sarwar
- Professional development sessions in July and October
- Lunch & learn sessions with other committees
- HLI Research Day:
 - Venue & Date: Robson Square, Friday August 16th
 - Speakers confirmed: Dr. Simon Pimstone & Dr. Simone Rousseau
 - Received sponsorship from: MERCK, Providence Health Research & St Paul Foundation



TRAINEE ASSOCIATION

Professional development committee (co-chairs: Firoozeh V. Gerayeli & Eric Xiang)
The committee hosted various professional development sessions, including:

1. Careers beyond the bench: Dr. Tony Yang discussed career paths and opportunities as a medical science liaison (MSL)
2. Graduate pathway to success: We hosted the UBC Centre for Student Involvement, aiming to provide an opportunity for the trainees to manage their academic experience and career planning
3. Open house for Toastmasters: We hosted Toastmasters organizers to provide HLI trainees an opportunity to improve their public speaking and general communications skills. Trainees now meet weekly
4. HirePhD: We invited the local nonprofit organization, HirePhD, to showcase career paths and opportunities to HLI trainees
5. Pathways to Professional Success: TAHLI and the Professional Development committee hosted an industry networking session in collaboration with HirePhD. Speakers from STEMCELL, AbCellera, Lululemon, and Integrated Nanotherapeutics came to the centre to talk about their careers and network with HLI trainees (hli.ubc.ca/2024/01/3378/). Dr. Darryl Knight and Dr. Denise Daley were among those in attendance.



TRAINEE ASSOCIATION

Biostats committee (Chair: Dr. Linda Lapp)

1. Hosted two workshops for trainees to learn how to use R for data analysis
2. Worked with GenomeBC to host a session in May for metadata analysis

Mentorship committee (co-chairs: Raveen Badyal & Tony Guo)

The committee was active in organizing several social activities for all HLI members:

1. Mentorship ice breaker, pairing 12 mentors and mentees for the semester
2. Monthly coffee walks, providing an opportunity for mentors and mentees to catch-up and network
3. Cooking Class with Gurpreet: networking and learning opportunity for trainees and staff
4. Pink Shirt Day exercise event with EDI committee
5. Ice skating event for all interested HLI trainees and staff
6. End-of-semester mentorship event

Scholarship Committee (Chair: Hattie Luo)

The committee worked with the HLI Grants team (Vivienne Chan and Evan Phillips) to host two interactive workshops, one on abstract writing and one on how to get funded (CGS-D and Vanier awards).



WORKPLACE WELLBEING PROGRAM

In the fall of 2023, HLI expanded its commitment to supporting wellbeing practices in the workplace by teaming with the UBC Workplace Wellbeing program. HLI now has a Workplace Wellbeing Ambassador (WWA) appointed to the centre. Through this initiative, UBC aims to support faculty and staff in their efforts to positively impact workplace wellbeing by building knowledge and applying lessons in the workplace. The role of a WWA is to share resources and learning opportunities as well as to organize and coordinate events and activities that promote the health and wellbeing of everyone in the centre.

To spearhead the new initiative, HLI participated in UBC’s Thrive month by launching the Canadian Mental Health Association’s Not Myself Today “Tip of the Week” program. This 52-week program provides valuable mental health tips to increase awareness and discussion around mental health topics. The tips are posted in high traffic areas throughout HLI, such as lunch rooms and the elevator.

Another initiative that was started in the fall was brought forward by one of HLI’s trainees, Cassie Gilchrist. As the women’s washrooms did not have feminine hygiene dispensers, there was a need to establish something in its place. To address this problem, baskets containing feminine hygiene products were put together and distributed to all female washrooms at HLI. Supplies continue to be refreshed on a regular basis.

These initiatives demonstrate HLI’s proactive approach to supporting the health and wellbeing of its employees, addressing not only immediate needs, but also contribute to fostering a culture of care and support within the organization.



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Agartee Technology Inc.	Interior Health Authority
AllerGen	InterMune Inc.
Alpha-1 Foundation	Ionis Pharmaceuticals, Inc.
Alzheimer Society of Canada	Janssen Inc.
Amarin Pharma Inc.	Juvenile Diabetes Research Foundation International
AMGEN Canada Inc.	La Jolla Pharmaceutical Company
Asahi Kasei Pharma America	Leading Biosciences Inc.
AstraZeneca Canada Inc.	MedImmune LLC
Bayer AG	Merck Sharp & Dohme Corp.
Boehringer Ingelheim (Canada) Ltd.	Michael Smith Health Research BC
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British Columbia Lung Association	National Research Council
British Columbia Proteomics Network	Natural Sciences and Engineering Research Council of Canada (NSERC)
Canada Foundation for Innovation	Novartis Pharmaceuticals Canada Inc.
Canada Research Chairs	Octapharma Canada Inc.
Canadian Diabetes Association	Pfizer Canada Inc.
Canadian Foundation for AIDS Research	Pharmaxis Ltd.
Canadian Institutes of Health Research (CIHR)	ProMetic Life Sciences Inc.
Cyon Therapeutics Inc.	PROOF Centre of Excellence
Cystic Fibrosis Canada	Providence Health Care Research Institute (PHCRI)
Cystic Fibrosis Foundation (US)	Province of British Columbia
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Genome British Columbia	RxSource Corp.
Gilead Sciences Inc.	sanofi-aventis Canada Inc.
GlaxoSmithKline	St. Paul's Hospital Foundation
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Heart and Stroke Foundation of British Columbia and Yukon	Trius Therapeutics Inc.
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UBC and St. Paul's Hospital



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