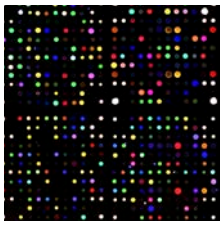
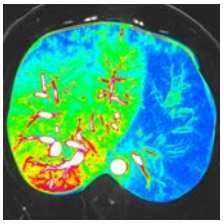
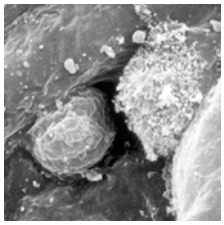
Centre for Heart Lung Innovation

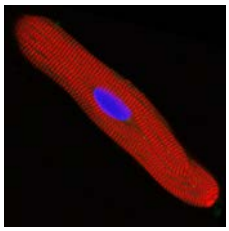
UBC and St. Paul's Hospital



2016 Annual Report







AT A GLANCE

Established in 1977 by Drs. James Hogg and Peter Paré

Director:	Dr. Keith Walley
Associate Directors:	Dr. Gordon Francis
	Dr. Tillie-Louise Hackett
Principal Investigators:	34
Early Career Investigators:	4
Investigators:	17
Research Associates:	5
Technicians:	21
Visiting Scientists:	7
Post-Doctoral Fellows:	36
Graduate Students:	48
Other Students:	39
Core/Operations Staff:	37
TOTAL:	251
Funding in FY 2016-17:	$11.89 Million
Space:	over 50,000 square feet
Hosted Biotech / Spin-off companies:	5

CORE Facilities:

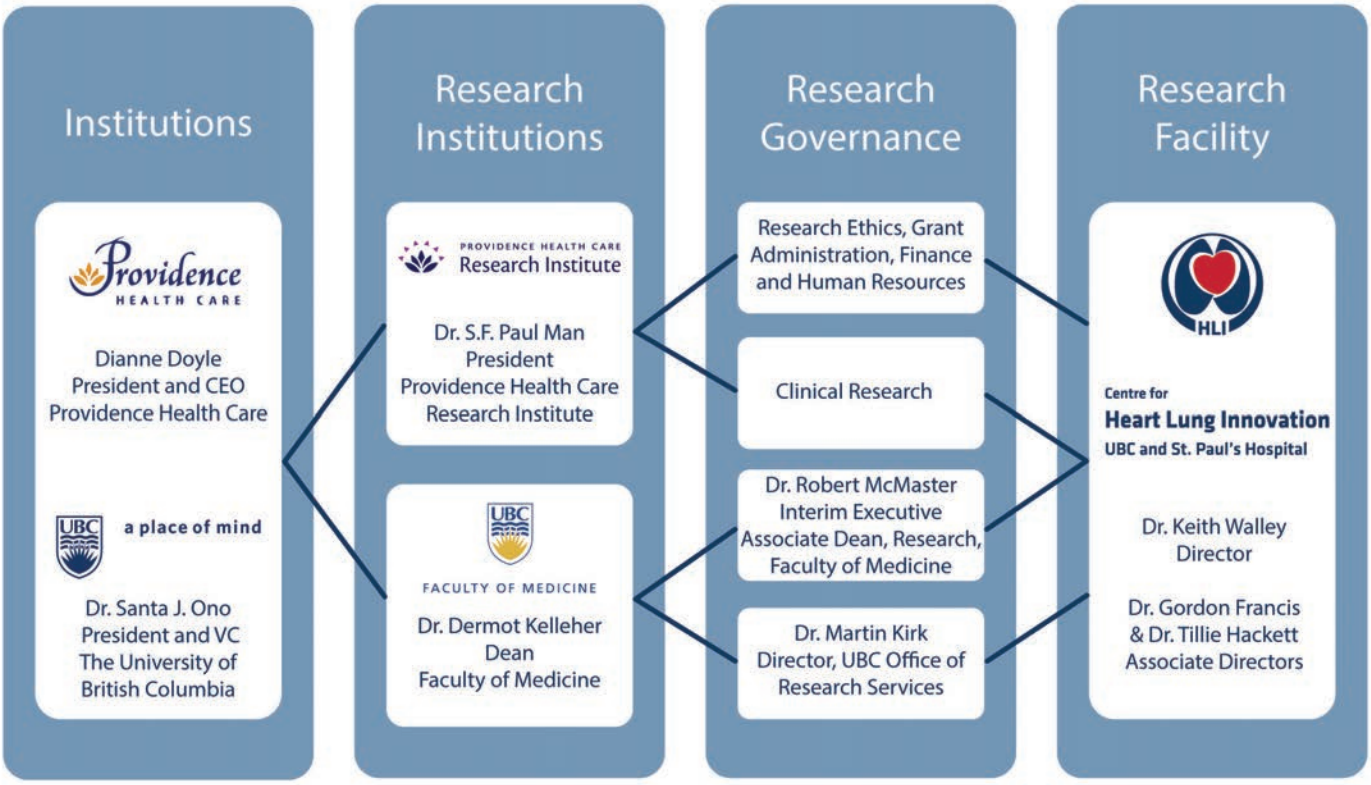
Cardiovascular Registry
Lung Tissue Registry
Cellular Imaging and Biophysics
Imaging Services
Histology
Molecular Phenotyping
Preclinical Services
Clinical Research
Information Technology

TABLE OF CONTENTS

About the Centre for Heart Lung Innovation

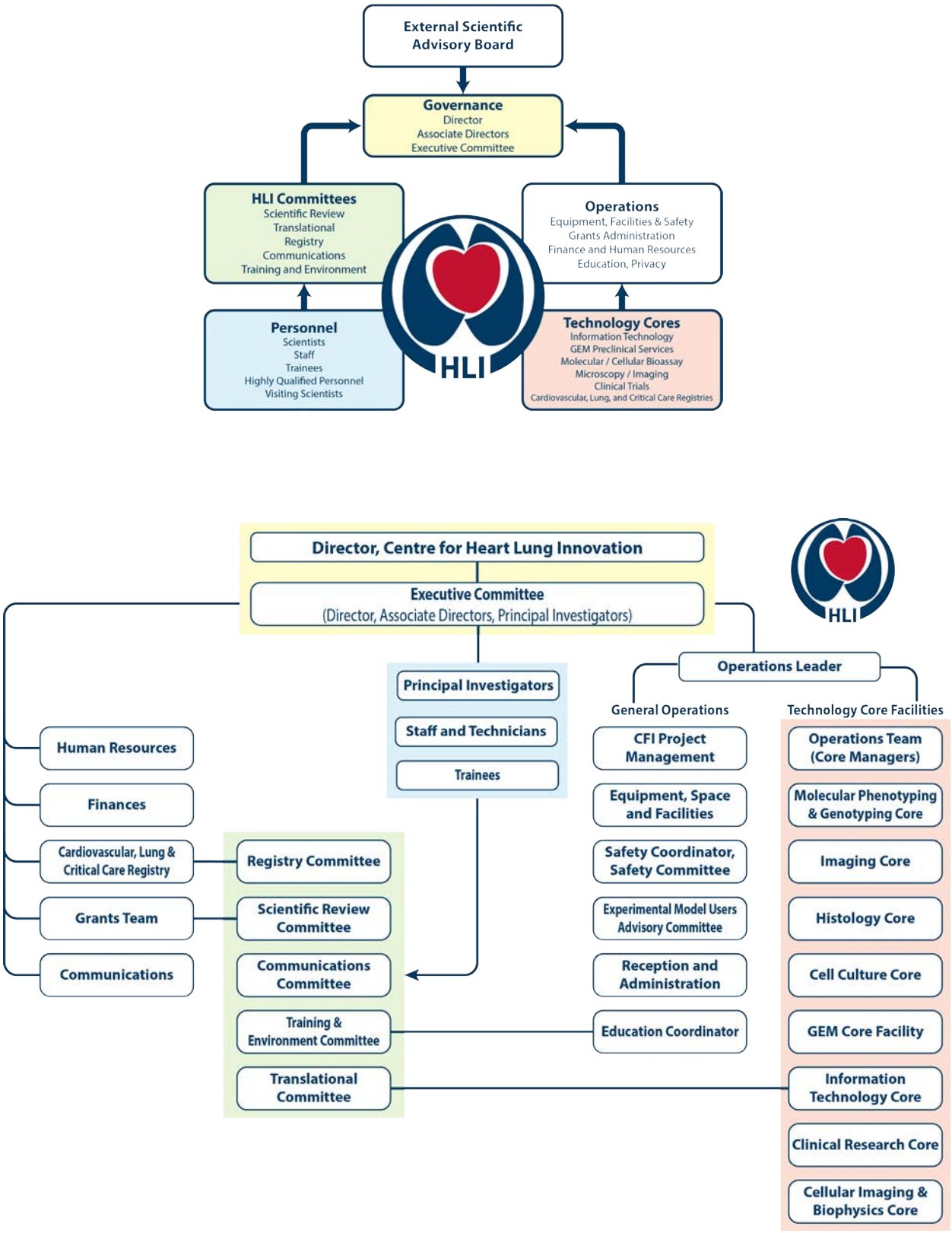
The Centre for Heart Lung Innovation (HLI; previously known as the iCapture and James Hogg Research Centre) is a University of British Columbia (UBC) Senate-approved Centre of Cardiovascular, Pulmonary, and Critical Care expertise, housed within Providence Health Care at St Paul's Hospital. The HLI's dual reporting structure is shown below in Figure 1. This ensures that the research conducted within the HLI adheres to the UBC Strategic Research Plan and is focused on the Providence Health Care "populations of emphasis" that include people with heart and lung disease.

Figure 1. Governance structure of the Centre for Heart Lung Innovation. 2016



The management structure under the HLI Executive involves a team approach led by Principal Investigators, Operations staff, and the Technology Cores.

Figure 2. Management structure of the Centre for Heart Lung Innovation.



MESSAGE FROM THE DIRECTOR

Dear Colleagues,

This Annual Report highlights the achievements of the Centre for Heart Lung Innovation's (HLI) Investigators and trainees in 2016.

Our success as a world-class research facility continues with the release of 299 publications for the calendar year 2016 and the receipt of $11.89 Million in funding for fiscal year 2016/2017. In 2016, we continued to gain exceptional researchers by adding new investigators to our team including: Dr. Jonathon Leipsic as a Principal Investigator, Dr. Simon Pimstone as an Investigator, and Dr. Zachary Laksman as an Early Career Investigator to support his development into a Principal Investigator.

This past year, the HLI researchers had phenomenal success in attracting prestigious and diverse research funding and awards, including three John Evans Leaders Awards from the Canada Foundation for Innovation, and numerous grants from the Canadian Institutes for Health Research, Heart and Stroke Foundation, and BC Lung Association.

2016 was an exceptionally successful year for our trainees and young investigators; our young Principal and Early Career Investigators received two Michael Smith Foundation for Health Research Scholar Awards, one Heart and Stroke Foundation New Investigator Award, one Canadian Institutes for Health Research New Investigator Award, as well as numerous other awards and recognitions.

The HLI scientists, trainees and staff would like to thank our funding partners: Canadian Institutes for Health Research, Canada Foundation for Innovation, BC Knowledge Development Fund, Providence Health Care,

University of British Columbia, Heart and Stroke Foundation of BC and Yukon, BC Lung Association, the St Paul's Hospital Foundation, the National Institutes for Health, and many vendors and industrial collaborators, for their crucial support of our ongoing programs for the race against cardiovascular/pulmonary/critical care disease.

We are proud of our progress to date and look forward to an equally successful 2017.

With kind regards,

Keith R. Walley, MD
Director, Centre for Heart Lung Innovation
Professor of Medicine, UBC
Associate Director ICU, St. Paul's Hospital

RESEARCH SPOTLIGHT

Dr. Mari DeMarco: Development of diagnostic tests for dementia

There are currently over half a million Canadians living with dementia. Although Alzheimer's disease is the most common type of dementia, there are other types including Lewy body dementia, frontotemporal degeneration, and vascular dementia. Diagnosing the specific type of dementia is necessary to ensure that patients receive the appropriate care and to help develop new disease-modifying therapeutics. Dr. Mari DeMarco, a Clinical Chemist at St. Paul's Hospital and an Early Career Investigator at the HLI, has developed a new test that can help physicians diagnose Alzheimer's in the early stages of the disease. The new test assesses the amount of particular proteins in the cerebrospinal fluid, the fluid that surrounds and protects the brain. These proteins are known to have a pathogenic role in specific types of dementia. Since even low levels of these proteins can be detected with Dr. DeMarco's method (using a technique called mass spectrometry), the hope is that earlier detection will be possible, potentially even prior to the onset of symptoms. Early and accurate diagnosis of Alzheimer's disease is critical because timely access to healthcare and community services has the potential to slow disease progression and improve quality of life. Early detection offers patients the opportunity to self-direct care and long-term planning. As new therapies become available, this test also provides the opportunity to begin treatment sooner to help prevent the progression and impact of the disease..

We aim to create better tools for timely diagnosis of Alzheimer's disease and other dementias, and make these tools easily accessible to those that need them.

FEATURED IN:

Global TV News, 25 Jan 2016
Human trials to be conducted on new Alzheimer's test
http://globalnews.ca/video/2477045/human-trials-to-be-conducted-on-new-alzheimers-test/

The Province, 25 Jan 2016
St Paul's [Hospital] develops more reliable Alzheimer's test
http://theprovince.com/news/local-news/st-pauls-develops-a-more-reliable-alzheimers-test

CKNW AM980 - Lynda Steele Show, 26 Jan 2016
Vancouver research spots Alzheimer's early
http://www.cknw.com/2016/01/26/the-lynda-steele-show-vancouver-research-spots-alzheimers-early/

Alzheimer Society of BC - Boomer Life, Mar 14, 2016
Dementia Research in BC
https://soundcloud.com/alzheimer-society-of-bc/boomerlife-mar-14th-2016

Huffington Post, Nov 11, 2016
Treatments for one type of dementia may also work in others
http://www.huffingtonpost.com/howard-fillit-md/treatments-for-one-typeo_b_13054702.html

HLI Sepsis Researchers: Predicting the response to corticosteroids in septic shock

Septic shock can occur in patients with sepsis, which is defined as the actual or suspected presence of an infection in addition to an aberrant inflammatory response. Septic shock leads to dangerously low blood pressure, reducing the body's ability to circulate the blood effectively. A team of HLI researchers, including Drs. Peter Bentzer (now at the University of Lund), Keith Walley, John Boyd and Jim Russell, conducted a retrospective study to determine if plasma cytokine concentrations can predict a beneficial response to corticosteroid treatment in patients with septic shock. Data was collected from patients that were part of a large randomized control trial (VASST - assessing vasopressin use in septic shock treatment). Patients that received or did not receive corticosteroid treatment were matched. A panel of 39 cytokines were measured at baseline and compared between the two groups of patients. While there were no differences in survival between patients that received corticosteroids or did not, there was a 13-member cytokine panel identified that predicted positive response to corticosteroid treatment. This finding suggests that plasma concentrations of selected cytokines may serve as a useful predictive biomarker to identify septic shock patients that may benefit from treatment with corticosteroids.

Plasma concentration of selected cytokines is a potential predictive biomarker to identify septic shock patients that may benefit from treatment with corticosteroids.

Bentzer P, Fjell C, Walley KR, Boyd J, Russell JA. Plasma cytokine levels predict response to corticosteroids in septic shock. Intensive Care Med. 2016 Dec;42(12):1970-1979.

Critical Care News, Nov 2016
http://criticalcare.news/story/plasma-cytokine-levels-predict-response-to-corticosteroids-in-septic-shock

Dr. Christopher Ryerson: Online information related to IPF is often inaccurate, incomplete and outdated

Idiopathic pulmonary fibrosis (IPF) is a chronic disease characterized by deteriorating lung function, often manifesting as shortness of breath. Despite the existence of current guidelines for IPF diagnosis, management and drug therapy, most patients with IPF obtain information from online sources. Dr. Chris Ryerson, a respirologist and Principal Investigator at the HLI, and colleagues recently conducted a study to assess the quality of internet resources intended for the general public, related to IPF. The majority of the 181 websites included in the study provided incomplete and incorrect information, and Wikipedia was found to have the best content and quality balance. Overall, a patient's lack of access to reliable information about IPF through internet resources is a barrier to patient education. This study highlights challenges faced by non-experts in trying to determine the quality of health-related information available on internet resources. This study also emphasizes that IPF stakeholders need to take a more active role in ensuring the accuracy, quality, and readability of online health information.

Patients who rely on the internet for treatment recommendations may be putting themselves at considerable risk.

Publication: Fisher JH, O'Connor D, Flexman AM, Shapera S, Ryerson CJ. Accuracy and reliability of internet resources for information on Idiopathic Pulmonary Fibrosis. Am J Respir Crit Care Med. 2016 Jul 15;194(2):218-25. doi: 10.1164/rccm.201512-2393OC.

Science Daily, Feb 5, 2016
https://www.sciencedaily.com/releases/2016/02/160205100454.htm

HLI COPD Researchers:

Sex differences in airway remodeling in a model of COPD

Chronic Obstructive Pulmonary Disease (COPD) is characterized by small airway remodeling and emphysema. Several researchers at the HLI investigate the underlying mechanisms responsible for the development of COPD. In particular, a recent study by Dr. Anthony Tam, a Postdoctoral Fellow in Dr. Don Sin's lab, and colleagues focused on the role of sex hormones in exacerbating the decline in lung function in females with COPD, who show a faster decline than males. The researchers used a mouse model to examine airway remodeling and emphysema in male and female mice exposed to cigarette smoke. In addition, they also measured the thickness of airways in male and female human smokers who were at risk of, or who already had, mild COPD using optical coherence tomography. The researchers found that small airway remodeling was increased in female mice compared to male mice, and that this sex difference could be prevented by blocking the female sex hormone estrogen. Also, compared to male human smokers, females had thicker airway walls. These results confirm that females are at increased risk of small airway disease after chronic cigarette smoke exposure and that blocking estrogen hormones may be a potential therapeutic target for female smokers at risk of COPD.

Estrogen receptor antagonism might be of value in reducing oxidative stress in female smokers.

Tam A, Churg A, Wright JL, Zhou S, Kirby M, Coxson HO, Lam S, Man SF, Sin DD. Sex differences in airway remodeling in a mouse model of Chronic Obstructive Pulmonary Disease. Am J Respir Crit Care Med. 2016 Apr 15;193(8):825-34. doi: 10.1164/rccm.201503-0487OC.

Comment in Am J Respir Crit Care Med, Apr 2016
Am J Respir Crit Care Med. 2016 Apr 15;193(8):813-4. doi: 10.1164/rccm.201512-2379ED

Predicting lung function decline in COPD

The rate of lung-function decline in chronic obstructive pulmonary disease (COPD) varies substantially among individuals. A team of researchers, including HLI researchers Drs. Don Sin, Paul Man, Bruce McManus, and Zsuszanna Hollander, recently conducted a study to develop and validate a model to predict lung function decline in individual patients who have mild COPD. The model specifically predicts future decline in forced expiratory volume at 1 second (FEV1), a common measure of lung function. Using data from 5594 patients who were part of a large, long-term clinical trial (the Lung Health Study) the researchers predicted future FEV1 values over 11 years according to clinical traits. The researchers found that a substantial part of individual variation in FEV1 decline can be explained by easily measured clinical variables. Importantly this model can be used to predict future lung health in patients with mild-to-moderate COPD. The algorithm developed by the researchers was added to a website that allows COPD physicians to predict how a patient's progression could be delayed with tailored therapies, thus allowing for precision, or individualized, medicine.

The model can be used for prediction of future lung health in patients with mild-to-moderate COPDs.

Publication: Zafari Z, Sin DD, Postma DS, Löfdahl CG, Vonk J, Bryan S, Lam S, Tammemagi CM, Khakban R, Man SF, Tashkin D, Wise RA, Connett JE, McManus B, Ng R, Hollander Z, Sadatsafavi M. Individualized prediction of lung-function decline in chronic obstructive pulmonary disease. CMAJ. 188(14): 1004-1011, 2016.

CityNews, Aug 26, 2016
http://www.citynews.ca/2016/08/26/crystal-ball-like-web-tool-could-help-patients-with-lung-disease-b-c-doctor/

The Granville Lab: Investigating the role of Granzyme B in cardiac fibrosis

Heart failure affects more than 5 million people in North America, and approximately half of all patients diagnosed with heart failure will die within five years due to a lack of effective therapies. Cardiac fibrosis, characterized by an increase in extracellular matrix proteins within the heart muscle, is a common pathological feature observed in many causes of heart failure. Dr. David Granville's laboratory studies the role of Granzyme B (GzmB), which has been suggested to play a role in the development of fibrosis. Recent research led by Dr. Yue Shen, a Postdoctoral Fellow in Dr. Granville's lab, and colleagues showed that levels of GzmB were increased in fibrotic human hearts and in mice in which cardiac fibrosis was experimentally induced using angiotensin II. In addition, using a mouse model, the researchers found that mice that lack the GzmB gene were protected against angiotensin II-induced cardiac fibrosis. GzmB deficiency reduced microvascular permeability, inflammation and fibroblast accumulation, ultimately protecting the heart from cardiac fibrosis development. This suggests that targeting GzmB may be a potential therapeutic strategy for intervening in the progression of cardiac fibrosis.

Targeting Granzyme B may be beneficial in interrupting the progression of cardiac fibrosis.

Publication: Shen Y, Cheng F, Sharma M, Merkulova Y, Raithatha SA, Parkinson LG, Zhao H, Westendorf K, Bohunek L, Bozin T, Hsu I, Ang LS, Williams SJ, Bleackley RC, Eriksson JE, Seidman MA, McManus BM, Granville DJ. Granzyme B deficiency protects against Angiotensin II-Induced Cardiac Fibrosis. Am J Pathol. 2016 Jan;186(1):87-100. doi: 10.1016/j.ajpath.2015.09.010.

Dr. Brad Quon: Identification of a pulmonary exacerbation biomarker for Cystic Fibrosis patients

Cystic fibrosis (CF) is a genetic disease that eventually leads to death due to progressive lung damage from chronic infection and inflammation of the lungs. There is currently no way to definitely diagnose exacerbations of CF, which cause a worsening of symptoms and an increase in mortality. Dr. Bradley Quon, a Principal Investigator at the HLI and the Research Director of the St. Paul's Hospital Adult Cystic Fibrosis Clinic, and colleagues conducted a recent study to identify blood-based biomarkers that can predict the onset of pulmonary exacerbations in CF patients. Using multiple reaction monitoring mass spectrometry (MRM-MS), the team identified a 6-protein panel that is able to distinguish between patients with or without an imminent exacerbation. The 6-protein panel identified by MRM-MS must be clinically validated, but the hope is that using this panel will provide advanced warning of pulmonary exacerbations in the future. With advanced warning, a pre-emptive strategy could be utilized to reduce the impact of exacerbations on lung function and ultimately enhance quality of life for those living with CF.

With further replication and assay development, this biomarker panel may be clinically applicable for prediction of exacerbations.

Quon BS, Dai DL, Hollander Z, Ng RT, Tebbutt SJ, Man SF, Wilcox PG, Sin DD. Discovery of novel plasma protein biomarkers to predict imminent cystic fibrosis pulmonary exacerbations using multiple reaction monitoring mass spectrometry. Thorax. 71(3):216-22, 2016.

Cyctic Fibrosis Care: Advancement Program, Mar 2016
http://www.advancesincf.org/newsfeed/47-new-and-emerging-targeted-therapies-for-cystic-fibrosis

HLI Principal Investigator Dr. Bradley Quon and trainee Minhee Jin in the laboratory

HLI INVESTIGATORS

HLI Investigators

34 PRINCIPAL INVESTIGATORS

Michael Allard
Pascal Bernatchez
John Boyd
Liam Brunham
Pat Camp
Chris Carlsten
Harvey Coxson
Denise Daley
Del Dorscheid
Gordon Francis
David Granville
Jordan Guenette
Tillie Hackett
James Hogg
Andrew Krahn
Scott Lear
Jonathon Leipsic
Honglin Luo
Paul Man
Bruce McManus
Raymond Ng
Peter Paré
Simon Pimstone
Brad Quon
James Russell
Chris Ryerson
Andrew Sandford
Chun Seow
Don Sin
Wan Tan-Hogg
Scott Tebbutt
Stephan van Eeden
Keith Walley
Decheng Yang

4 EARLY CAREER INVESTIGATORS

Mari DeMarco
Janice Leung
Michael Seidman
Zachary Laksman

NEW INVESTIGATORS

New Early Career Investigator

Zachary Laksman, MD, MSc

Clinical Assistant Professor, Division of Cardiology, UBC
Adjunct Professor, Biomedical Physiology and Kinesiology, SFU
Director, Inherited Arrhythmia Clinic and Atrial Fibrillation Clinic, St. Paul's Hospital

Dr. Zachary Laksman is a clinician scientist with a specific focus on cardiogenetics, stem cell disease modeling, and personalized medicine. Dr. Laksman's research is funded by the Canadian Institutes of Health and Research, the Heart and Stroke Foundation, and the Canadian Cardiovascular Society.

Dr. Laksman graduated from medical school at the University of Toronto after which he completed his MSc at the University of Toronto under the supervision of Drs. Peter Backx and Gordon Keller. He specializes in the management of cardiac arrhythmias, and simple and complex ablation and device implantation. Dr. Laksman holds the Dr. Charles Kerr distinguished Scholar in Cardiovascular Genetics.

New Investigator

Simon Pimstone, MD, PhD, FRCPC

Director, President and CEO at Xenon Pharmaceuticals Inc.
Clinical Associate Professor, Division of General Internal Medicine, UBC

Dr. Pimstone is a founder, Director, and President and Chief Executive Officer at Xenon Pharmaceuticals Inc., one of Canada's leading privately owned biotechnology companies. Xenon is engaged in discovering and developing novel pharmaceuticals targeting genes and proteins that underlie human diseases.

He received his MD from the University of Cape Town and his PhD through the University of Amsterdam. He is an internal medicine specialist (FRCPC) with an interest in cardiovascular disease.

He is a member of the Translation Advisory Committee of the PROOF Centre, a member of the Advisory Board of the CMMT and a member of the BC Health Research Strategy Advisory Board for the MSFHR. Dr. Pimstone serves as a consultant physician at the UBC Medical and Cardiology Clinic at UBC Hospital. He is a founder and co-PI of SAVE BC, a provincial program of families with very premature atherosclerotic cardiovascular disease. Dr. Pimstone serves as Chair of the Board of Directors of Eupraxia Pharmaceuticals and Accuro Technologies Inc.

In 2005 he received the Business in Vancouver Top 40 under 40 Award and in 2004 the Globe & Mail's Canadian Top 40 Under 40 Award. Dr. Pimstone is the author of numerous peer-reviewed publications and is also a regular guest speaker at international scientific meetings and healthcare conferences.

NEW INVESTIGATORS

New Principal Investigator

Jonathon Leipsic, MD, FRCPC FSCCT

Associate Professor, Radiology and Cardiology, UBC

Dr. Jonathon Leipsic is the Chairman of the Department of Radiology for Providence Health Care and the Vice Chairman of Research for the UBC Department of Radiology. He is an Associate Professor of Radiology and Cardiology with UBC. Dr Leipsic is also a Canada Research Chair in Advanced Cardiopulmonary Imaging. Dr. Leipsic has over 325 peer reviewed manuscripts in press or in print, over 250 scientific abstracts, and is the editor of 2 textbooks. He speaks internationally on a number of cardiopulmonary imaging topics with over 120 invited lectures in the last 4 years. He is the Immediate Past President of the Society of Cardiovascular Computed Tomography (CT), the largest international society dedicated to Cardiac CT.

INVESTIGATOR RESEARCH PROFILES

Michael Allard
UBC Department of Pathology and Laboratory Medicine

Dr. Allard's research program focuses on adaptation of the heart to physiological states, such as endurance exercise, and pathological processes, such as hypertension, that result in cardiac hypertrophy. He is particularly interested in how these conditions alter substrate use by the heart and how changes in substrate use influence heart function. A major recent focus of his research has been delineation of the cellular and molecular mechanisms that account for the alterations in substrate use by the hypertrophied heart.

Pascal Bernatchez
UBC Department of Anesthesiology, Pharmacology, and Therapeutics

Dr. Bernatchez's research program is aimed at the dynamic interplay between blood vessel homeostasis and chronic diseases, such as hypertension, atherosclerosis, rare muscular dystrophies and aortic aneurysm associated with Marfan syndrome, as well as exploring novel pharmacological approaches to treat and prevent endothelial dysfunction and its consequences. Dr. Bernatchez's most recent work focuses on the novel regulation mechanism of nitric oxide bioavailability and its role in vascular disease, and how plasma lipid levels influence the loss of muscle function in dystrophic patients.

John Boyd
UBC Department of Medicine

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. In collaboration with Dr. Robert Hancock, he recently identified a 31 gene endotoxin tolerance profile which predicts subsequent organ failure. Following the recent discovery of the role of the PCSK9 enzyme in the clearance of pathogenic bacterial and fungal lipids from the bloodstream, he collaborates with Drs. Keith Walley and James Russell to develop an anti-PCSK9 therapy as a novel treatment for sepsis.

Liam Brunham
UBC Department of Medicine

Dr. Brunham's research focuses on understanding how changes in specific genes contribute to differences in drug response as well as to alterations in plasma lipid levels and their relationship to metabolic and cardiovascular disease. His laboratory uses cutting-edge approaches in human genetics including genome-wide association studies and next-generation sequencing to investigate the role of genetic variation in these phenotypes. In December 2015, Dr. Brunham started a collaboration with Dr. Simon Pimstone to launch the SAVE BC study, aiming to identify risk factors and develop new approaches for diagnosis and treatment of BC families affected by early-onset atherosclerotic heart disease.

Pat Camp
UBC Department of Physical Therapy

Dr. Camp's research interests focus on improving the physical activity of individuals with chronic lung disease. Her current studies include optimal exercise prescription and the measurement of physical activity for COPD patients as part of a pulmonary rehabilitation program; eHealth technology for pulmonary rehabilitation; and pulmonary rehabilitation for lung disease patients with cardiovascular comorbidity.

Christopher Carlsten
UBC Department of Medicine

Dr. Carlsten's clinical and research interests centre on occupational airways disease, including the effects of inhaled exposures on asthma induction and exacerbation. His laboratory investigates the pulmonary-immunological health effects of inhaled environmental and occupational exposures, using diesel exhaust, western red cedar, and phthalates as model inhalants. His research addresses the fundamental question of the synergism of inhaled particles and allergens in mediating health effects. Dr. Carlsten's lab uses an interdisciplinary, team-focused approach to ask related questions on genetic, cellular, functional, and epidemiologic levels.

Harvey Coxson
UBC Department of Radiology

Dr. Coxson specializes in quantitative imaging of the lung, particularly computed tomography, with correlations to quantitative pathology and pulmonary function. Dr. Coxson's laboratory is the core imaging site for the Canadian Cohort of Obstructive Lung Disease (CanCOLD) study, a population based study of COPD, and was the core imaging analysis site for the international COPD study ECLIPSE. Dr. Coxson also works with investigators across Canada as part of the Thoracic Imaging Network of Canada and the Canadian Respiratory Research Network.

Denise Daley
UBC Department of Medicine

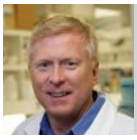
Dr. Daley is utilizing cutting-edge statistical, epigenetic, and bioinformatics techniques to obtain a better understanding of how inherited genetic variants and environmental exposures interact to modify the risk for developing disease. Her lab has recently completed several genome-wide association and sequencing studies to identify genetic susceptibility to common complex diseases such as asthma and COPD, and initiated new studies focused on the evaluation of the "epigenome", or the genome's response to environmental exposures. Dr. Daley's overall research goal is to better understand the etiology of disease and the modifiable environmental risk factors to identify individuals at greatest risk and develop biomarkers and public health interventions.

Mari DeMarco
UBC Department of Pathology and Laboratory Medicine

With a strong interest in bridging basic biomedical science, analytical chemistry, and laboratory medicine, Dr. DeMarco's research group specializes in new methodological approaches for identification and quantitation of protein biomarkers of health and disease. A particular focus is advancing clinical diagnostics for neurodegenerative disorders, such as Alzheimer's disease and frontotemporal dementia. This work to translate new biomedical discoveries into patient care is accomplished in collaboration with clinicians and scientists at HLI, the UBC Centre for Brain Health and the provincial Clinic for Alzheimer's Disease and Related Disorders.

Delbert Dorscheid
UBC Department of Medicine

Dr. Dorscheid leads an active research group investigating the role of the airway epithelium in the genesis of inflammatory airways diseases. The research program studies the role for inappropriate injury-repair cycles in the development of both chronic diseases such as asthma and acute illnesses like ALI/ARDS. Specific projects include the role of glucocorticoid-induced airway epithelial cell apoptosis, novel glycoproteins and the glycomics involved in the repair of an injured epithelium, and the expression of FasL as an immune barrier for the airway.



Gordon Francis
UBC Department of Medicine

Dr. Francis's research involves understanding the mechanisms of accumulation of cholesterol in arteries in atherosclerosis, and how to remove this cholesterol to prevent coronary heart disease and stroke. Current major projects in his lab include: understanding the role of cholesterol derived from lysosomes in regulating gene expression required for cholesterol removal from cells, and whether accumulation of excess cholesterol in lysosomes is a feature of atherosclerosis; understanding the reason arterial smooth muscle cells appear to accumulate more cholesterol than arterial macrophages; and developing synthetic peptides that turn on production of the beneficial cholesterol particles, high density lipoproteins (HDL), to help remove excess cholesterol from the artery wall and thereby reduce atherosclerosis. His lab recently demonstrated that smooth muscle cells, rather than monocyte-derived macrophages, are the primary site of cholesterol overaccumulation in human and mouse atherosclerotic plaque, which may lead to a major paradigm shift in the understanding of the pathogenesis and treatment of ischemic vascular disease.

David Granville
UBC Department of Pathology and Laboratory Medicine

Dr. Granville's research group has identified a pathogenic role for granzyme serine proteases in inflammation, impaired tissue healing and remodeling. It is now recognized that apoptosis is not the only function of granzymes and that granzymes also promote inflammation, activate protease-activated receptors, and cleave extracellular proteins. Dr. Granville's recent publication defined a mechanism by which UV light induces GzmB in the skin, leading to collagen degradation and disrupted remodeling. In collaboration with viDA Therapeutics, Dr. Granville's laboratory is developing a novel, small molecule inhibitor of GzmB that can be applied topically to the skin to treat UV-induced skin injury and scarring.

Jordan Guenette
UBC Department of Physical Therapy

The primary aim of Dr. Guenette's research program is to better understand the physiological factors that limit exercise tolerance across the spectrum of health and chronic lung disease. His lab uses a number of novel measurement techniques to simultaneously assess the respiratory, cardiovascular, muscular and neuro-physiological responses to exercise. His current project aims to identify the causes of shortness of breath in patients with interstitial lung disease (ILD) and chronic obstructive pulmonary disease (COPD). Ultimately, this research will lead to the development of more effective treatments to better manage breathlessness and improve exercise tolerance and quality of life for individuals with chronic respiratory diseases.

Tillie Hackett
UBC Department of Anesthesiology, Pharmacology, and Therapeutics

Dr. Hackett's research program is focused on understanding the disruption of normal repair processes within the epithelial-mesenchymal trophic unit (EMTU) of the lung and how this propagates inflammation and tissue remodeling in patients with obstructive lung disease. Her laboratory uses an innovative and targeted approach to isolate cells from donor lungs guided by Computed Tomography imaging. The goal of this research program is to further understand the airway microenvironment to determine therapeutic targets in order to prevent the initiation and perpetuation of pathological processes which contribute to obstructive airway diseases like asthma and chronic obstructive pulmonary disease.

James Hogg
UBC Department of Pathology and Laboratory Medicine

Dr. Hogg has been on the staff of the University of British Columbia at St. Paul's Hospital since 1977 and is currently an Emeritus Professor of Pathology at UBC. He 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. Very recently he and his colleagues used microCT to show that terminal and respiratory bronchioles are sequentially destroyed in COPD. Dr. Hogg collaborated with Dr. Avrum Spira's group at Boston University to demonstrate a 127 gene expression signature for emphysematous destruction that showed this signature could be reversed toward control levels by the tripeptide GHK. He began to study the lung microbiome in COPD and is currently examining the host response to this microbiome in human lung.

Andrew Krahn
UBC Department of Medicine

Dr. Krahn's current research interests include investigating the genetic causes of arrhythmias, causes of loss of consciousness, and implantable arrhythmia device monitoring. Dr. Krahn is working on creating a province-wide network that would refer individuals with inherited arrhythmia and their relatives to a clinic at St. Paul's Hospital or Royal Jubilee Hospital in Victoria, or use telemedicine technologies to provide remote examinations and counselling.

Zachary Laksman
UBC Division of Cardiology, SFU Department of Biomedical Physiology and Kinesiology

Dr. Laksman's reserach focus is on the genetic basis for diseases of the heart muscle, heart rhythm, and sudden cardiac death. An element of Dr. Laksman's work involves using a stem cell model and growing heart cells in a dish. In doing so, Dr. Laksman's laboratory can model an individual patient's specific disease, apply medicines to it, and study the cause of the disease and the effect of treatment.

Scott Lear
Simon Fraser University Faculty of Health Sciences

Dr. Lear's research focuses on effective prevention and management policies and programs for cardiovascular and other chronic diseases. His research uses a population and health services approach to prevent and manage disease (www.CoHeaRT.ca). This work includes investigating how the "built" environment in which we live acts as either a barrier or facilitator of healthy behaviours. His Multi-cultural Community Health Assessment Trial (M-CHAT) is an ongoing investigation to identify the role of ethnic background in risk for obesity, diabetes and cardiovascular disease. For people with disease, Dr. Lear looks at how technology can support patients in managing their chronic diseases under the umbrella of the British Columbia Alliance for Telehealth Policy and Research (www.BCATPR.ca).

Jonathon Leipsic
UBC Department of Radiology

Dr. Leipsic's research program is at the forefront of advanced imaging for structural heart disease and has helped guide the use of computed tomography in these procedures on a global scale. His team has published extensively in this realm as well as more broadly in the realm of coronary artery atherosclerosis, prognosis, and the interplay between ischemic heart and chronic obstructive pulmonary disease. Some of his work has informed and modified clinical practice on a global scale. He is extremely excited about the opportunity to continue to learn about how advanced imaging can help improve clinical practice at present, as well as allow for the potential for deeper understanding of the mechanisms and drivers of acute myocardial infarction, sudden cardiac death, and chronic pulmonary obstructive disease exacerbations.

Janice Leung
UBC Department of Medicine

Dr. Leung is studying the clinical outcomes, manifestations, and underlying mechanisms of HIV-associated chronic obstructive pulmonary disease. In particular, she is interested in the pathogenesis of accelerated aging in the lung and has detected signs of accelerated aging using the blood and airway epithelial cells from HIV-infected patients. Platforms for this research include next generation sequencing methylomics and transcriptomics as well as the microbiome.

Honglin Luo
UBC Department of Pathology and Laboratory Medicine

The focus of Dr. Luo's research is to define the pathogenetic determinants of virus-host interactions in enterovirus-induced heart disease. She is currently working on: (1) Protein degradation pathways, including the ubiquitin/proteasome pathway and the autophagy pathway, in virus-induced myocarditis and dilated cardiomyopathy; and (2) The molecular mechanisms of impaired cardiac function in viral myocarditis.

Bruce McManus
UBC Department of Pathology and Laboratory Medicine

Dr. McManus is the CEO of the Centre of Excellence for Prevention of Organ Failure (PROOF) and the Co-Director of the Institute for Heart + Lung Health. His research program is focused on mechanisms, consequences, detection and prevention of injury and aberrant repair involved in inflammatory diseases of the heart and blood vessels. Dr. McManus works in a cross-disciplinary fashion on translational research questions for which answers are critically enabled by computational sciences including molecular biomarker discovery and validation, information acquisition, annotation, and use, and registry development to support heart and lung research.

Peter Paré
UBC Department of Medicine

Dr. Paré is an Emeritus Professor of Respiratory Medicine and Pathology. Dr. Paré's research expertise is in the pathophysiology and genetics of asthma and COPD. Dr. Paré and colleague Dr. Chun Seow are investigating the molecular and bio-mechanical events which relate broncho-constricting stimuli to the ultimate airway narrowing in asthma and other obstructive airway diseases. They are examining isotonic and isometric length-tension properties, and the plastic behaviour of smooth muscle using physiologic, morphologic and biochemical approaches. With colleagues Drs. Don Sin and Ma'en Obeidat, he is studying the genetic control of gene expression in the lung and blood of COPD patients.

S.F. Paul Man
UBC Department of Medicine

Dr. Man's research expertise is in clinical trials and translational research, particularly in chronic obstructive lung disease. The clinical outcomes in COPD are unexpectedly influenced by the premature development of atherosclerosis. In close collaboration with Dr. Don Sin, he has been trying to understand epidemiological observations in clinical context, and to design and execute clinical studies and trials to test specific hypotheses.

Raymond Ng
UBC Department of Computer Sciences

Dr. Ng's research focuses on data mining, which can be broadly viewed as large scale data analysis. With the advancement of computer technologies and biotechnologies, data are collected and accumulated at a phenomenal rate, however our ability to collect data far exceeds the ability to analyze them. The general focus of Dr. Ng's research is to develop tools that can help domain experts analyze their data in ways that are feasible, efficient to deal with the volume of the data, and statistically sound. One focus is to perform gene expression profiling for various heart and blood vessel diseases. A specific goal is to identify genes and pathways that are critical to the development, and hence cure, of those diseases.

Bradley Quon
UBC Department of Medicine

Dr. Quon is an Adult Respirologist with a primary clinical and research interest in cystic fibrosis (CF). His research focuses on bridging discoveries in the basic laboratory into the clinic to improve patient outcomes. He is currently searching for novel biomarkers of inflammation and infection to improve disease monitoring in CF. He is co-Investigator of an international collaboration examining health outcomes for individuals with CF living in Canada and the United States. He is also actively involved in several quality improvement initiatives within the St. Paul's Hospital Adult CF clinic and several clinical trials investigating new therapies in CF.

James Russell
UBC Department of Medicine

Dr. Russell has published over 225 peer-reviewed articles and editorials as well as 43 book chapters; he serves on the editorial boards of five journals. Dr. Russell has had an active research program focused on sepsis, particularly on: (1) novel, innovative therapies for sepsis; (2) genomics and pharmacogenomics of sepsis; (3) vasopressin treatment of septic shock; and (4) novel outcomes in trials in sepsis as well as the nature and mechanisms of impaired long-term outcomes of sepsis. Dr. Russell has worked closely with Drs. Walley and Boyd to discover that inhibition of the enzyme PCSK9 could improve the outcome of sepsis. They have spun off a new biotechnology company (Cyon Therapeutics) focused on development of PCSK9 inhibitors to treat sepsis.

Christopher Ryerson
UBC Department of Medicine

Dr. Ryerson specializes in interstitial lung disease (ILD), idiopathic pulmonary fibrosis (IPF), emphysema, dyspnea, and pulmonary rehabilitation. His current research aims to provide a comprehensive understanding of frailty in ILD, including its prevalence, causes, and impact on outcomes. He specifically plans to develop an improved ILD-specific rehabilitation program to target the key deficits in ILD patients. This area of research is particularly important given the marginal benefits and major toxicities of existing ILD pharmacotherapies, thus having the potential to significantly improve the lives of ILD patients.

Andrew Sandford
UBC Department of Medicine

The focus of Dr. Sandford's research is the genetic basis of obstructive lung disease. His current work includes identification of genetic risk factors for the development of asthma and chronic obstructive pulmonary disease as well as genetic modifiers of disease severity in cystic fibrosis. He is also investigating the functional impact of genetic variants that have been associated with respiratory disease.

Michael Seidman
UBC Department of Pathology and Laboratory Medicine

Dr. Seidman conducts primarily collaborative research studies, and is also working on several small projects of his own design aimed at improving diagnostics in cardiovascular pathology. His areas of focus are cardiovascular pathology, research histopathology, and cardiovascular genetics.

Chun Seow
UBC Department of Pathology and Laboratory Medicine

Dr. Seow specializes in smooth and skeletal muscle cell biology/physiology. His current research focus is on the mechanical function, ultrastructure and biochemistry of airway smooth muscle in health and disease. His other interests include skeletal muscle mechanics, ATPase cycle associated with the crossbridge cycle, energetics of muscle contraction, and mathematical modeling of muscle function.

Don Sin
UBC Department of Medicine

Dr. Sin's research is geared towards biomarker discovery in COPD and related conditions such as lung cancer, ischemic heart disease and stroke. His group has shown that patients with COPD experience persistent low-grade systemic inflammation, which can be assessed by interrogating their peripheral circulation. By deploying this strategy, they found that certain pneumoproteins (proteins that are synthesized predominantly in lungs but secreted into the systemic circulation) are promising biomarkers of COPD clinical endpoints. Currently, Dr. Sin's team is using high throughput and high volume proteomics and genomics platforms to accelerate biomarker discovery in COPD.

Wan Tan
UBC Department of Medicine

Dr. Tan is a co-principal investigator of the Canadian Cohort of Obstructive Lung Disease (CanCOLD), a multi-centre cohort study conducted across Canada, dedicated to increasing the understanding of COPD and related co-morbidities, to improve its management and to reduce its burden. The objectives are to characterize the severity of COPD and patient response to disease (link of structural/physiological, clinical variables and health perception), while taking into account lifestyle risk factors (smoking and other modifiable risk factors), age and sex, and associated co-morbidities (cardiovascular diseases, osteoporosis, anxiety and depression).

Scott Tebbutt
UBC Department of Medicine

Dr. Tebbutt's research program is focused on multi-omics analyses of complex respiratory diseases, including the development of biomarker signatures of early and late reactions in allergic asthma and rhinitis. His research combines hypothesis-driven study of biological mechanisms with the development of advanced tools and technology (including bioinformatics and computational biology) to better facilitate basic and translational research. Dr. Tebbutt is also Chief Scientific Officer of the Prevention of Organ Failure (PROOF) Centre of Excellence - a not-for-profit organization dedicated to moving research findings into health care, and focused on non-invasive biomarkers.

Stephan van Eeden
UBC Department of Medicine

The focus of Dr. van Eeden's research is on the mechanisms of lung inflammation caused by infection, cigarette smoking and air pollution. His group demonstrated that pro-inflammatory mediators generated in the lung spill over in the blood stream and are responsible for the downstream adverse cardiovascular health effects following exposure to air pollution. Dr. van Eeden recently discovered that statins, a medication commonly used to treat patients with increased blood lipid/cholesterol, significantly attenuated the inflammatory response in the lung induced by exposure to air pollution particles. This novel finding holds promise for future use of this class of drug to protect the heart and lungs during episodes of worsening air pollution.

Keith Walley
UBC Department of Medicine

The focus of Dr. Walley's research is to investigate: (1) the mechanism of decreased left ventricular contractility and other organ failure during sepsis, and (2) the impact of genotype on patient outcomes in sepsis and systemic inflammatory states. Dr. Walley translates basic discoveries into clinical practice in the ICU. Together with Drs. Russell and Boyd, he recently demonstrated that blocking the function of PCSK9, an enzyme that inhibits the clearance of endogenous cholesterol from blood, is associated with increased pathogen lipid clearance via the LDLR, a decreased inflammatory response, and improved septic shock outcome. This important discovery facilitated the emergence of anti-PCSK9 therapies as a one of the most promising treatments for sepsis.

Decheng Yang
UBC Department of Pathology and Laboratory Medicine

The first area of Dr. Yang's research is the molecular biology and pathogenesis of coxsackievirus, an RNA virus known to cause myocarditis. Dr. Yang is studying the mechanisms of host-pathogen interactions, viral translation initiation, and cardiovirulence with the aim to develop novel antiviral therapies to treat coxsackievirus-induced myocarditis. The second area of Dr. Yang's research is the study of host gene responses to viral infection. He and his team have previously identified genes as well as microRNAs involved in myocarditis induction. His specific focus is the roles of these selected genes and microRNAs in signal transduction pathways and epigenetic modifications leading to cardiomyocyte apoptosis or cardiac hypertrophy. These studies have great potential to discover new targets for gene therapy and molecular markers for diagnosis of viral myocarditis and other related infectious diseases.

RECOGNIZING RESEARCH EXCELLENCE

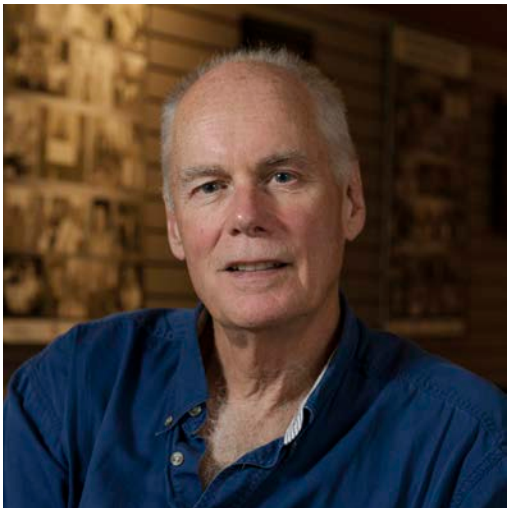
Dr. Liam Brunham wins the 2016 Innovation and Translational Research Award

The 2016 PHCRI and VCHRI Innovation and Translational Research Award was received by Dr. Liam Brunham, a Principal Investigator at the HLI and an attending physician at the Healthy Heart Program at St. Paul's Hospital. The Innovation and Translational Research Award was launched in 2014 in recognition of the need for knowledge translation in the patient health care setting. The award will fund Dr. Brunham's research study that aims to provide proper diagnosis and treatment for patients with familial hypercholesterolemia (FH), a genetic disorder that is often misdiagnosed, leaving patients at risk of heart disease. FH elevates cholesterol levels in patients of all ages and is commonly inherited by family members. An estimated 1 in 300 Canadians have FH, however, only 10% of those affected have been properly diagnosed. This makes it difficult for patients to receive the life-saving treatment required, and for their family members to be screened in a timely manner. Dr. Brunham aims to bridge this gap using targeted next generation sequencing (NGS) to identify problem genes in patients and their relatives. NGS allows researchers to study specific disease-causing genes accurately and cost-effectively. This is the first time NGS will be employed to test FH in BC. This is the second year in a row that an HLI investigator has won the Innovation and Translational Research Award, with the inaugural award going to Dr. Pat Camp in 2015.

Dr. Don Sin wins a UBC Killam Research Prize

In March, 2016, Dr. Don Sin, a Principal Investigator at the HLI, was recognized at an award reception for winning a UBC Killam Research Prize, which is a UBC Faculty Research Award that recognizes outstanding research and scholarly contributions. Dr. Sin was recruited to UBC in 2004 as a Canada Research Chair in COPD and a GlaxoSmithKline/St. Paul's Foundation Professor of COPD. He is currently a Professor of Respiratory Medicine at UBC, a staff respirologist at St. Paul's Hospital, and the head of Respiratory Medicine at Providence Health Care. Dr. Sin is recognized around the world for his contributions to COPD research, particularly his work to discover novel biomarkers to improve the care and diagnosis of patients with COPD, which currently is the 3rd leading cause of death worldwide. According to Expertscape, Dr. Sin is the leading medical expert in COPD across North America and the 2nd in the world. He is also the only Canadian to serve on the scientific committee of the Global Initiative for Chronic Obstructive Lung Disease (GOLD).

Dr. Peter Paré named 2016 Distinguished Lecturer in Respiratory Sciences



In celebration of his scholarship and creativity in the respiratory sciences, Dr. Peter Paré, a Principal Investigator at the HLI, was the recipient of the 2016 Lecturer in Respiratory Sciences Award presented by CIHR's Institute of Circulatory and Respiratory Health and the Canadian Thoracic Society. He received the award at the Canadian Respiratory Conference in Halifax, Nova Scotia, on April 16, 2016. As Honoree, he also presented a keynote lecture at the conference. The award was established in 2006 to recognize outstanding contributions to the advancement of respiratory sciences in Canada. Dr. Paré was recruited to St. Paul's Hospital in 1977, along with Drs. James Hogg and Lisa Baile, to open the Pulmonary Research Laboratory, which has evolved over the decades to become the Centre for Heart Lung Innovation. Dr. Paré is currently an Emeritus Professor of Medicine and Pathology at UBC and is internationally recognized for his outstanding contributions to the study of the physiological assessment, pathophysiology, and genetics of asthma and COPD. He is already the recipient of the Bill and Marilyn Webber Lifetime Achievement Award and the UBC Distinguished Achievement Award.

Dr. Mari DeMarco receives Young Investigator Award from the American Association for Clinical Chemistry

Dr. Mari DeMarco, an Early Career Investigator at the HLI and a Clinical Chemist at St. Paul's Hospital, was the recipient of the 2016 Outstanding Scientific Achievements by a Young Investigator Award from the American Association for Clinical Chemistry. The award recognizes and encourages the professional development of a young investigator who has demonstrated exceptional scientific achievements early in their career. It reflects the degree of originality exhibited by the investigator's creative process and the significance of their research accomplishments. Dr. DeMarco previously completed a Clinical Chemistry Fellowship at Washington University's School of Medicine in St. Louis. For her PhD, she explored protein misfolding pathways and focused on the pathological mechanisms involved in human prion diseases. In 2013, she was recruited to UBC where she is now pursuing research focused on the development of assays to support diagnostic and research efforts in the areas of amyloidosis and neurodegeneration. She is also interested in applying mass spectrometry to tackle challenging diagnostic problems in Laboratory Medicine.

Dr. Bruce McManus awarded UBC Jacob Biely Faculty Research Prize

HLI Primary Investigator and past Director, Dr. Bruce McManus, was the recipient of the Jacob Biely Research Prize in 2016, one of UBC's top research awards. The award is named after eminent researcher and Professor, Jacob Biely, who joined UBC Faculty on a full-time basis in 1935 as an Instructor in the Department of Poultry Science. The Jacob Biely Faculty Research Prize was established in 1969 and is regarded as UBC's premier award for research that crosses all fields. The prize is awarded annually to a UBC faculty member for a distinguished record of research. Dr. McManus is the Co-Director of the Institute for Heart + Lung Health and the CEO for the Centre of Excellence for Prevention of Organ Failure (PROOF Centre). Dr. McManus is internationally-recognized for his research on the mechanisms, consequences, detection, and prevention of injury and aberrant repair in inflammatory diseases of the heart and blood vessels.

Merit-Based Salary Increases

In 2016 the total number of Department of Medicine Faculty Members who received merit-based salary increases at Providence Health Care was 25. Of these 25, 11 were HLI Principal Investigators!

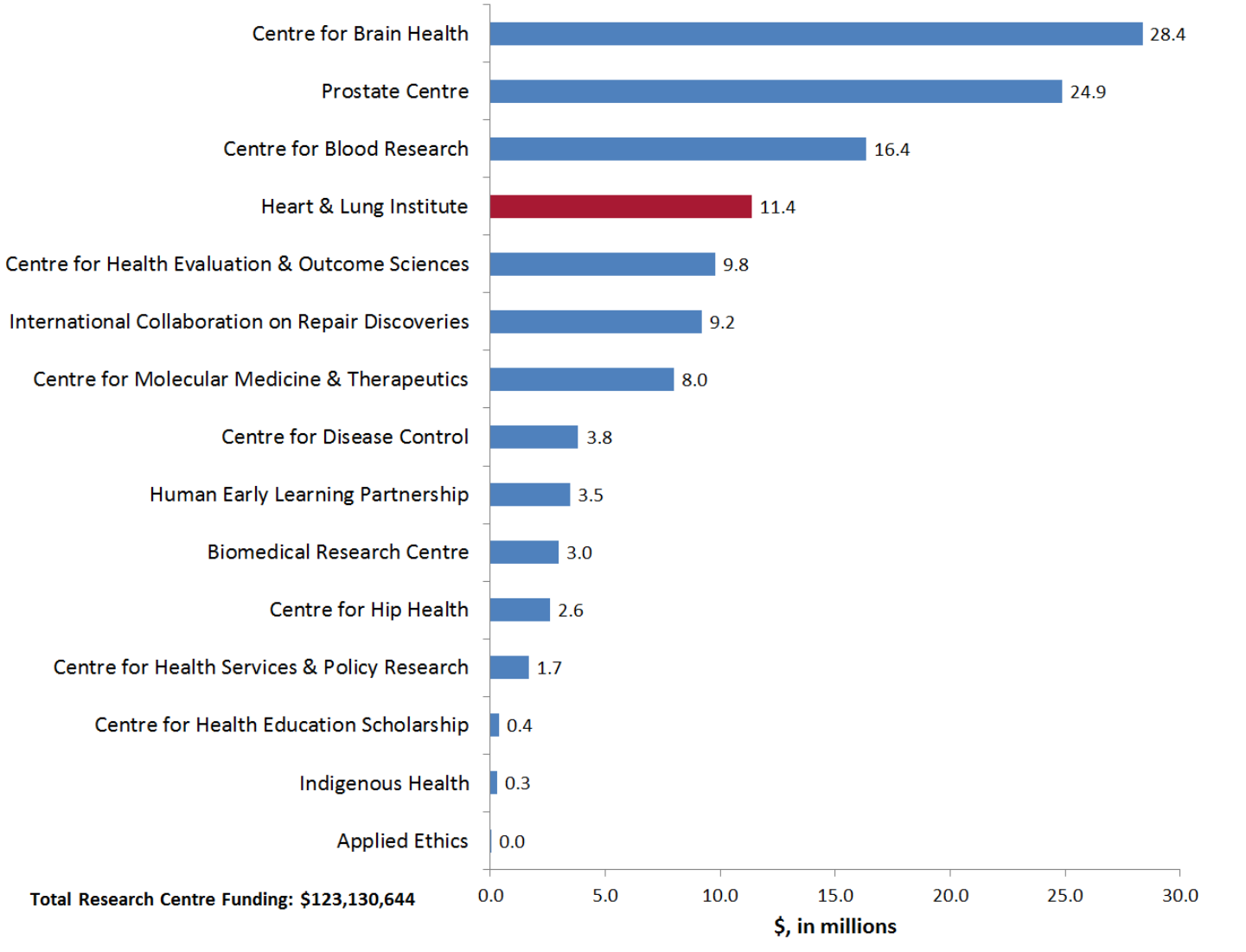
Research Funding

The Centre for Heart Lung Innovation (Heart & Lung Institute in the figure below) was successful in attracting **11.4%** of all of the UBC Faculty of Medicine funding for the previous fiscal year, 2015-2016.

Available data for the fiscal year 2016–2017 indicates that the HLI Investigators were successful in attracting **$10,345,167** in external research grants and contracts.

Details about the HLI's funding for fiscal year 2016 – 2017 can be found in Appendix A.

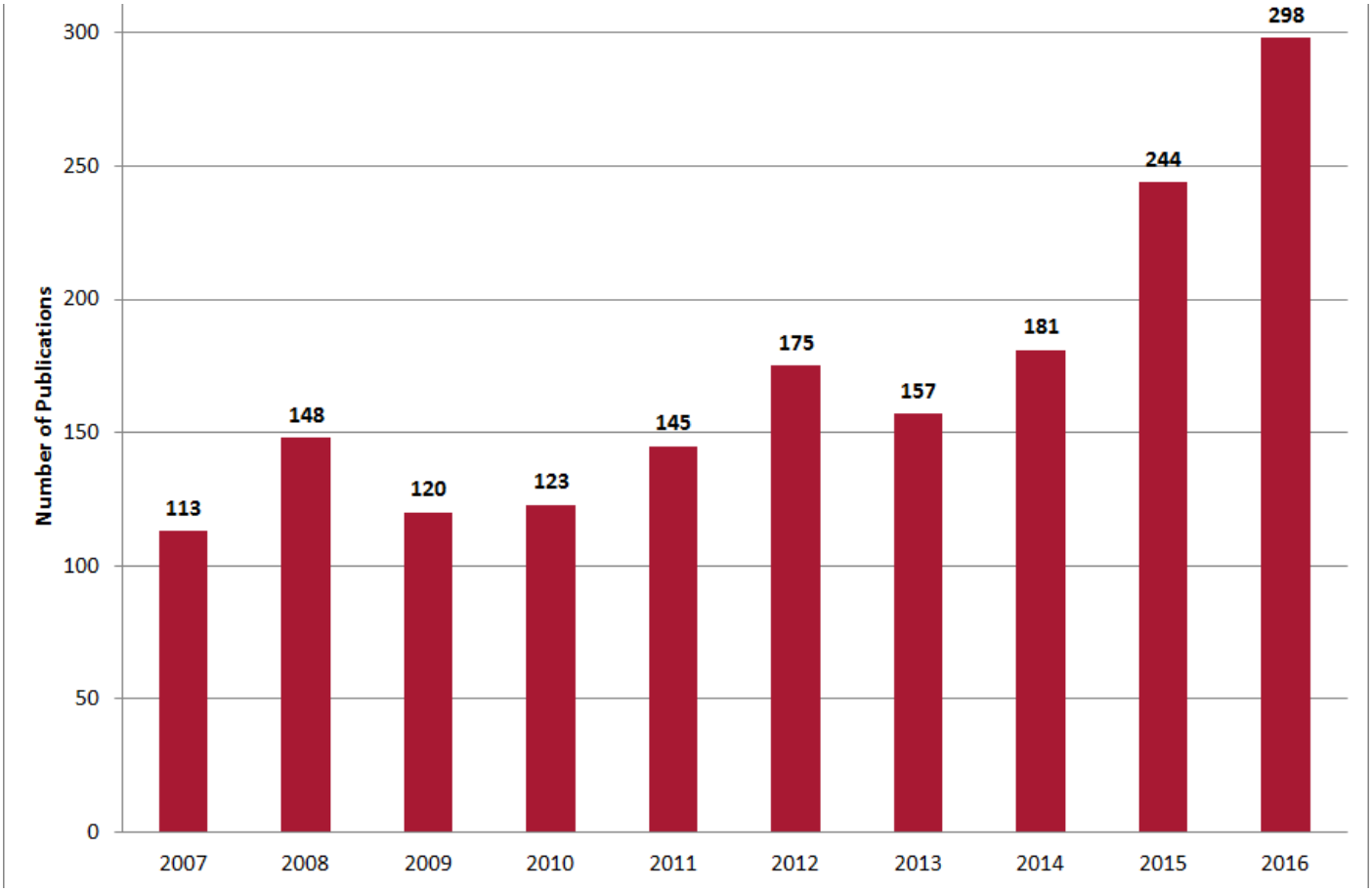
Figure 3. 2015-16 Faculty of Medicine research funding from all sources, by research centre.



Peer Reviewed Publications

The Centre for Heart Lung Innovation's investigators and students produced 299 publications in 2016. That is a 23% increase compared to 2015.

Figure 4. Publications by the Centre for Heart Lung Innovation PIs - 10 year trend. Full details about the 2016 HLI PI publications can be found in Appendix B.



In 2016, HLI investigators published more often in high-impact journals than the average UBC or national researcher. The full list of all 50 high impact publications (IF > 10) by HLI investigators follows.

Figure 5. Field weighted citation impact was above the Canadian average for HLI investigators in 2016 in the HLI areas of expertise.

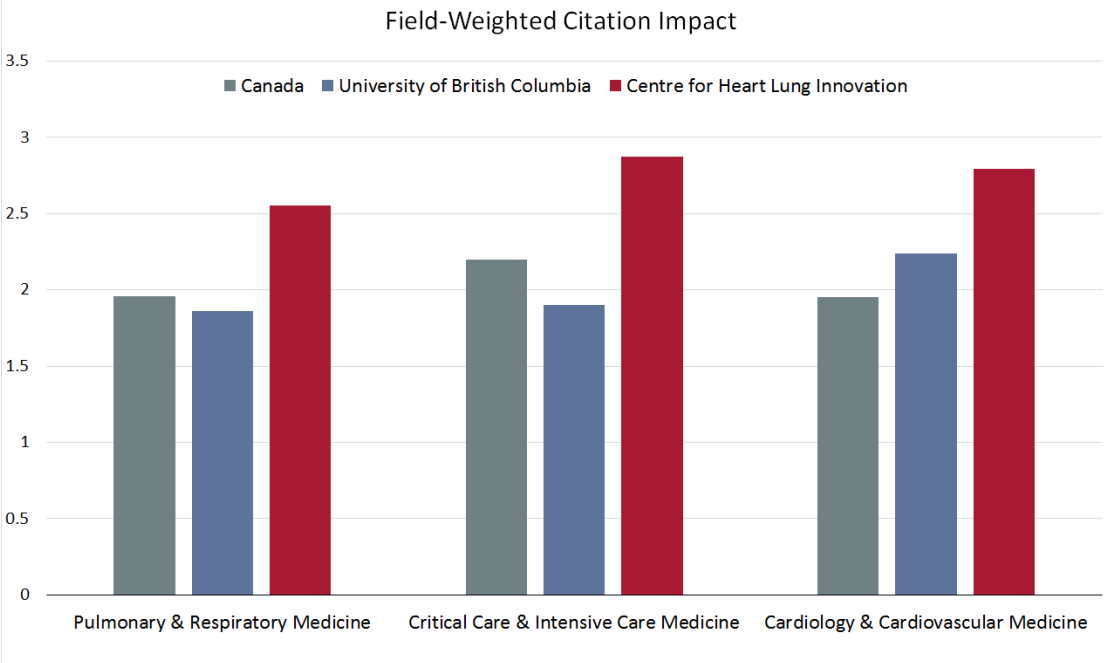
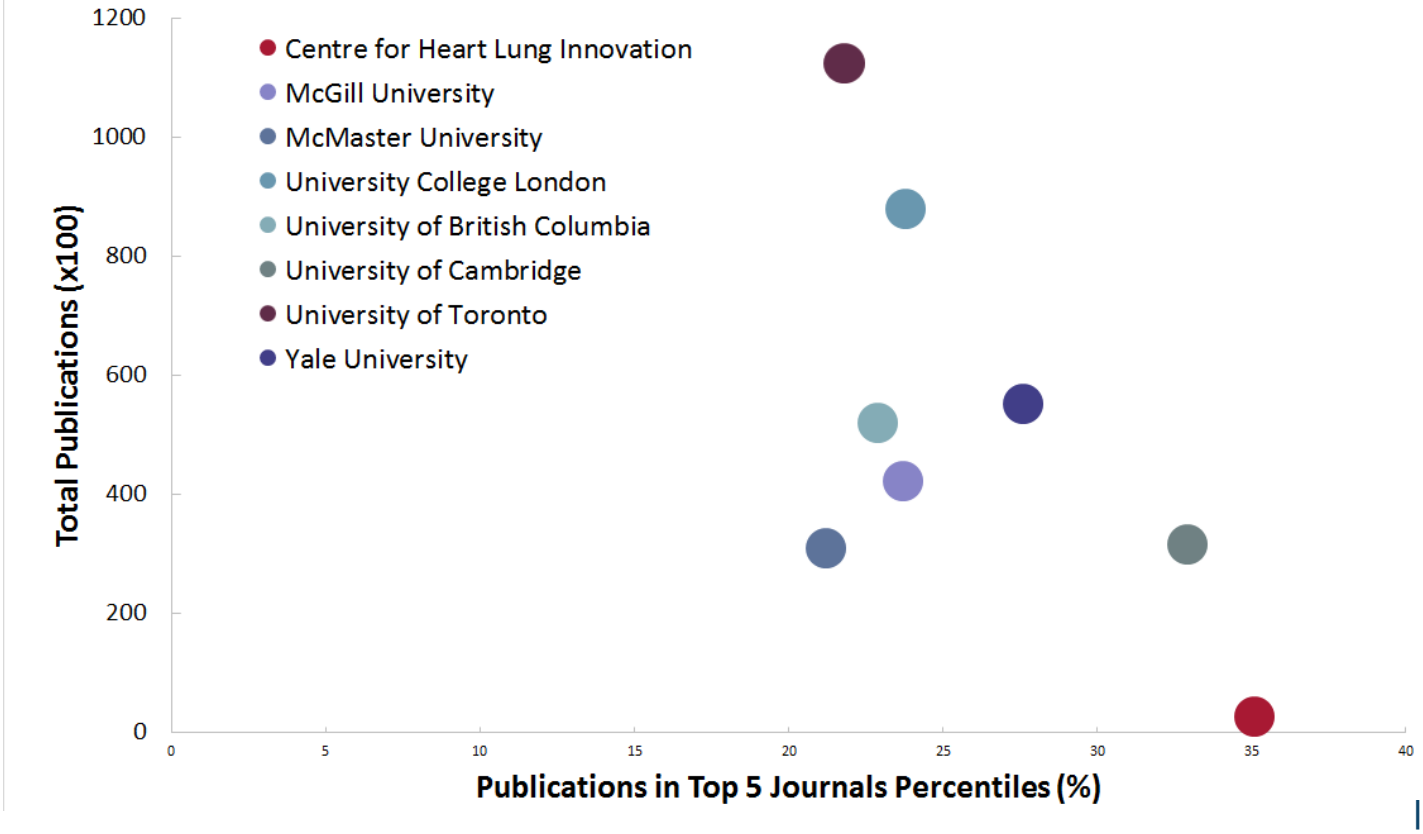


Figure 6. High-Impact Publications by Total Publication Number for the Centre for Heart Lung Innovation compared to top research institutions in 2016.



High Impact Papers By HLI Investigators in 2016

Lancet

Impact Factor: 44.002

Journal Category: Medicine, General and Internal

Rank Within Category: 2/155

Khatib R, McKee M, Shannon H, Chow C, Rangarajan S, Teo K, Wei L, Mony P, Mohan V, Gupta R, Kumar R, Vijayakumar K, **Lear SA**, Diaz R, Avezum A, Lopez-Jaramillo P, Lanas F, Yusoff K, Ismail N, Kazmi K, Rahman O, Rosengren A, et al. Availability and affordability of cardiovascular disease medicines and their effect on use in high-income, middle-income, and low-income countries: an analysis of the PURE study data. Lancet. 2016 Jan 2;387(10013):61-9. doi: 10.1016/S0140-6736(15)00469-9.

Mente A, O'Donnell M, Rangarajan S, Dagenais G, **Lear S**, McQueen M, Diaz R, Avezum A, Lopez-Jaramillo P, Lanas F, Li W, Lu Y, Yi S, Rensheng L, Iqbal R, Mony P, Yusuf R, Yusoff K, Szuba A, Oguz A, Rosengren A, Bahonar A, et al. Associations of urinary sodium excretion with cardiovascular events in individuals with and without hypertension: a pooled analysis of data from four studies. Lancet. 2016 Jul 30;388(10043):465-75. doi: 10.1016/S0140-6736(16)30467-6. Review.

Reddel HK, Busse WW, Pedersen S, **Tan WC**, Chen YZ, Jorup C, Lythgoe D, O'Byrne PM. Should recommendations about starting inhaled corticosteroid treatment for mild asthma be based on symptom frequency: a post-hoc efficacy analysis of the START study. Lancet. 2016 Nov 29. pii: S0140-6736(16)31399-X. doi: 10.1016/S0140-6736(16)31399-X.

JAMA-Journal of the American Medical Association

Impact Factor: 37.684

Journal Category: Medicine, General and Internal

Rank Within Category: 3/155

Bentzer P, Griesdale DE, **Boyd J**, MacLean K, Sirounis D, Ayas NT. Will This Hemodynamically Unstable Patient Respond to a Bolus of Intravenous Fluids? JAMA. 2016 Sep 27;316(12):1298-309. doi: 10.1001/jama.2016.12310. Review.

Bhatt SP, Terry NL, Nath H, Zach JA, Tschirren J, Bolding MS, Stinson DS, Wilson CG, Curran-Everett D, Lynch DA, Putcha N, Soler X, Wise RA, Washko GR, Hoffman EA, Foreman MG, Dransfield MT; Genetic Epidemiology of COPD (COPDGene) Investigators. Association Between Expiratory Central Airway Collapse and Respiratory Outcomes Among Smokers. JAMA. 2016 Feb 2;315(5):498-505. doi: 10.1001/jama.2015.19431. COPDgene Investigators include: **Coxson HO**

Putman RK, Hatabu H, Araki T, Gudmundsson G, Gao W, Nishino M, Okajima Y, Dupuis J, Latourelle JC, Cho MH, El-Chemaly S, **Coxson HO**, Celli BR, Fernandez IE, Zazueta OE, Ross JC, Harmouche R, Estépar RS, Diaz AA, Sigurdsson S, Gudmundsson EF, Eiríksdottír G, et al. Association Between Interstitial Lung Abnormalities and All-Cause Mortality. JAMA. 2016 Feb 16;315(7):672-81. doi: 10.1001/jama.2016.0518.

BMJ-British Medical Journal

Impact Factor: 19.697

Journal Category: Medicine, General and Internal

Rank Within Category: 4/155

Quon BS, Rowe SM. New and emerging targeted therapies for cystic fibrosis. BMJ. 2016 Mar 30;352:i859. doi: 10.1136/bmj.i859. Review.

Journal of the American College of Cardiology

Impact Factor: 17.759

Journal Category:	Rank Within Category:
Cardiac and Cardiovascular Systems	1/124

Essebag V, Verma A, Healey JS, **Krahn AD**, Kalfon E, Coutu B, Ayala-Paredes F, Tang AS, Sapp J, Sturmer M, Keren A, Wells GA, Birnie DH; BRUISE CONTROL Investigators. Clinically Significant Pocket Hematoma Increases Long-Term Risk of Device Infection: BRUISE CONTROL INFECTION Study. J Am Coll Cardiol. 2016 Mar 22;67(11):1300-8. doi: 10.1016/j.jacc.2016.01.009.

Hansson NC, Grove EL, Andersen HR, **Leipsic J**, Mathiassen ON, Jensen JM, Jensen KT, Blanke P, Leetmaa T, Tang M, Krusell LR, Klaaborg KE, Christiansen EH, Terp K, Terkelsen CJ, Poulsen SH, Webb J, Bøtker HE, Nørgaard BL. Transcatheter Aortic Valve Thrombosis: Incidence, Predisposing Factors, and Clinical Implications. J Am Coll Cardiol. 2016 Nov 8;68(19):2059-2069. doi: 10.1016/j.jacc.2016.08.010.

Leipsic J, Naoum C, Blanke P. Diagnostic Algorithms for Stable Chest Pain: From Opinion to Science Lessons From PROMISE. J Am Coll Cardiol. 2016 Jun 7;67(22):2617-9. doi: 10.1016/j.jacc.2016.04.013.

Sheldon R, Raj SR, Rose MS, Morillo CA, **Krahn AD**, Medina E, Talajic M, Kus T, Seifer CM, Lelonek M, Klingenheben T, Parkash R, Ritchie D, McRae M; POST 2 Investigators.. Fludrocortisone for the Prevention of Vasovagal Syncope: A Randomized, Placebo-Controlled Trial. J Am Coll Cardiol. 2016 Jul 5;68(1):1-9. doi: 10.1016/j.jacc.2016.04.030.

Yoon SH, Lefèvre T, Ahn JM, Perlman GY, Dvir D, Latib A, Barbanti M, Deuschl F, De Backer O, Blanke P, Modine T, Pache G, Neumann FJ, Ruile P, Arai T, Ohno Y, Kaneko H, Tay E, Schofer N, Holy EW, Luk NH, Yong G, **Leipsic J**, et al. Transcatheter Aortic Valve Replacement With Early- and New-Generation Devices in Bicuspid Aortic Valve Stenosis. J Am Coll Cardiol. 2016 Sep 13;68(11):1195-205. doi: 10.1016/j.jacc.2016.06.041.

Circulation

Impact Factor: 17.202

Journal Category:	Rank Within Category:
Cardiac and Cardiovascular Systems	2/124
Peripheral Vascular Disease	1/63

De Ferrari GM, Dusi V, Spazzolini C, Bos JM, Abrams DJ, Berul CI, Crotti L, Eldar M, Kharlap M, Khoury A, **Krahn AD**, Leenhardt A, Moir CR, Odero A, Nordkamp LO, Paul T, I Noguer FR, Shkolnikova M, Till J, Wilde AA, Ackerman MJ, Schwartz PJ. Response to Letters Regarding Article, "Clinical Management of Catecholaminergic Polymorphic Ventricular Tachycardia: The Role of Left Cardiac Sympathetic Denervation". Circulation. 2016 Jan 26;133(4):e366-7. doi: 10.1161/CIRCULATIONAHA.115.019465.

European Heart Journal

Impact Factor: 15.064

Journal Category:	Rank Within Category:
Cardiac and Cardiovascular Systems	3/124

Motwani M, Dey D, Berman DS, Germano G, Achenbach S, Al-Mallah MH, Andreini D, Budoff MJ, Cademartiri F, Callister TQ, Chang HJ, Chinnaiyan K, Chow BJ, Cury RC, Delago A, Gomez M, Gransar H, Hadamitzky M, Hausleiter J, Hindoyan N, Feuchtner G, Kaufmann PA, **Leipsic J**, et al. Machine learning for prediction of all-cause mortality in patients with suspected coronary artery disease: a 5-year multicentre prospective registry analysis. Eur Heart J. 2016 Jun 1. pii: ehw188.

Lancet: Global Health

Impact Factor: 14.722

Journal Category:	Rank Within Category:
Public, Environmental & Occupational Health	1/173

Miller V, Yusuf S, Chow CK, Dehghan M, Corsi DJ, Lock K, Popkin B, Rangarajan S, Khatib R, **Lear SA,** Mony P, Kaur M, Mohan V, Vijayakumar K, Gupta R, Kruger A, Tsolekile L, Mohammadifard N, Rahman O, Rosengren A, Avezum A, Orlandini A, et al. Availability, affordability, and consumption of fruits and vegetables in 18 countries across income levels: findings from the Prospective Urban Rural Epidemiology (PURE) study. Lancet Glob Health. 2016 Oct;4(10):e695-703. doi: 10.1016/S2214-109X(16)30186-3.

American Journal of Respiratory and Critical Care Medicine

Impact Factor: 13.118

Journal Category:	Rank Within Category:
Critical Care Medicine	2/33
Respiratory System	2/58

Bayram H, Bauer AK, Abdalati W, **Carlsten C**, Pinkerton KE, Thurston GD, Balmes JR, Takaro TK. Environment, Global Climate Change, and Cardiopulmonary Health. Am J Respir Crit Care Med. 2016 Sep 21. [Epub ahead of print]

Bhatt SP, Soler X, Wang X, Murray S, Anzueto AR, Beaty TH, Boriek AM, Casaburi R, Criner GJ, Diaz AA, Dransfield MT, Curran-Everett D, Galb¡n CJ, Hoffman EA, **Hogg JC**, Kazerooni EA, Kim V, Kinney GL, Lagstein A, Lynch DA, Make BJ, Martinez FJ, et al. Association between Functional Small Airway Disease and FEV1 Decline in Chronic Obstructive Pulmonary Disease. Am J Respir Crit Care Med. 2016 Jul 15;194(2):178-84. doi: 10.1164/rccm.201511-2219OC.

Boon M, Verleden SE, Bosch B, Lammertyn EJ, McDonough JE, Mai C, Verschakelen J, Kemner-van de Corput M, Tiddens HA, Proesmans M, Vermeulen FL, Verbeken EK, Cooper J, Van Raemdonck DE, Decramer M, Verleden GM, **Hogg JC**, Dupont LJ, Vanaudenaerde BM, De Boeck K. Morphometric Analysis of Explant Lungs in Cystic Fibrosis. Am J Respir Crit Care Med. 2016 Mar 1;193(5):516-26. doi: 10.1164/rccm.201507-1281OC.

Boueiz A, Lutz SM, Cho MH, Hersh CP, Bowler RP, Washko GR, Halper-Stromberg E, Bakke P, Gulsvik A, Laird NM, Beaty TH, **Coxson HO**, Crapo JD, Silverman EK, Castaldi PJ, DeMeo DL; for COPDGene and ECLIPSE investigators. Genome-Wide Association Study of the Genetic Determinants of Emphysema Distribution. Am J Respir Crit Care Med. 2016 Sep 26.

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Cook DP, Rector MV, Bouzek DC, Michalski AS, Gansemer ND, Reznikov LR, Li X, Stroik MR, Ostedgaard LS, Abou Alaiwa MH, Thompson MA, Prakash YS, Krishnan R, Meyerholz DK, **Seow CY**, Stoltz DA. Cystic Fibrosis Transmembrane Conductance Regulator in Sarcoplasmic Reticulum of Airway Smooth Muscle. Implications for Airway Contractility. Am J Respir Crit Care Med. 2016 Feb 15;193(4):417-26. doi: 10.1164/rccm.201508-1562OC.

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To T, Zhu J, Larsen K, Simatovic J, Feldman L, Ryckman K, Gershon A, Lougheed MD, Licskai C, Chen H, Villeneuve PJ, Crighton E, Su Y, Sadatsafavi M, Williams D, **Carlsten C**; Canadian Respiratory Research Network. Progression from Asthma to Chronic Obstructive Pulmonary Disease. Is Air Pollution a Risk Factor? Am J Respir Crit Care Med. 2016 Aug 15;194(4):429-38. doi: 10.1164/rccm.201510-1932OC.

The Journal of Allergy and Clinical Immunology

Impact Factor: 12.485

Journal Category:	Rank Within Category:
Allergy	1/25
Immunology	5/151

Gauvreau GM, Arm JP, Boulet LP, Leigh R, Cockcroft DW, Davis BE, Mayers I, FitzGerald JM, Dahlen B, Killian KJ, Laviolette M, **Carlsten C**, Lazarinis N, Watson RM, Milot J, Swystun V, Bowen M, Hui L, Lantz AS, Meiser K, Maahs S, Lowe PJ, et al. Efficacy and safety of multiple doses of QGE031 (ligelizumab) versus omalizumab and placebo in inhibiting allergen-induced early asthmatic responses. J Allergy Clin Immunol. 2016 Oct;138(4):1051-1059. doi: 10.1016/j.jaci.2016.02.027.

Rider CF, Yamamoto M, Günther OP, **Hirota JA**, Singh A, **Tebbutt SJ, Carlsten C**. Controlled diesel exhaust and allergen coexposure modulates microRNA and gene expression in humans: Effects on inflammatory lung markers. J Allergy Clin Immunol. 2016 Dec;138(6):1690-1700. doi: 10.1016/j.jaci.2016.02.038.

Tkacova R, Dai DL, Vonk JM, **Leung JM**, Hiemstra PS, van den Berge M, Kunz L, Hollander Z, Tashkin D, Wise R, Connett J, **Ng R, McManus B, Paul Man SF**, Postma DS, **Sin DD**. Airway hyperresponsiveness in chronic obstructive pulmonary disease: A marker of asthma-chronic obstructive pulmonary disease overlap syndrome? J Allergy Clin Immunol. 2016 Dec;138(6):1571-1579.e10. doi: 10.1016/j.jaci.2016.04.022.

van der Plaat DA, de Jong K, Lahousse L, Faiz A, Vonk JM, van Diemen CC, Nedeljkovic I, Amin N, Brusselle GG, Hofman A, Brandsma CA, Bossé Y, **Sin DD,** Nickle DC, van Duijn CM, Postma DS, Boezen HM. Genome-wide association study on the FEV(1)/FVC ratio in never-smokers identifies HHIP and FAM13A. J Allergy Clin Immunol. 2016 Sep 6. pii: S0091-6749(16)30895-8. doi: 10.1016/j.jaci.2016.06.062. [Epub ahead of print]

Trends in Pharmacological Sciences

Impact Factor: 11.840

Journal Category:	Rank Within Category:
Pharmacology and Pharmacy	5/255

Krishnan R, Park JA, **Seow CY**, Lee PV, Stewart AG. Cellular Biomechanics in Drug Screening and Evaluation: Mechanopharmacology. Trends Pharmacol Sci. 2016 Feb;37(2):87-100. doi: 10.1016/j.tips.2015.10.005. Review.

Circulation Research

Impact Factor: 11.551

Journal Category:	Rank Within Category:
Cardiac and Cardiovascular Systems	4/124

Fung G, **Luo H**, Qiu Y, **Yang D, McManus B**. Myocarditis. Circ Res. 2016 Feb 5;118(3):496-514. doi: 10.1161/CIRCRESAHA.115.306573. Review.

American Journal of Human Genetics

Impact Factor: 10.794

Journal Category:	Rank Within Category:
Genetics and Heredity	8/166

Auer PL, Reiner AP, Wang G, Kang HM, Abecasis GR, Altshuler D, Bamshad MJ, Nickerson DA, Tracy RP, Rich SS; NHLBI GO Sequencing Project., Leal SM. Guidelines for Large-Scale Sequence-Based Complex Trait Association Studies: Lessons Learned from the NHLBI Exome Sequencing Project. Am J Hum Genet. 2016 Oct 6;99(4):791-801. doi: 10.1016/j.ajhg.2016.08.012. NHLBI Exome Sequencing Project includes HLI investigators: **Daley D, Paré PD, Sandford AJ, Sin DD.**

Nature Reviews Cardiology

Impact Factor: 10.553

Journal Category:	Rank Within Category:
Cardiac and Cardiovascular Systems	5/124

Behr ER, **Krahn AD**. Arrhythmias: Opening Pandora's Box - incidental genetic findings. Nat Rev Cardiol. 2016 Apr;13(4):187-8. doi: 10.1038/nrcardio.2016.27.

Intensive Care Medicine

Impact Factor: 10.125

Journal Category:	Rank Within Category:
Critical Care Medicine	3/33

Bentzer P, Fisher J, Kong HJ, Mörgelin M, **Boyd JH, Walley KR, Russell JA**, Linder A. Heparin-binding protein is important for vascular leak in sepsis. Intensive Care Med Exp. 2016 Dec;4(1):33.

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Perner A, Gordon AC, De Backer D, Dimopoulos G, **Russell JA**, Lipman J, Jensen JU, Myburgh J, Singer M, Bellomo R, Walsh T. Sepsis: frontiers in diagnosis, resuscitation and antibiotic therapy. Intensive Care Med. 2016 Dec;42(12):1958-1969. Review.

Pisitsak C, **Walley KR**. Does this patient have septic shock? Intensive Care Med. 2016 Jan 11. [Epub ahead of print]

Reuter DA, **Russell JA**, Mekontso Dessap A. Beta-blockers in septic shock to optimize hemodynamics? Yes. Intensive Care Med. 2016 Oct;42(10):1607-9. doi: 10.1007/s00134-016-4414-4.

Impact factors and journal rankings are based on the Thomson Reuters InCites Journal Citation report for 2015.

The HLI Principal Investigators' names are in **bold**; trainees, visiting scientists and research personnel are underlined.

High School Science Week participants.

TRAINING THE NEXT GENERATION

The HLI prides itself on its success in attracting international trainees and research personnel from all over the world. In the past 5 years, the HLI has hosted trainees and research personnel from 39 countries and 6 continents.

HLI SUMMER STUDENT RESEARCH PROGRAM

About the HLI-SSRP

Throughout the year, numerous undergraduate students are trained at the HLI through co-operative education programs, directed studies programs or various employment opportunities. Our busiest time of year is May to August when undergraduate students participate in our Summer Student Research Program (HLI-SSRP). Students are mentored by a senior professor and an immediate supervisor, and gain hands-on basic science laboratory experience while working on a research project. Not only does each student learn, in detail, one or two technologies per four-month or eight-month fellowship, but, more importantly for this formative period of development, students learn the critical logic of complementary technologies and when to employ them to experimental advantage.

Over the last 10 years the HLI has hosted over 600 undergraduate students

In addition to technical and scientific training, students learn to present their original work at the Summer Student Research Day, a one-day conference featuring both oral and poster presentations by student researchers.

In 2016 the HLI hosted **42 summer students** through our Summer Student Research Program.

Summer Student Research Day - August 12, 2016

Dr. Bruce McManus Presentation Awards

Award	Recipient	HLI Supervisor
Top Heart Oral Presentation	Collin Pryma	Gordon Francis
Top Lung Oral Presentation	Luka Culibrk	Scott Tebbutt
Top Innovation Oral Presentation	Cody Lo	Liam Brunham
Top Poster (session 1)	Lauren Coxson	Stephen van Eeden
Top Poster (session 2)	Dorothy Lau	Don Sin and Anthony Tam

IMPACT Program

About IMPACT

The Integrated and Mentored Pulmonary and Cardiovascular Training (IMPACT) program was a CIHR supported strategic training program at the University of British Columbia and the University of Manitoba. This program provided funding to high quality clinical and basic science post-doctoral fellows and gave these fellows the opportunity to join focused teams of researchers in unique multidisciplinary research groups. IMPACT helped train a generation of investigators capable of developing and translating knowledge from bench to bedside with the outcome of improved cardio-pulmonary health for the Canadian population.

13 postdoctoral fellows were funded by IMPACT in 2016

In 2016, the IMPACT program provided a final round of funding to **13 postdoctoral fellows** at the HLI.

IMPACT's Impact on Training

Since the beginning of the IMPACT program in 2003 there have been **52 IMPACT Fellows**.

Where are the past IMPACT Fellows now?

- 25 have secured faculty positions in universities and medical schools
- 9 are working as clinicians
- 2 have entered medical school
- 2 are working in government
- 7 are engaged in additional research or training
- 4 are working as research scientists
- 9 continue their training with the HLI, under alternate funding

Heart + Lung FEST

The annual Heart + Lung Health FEST is an activity of, developed by and hosted by the community-wide umbrella organization, the Institute for Heart + Lung Health. The FEST is an opportunity for HLI trainees to present their ongoing research. In 2016 a number of HLI trainees won awards, in both best abstract and best poster presentation categories.

FEST 2016 Award Winners

Award	Recipient	HLI Supervisor
Abstract Award (Heart)	Brodie Sakakibara	Scott Lear
Abstract Award (Lung)	Steven Booth	Tillie-Louise Hackett
Abstract Award (Other)	Stephanie Santacruz	David Granville
Poster Presentation (Heart)	Ying Wang	Gordon Francis
Poster Presentation (Lung)	Loubna Akhabir	Denise Daley
Poster Presentation (Other)	Chhavi Tripathi	Denise Daley

HLI Career Day

Every year the HLI holds a Career Day for trainees. In 2016 Career Day focused on providing trainees with useful information about career options in science and research. Talks about preparing posters and writing scientific journal articles were also offered.

High School Science Week

For one week in spring and fall each year, high school students participate in the High School Science Week hosted at the HLI. Eight students are invited to participate in various laboratory sessions and seminars. This program is a very unique opportunity for students to get real hands-on biomedical lab experience that can help shape their education and career paths.

Students who participate in the High School Science Week are eligible to apply for the **Peter D. Paré Scholarship,** an eight-week summer internship at the HLI (valued at $2,000).

The Peter D. Paré Scholarship recipient for 2016 was **Aileen Hsieh.** Aileen worked in Dr. Tillie Hackett's lab on the project, *"The role of Interleukin-1 in driving inflammation and remodelling in the asthmatic EMTU",* and presented her research at Summer Student Research Day 2016.

HLI Weekly Seminars

The Centre for Heart Lung Innovation holds two weekly seminars, the Research in Progress Seminar Series and the HLI Friday Seminar Series, both of which run from September through June each year.

The HLI Friday Seminar Series features invited experts in specific fields from all over the world to give talks which encourage education and collaboration. Detailed information about the 2016 HLI Friday Seminars can be found in Appendix C. The Research in Progress seminar series gives graduate students and post-doctoral fellows at the HLI the opportunity to present their ongoing research to other HLI researchers. The idea behind these seminars is for a critical, but supportive, audience to give feedback at the conceptual or analytic stage of the trainees' research program. Detailed information about the 2016 Research in Progress Seminars can be found in Appendix D.

Trainee Fellowships and Scholarships

Name	Type/Award Name	Awarding Body
Booth, Steve	Graduate and International Student Tuition Award	UBC Faculty of Medicine
Eslami, Aida	Postdoctoral Fellowship	MSFHR and AllerGen
Eslami, Aida	Postdoctoral Fellowship	NSERC
Inskip, Jessica	Respiratory Rehabilitation Fellowship	BC Lung Association
Ben Ari, Ori	Canadian Respiratory Health Professionals Fellowship	Canadian Lung Association
Studart, Fernando	Fellowship (top-up)	CIHR IMPACT
Syed, Nafeez	Studentship	Canadian Respiratory Research Network
Syed, Nafeez	Respiratory Rehabilitation Fellowship	BC Lung Association
Tehrani, Arash	Graduate Entrance Scholarchip	UBC Faculty of Medicine

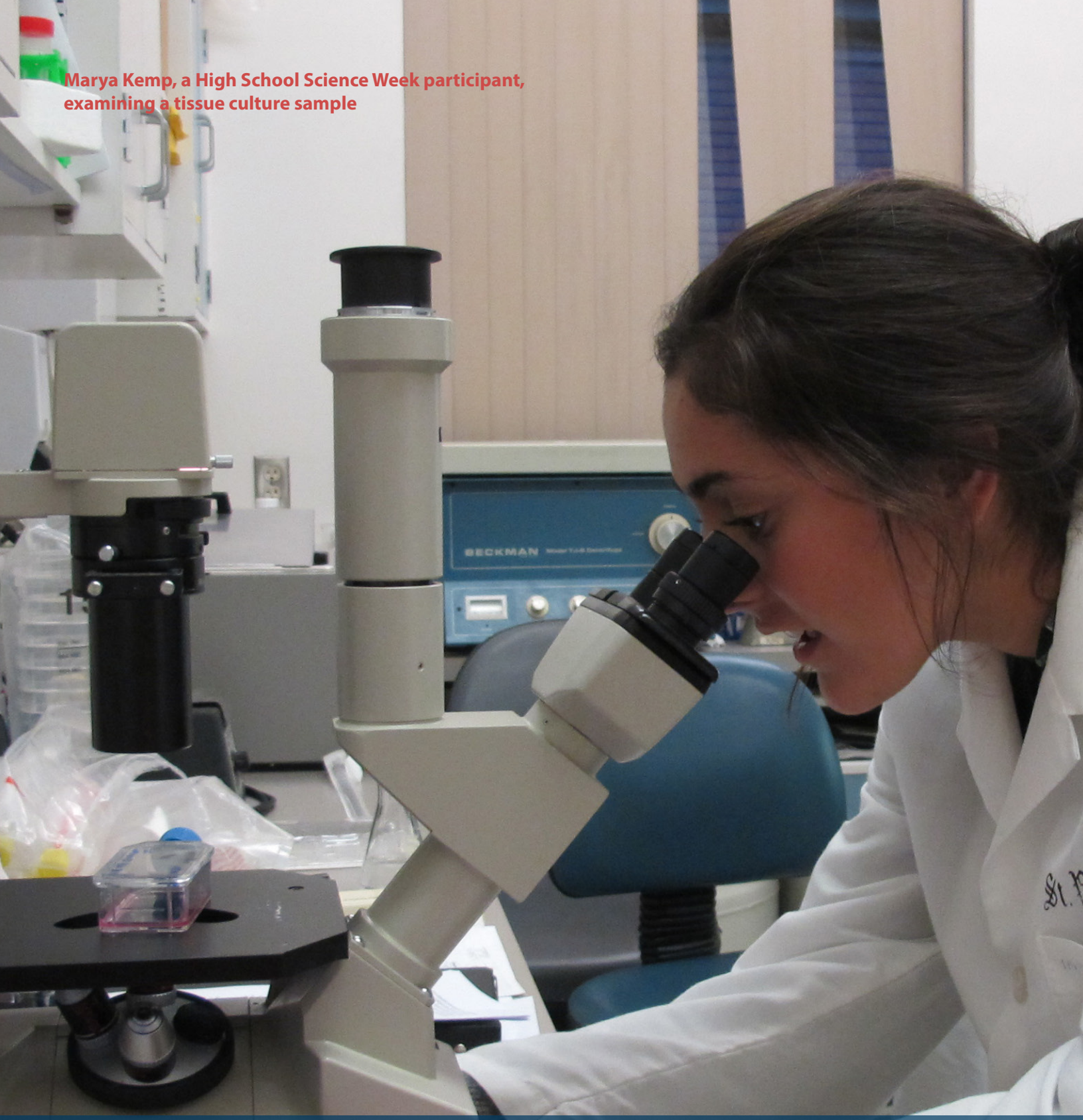
Other Trainee and Staff Awards and Recognitions

Name	Award	Awarding Body
Booth, Steve	Abstract Award	American Thoracic Society
Chen, Roy	Travel Award	BC Children's Hospital and Women's Hospital and Health Centre Laboratory
Chen, Roy	Travel Award	Mass Spectrometry: Applications to the Clinical Lab
Dubland, Joshua	Graduate Student Poster Presentation Award	Canadian Lipoprotein Conference
Dubland, Joshua	Publication Award	UBC Faculty of Medicine
Eslami, Aida	Travel Award	AllerGen
Genga, Kelly	Graduate Publication Award	UBC Faculty of Medicine
Kirby, Miranda	Travel Award	National Emphysema Foundation for ATS
Kirby, Miranda	3rd place Poster Award	Canadian Thoracic Society Poster Competition at ATS
Mitchell, Reid	Graduate Student Poster Presentation Award	Canadian Society for Exercise Physiology Annual General Meeting
Mitchell, Reid	Abstract Award	UBC Department of Rehabilitation Science
Mostaco, Leila	Travel Award	AllerGen
Mostaco, Leila	Abstract Award	American Thoracic Society
Mostaco, Leila	2nd place Poster Competition	Canadian Thoracic Society Poster Competition at ATS
Osei, Emmanuel	Travel Award	AllerGen
Qui, Ye	Travel Award	Histochemical Society
Studart, Fernando	Abstract Award	National Emphysema Foundation for ATS
Wang, Ying	Oral Presentation Award	Canadian Lipoprotein Conference
Yang, Jasemine	Travel Award	AllerGen
Yang, Jasemine	Honorable Mention Conference Poster Competition	AllerGen Conference
Zheng, Emma	Travel Award	Mass Spectrometry: Applications to the Clinical Lab

TRAINEE CAREER PATHS

In 2016, twelve of our trainees finished their training at the HLI. Here are some of the impressive scientific career paths several of them have moved on to.

Trainee	Supervisor (s)	Start/End Date	Degree/Study Level	Present Position
Loubna Akhabir	Denise Daley	Oct 2014 - June 2016	Postdoctorate	Postdoctoral Fellow at McMaster University
Daisuke Kinose	James Hogg	Feb 2012 - June 2016	Postdoctorate	Respiratory Physician and Assistant Professor at Shiga University of Medical Science
Nicholas Swyngedouw	Chun Seow	Jan 2014 - July 2016	MSc	Research Coordinator at University of Alberta
Hao-Heng (Rachel) Chen	Don Sin	May 2014 - July 2016	MSc	Medical Student at UBC
David Jaw	Don Sin	May 2010 - June 30	PhD	Postdoctoral Fellow at the HLI
Yulia Merkulova	David Granville	May 2014 - Apr 2016	MSc	Research Associate at STEMCELL Technologies
Elena Topchiy	David Granville	May 2014 - Apr 2016	Postdoctorate	Research Scientist at Symvivo Corporation
Aabida Saferali	Andrew Sandford	Jan 2012 - Sept 2016	PhD	Postdoctoral Fellow at the Channing Division of Network Medicine, Brigham and Women's Hospital, Harvard Medical School
Chen Wang	Honglin Luo	Mar 2014 - Mar 2016	Visiting Scientist	Assistant Professor at Beijing University of Chinese Medicine



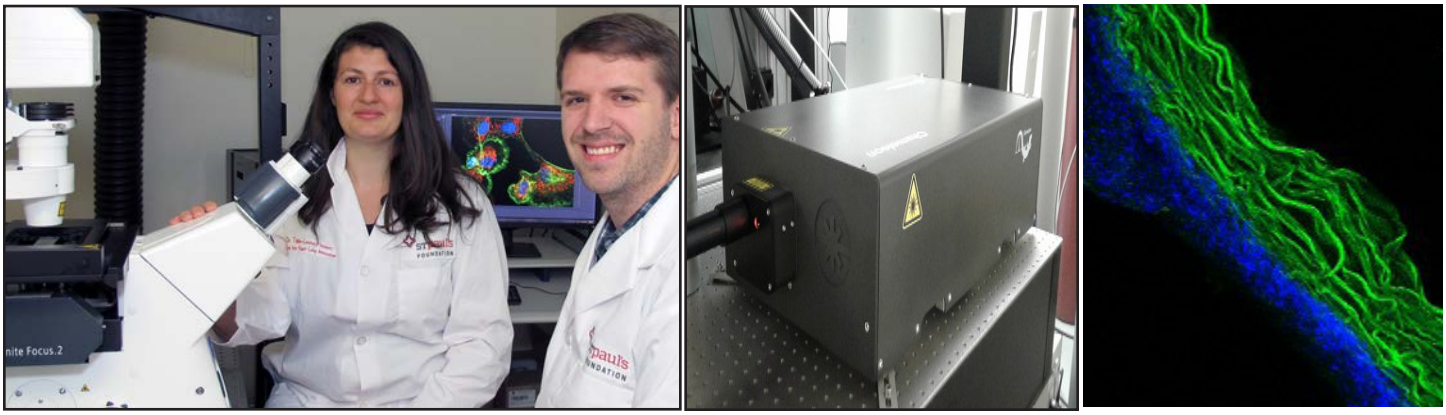
Marya Kemp, a High School Science Week participant, examining a tissue culture sample

HLI OPERATIONS

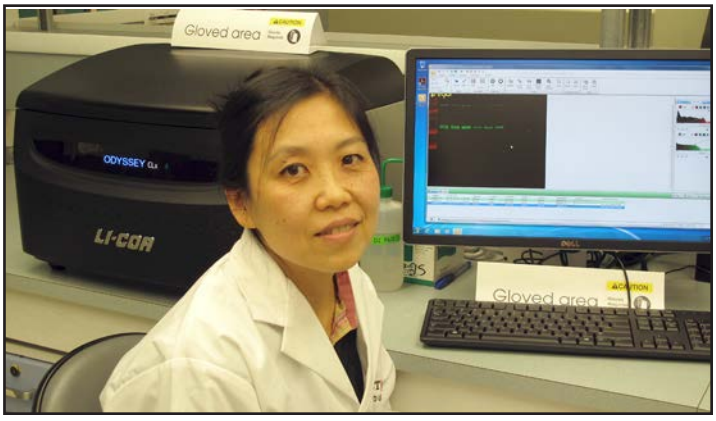
Centre Operational Highlights

Laboratory Equipment Acquisitions

In 2016, our Cellular Imaging and Biophysics Core acquired some much needed updates to our microscopy repertoire, adding the final pieces from our **Canada Foundation for Innovation (CFI) Award**. Thanks to the generosity of the St. Paul's Hospital Foundation, we were also able to replace outdated equipment. A new Zeiss LSM 880 confocal microscope enables us to visualize structure and dynamic function of cells and tissues with unprecedented resolution and sensitivity. Our new Coherent Chameleon Ultra II multiphoton laser system replaces an aging but well used multiphoton system. This new laser will allow us to do label-free deep tissue imaging, build on collaborations and expand core services for both internal and external users.



Left: Dr. Tillie Hackett, Co-Associate Director of the HLI, and Dr. Aaron Barlow, Cellular Imaging Core Manager, use the new Zeiss LSM confocal microscope. Middle: New Coherent Chameleon Ultra II multiphoton laser. Right: An image of an aortic section taken with the laser (collagen in blue, elastin in green).



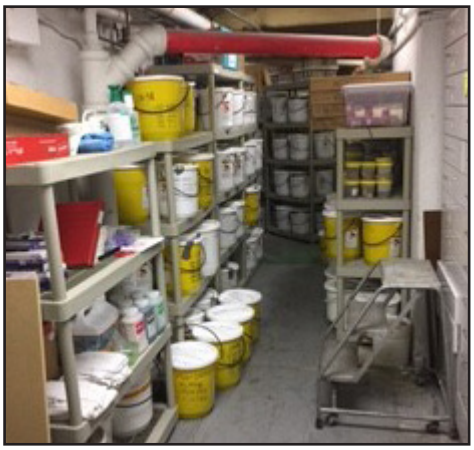
Thanks to the CFI, Dr. Lu Wang has access to our new Li-Cor Infrared Imaging System, which allows her to precisely quantify the contractile and structural proteins in airway smooth muscle.

Preclinical Services

GEM (Preclinical Services) staff continued to contribute to UBC Facility Management and Policy Development Committees and also acquired new CFI funded housing. The GEM group completed successful inspections with UBC, ensuring the highest standards of animal care were delivered.

Cardiovascular and Lung Tissue Registry

The HLI Cardiovascular and Lung Tissue Registry was successful in their proposal (Hackett & Smits) for securing funding from the James Hogg iCAPTURE endowment, St. Paul's Hospital Foundation and the Providence Health Care Research Institute and progressed with renovations in 2016 for our new state-of-the-art sample storage facilities. The newly expanded facility ensures sustainability and provides continued access for investigators worldwide (30 independent projects) to further grow our 31-year-old registry.



Left: The old non-ventilated room. Middle and Right: The new HLI Cardiovascular and Lung Registries Biobanking Facility is ready for move in.

IT Services

HLI's Information Technology team had a very busy year. For the prevention and SAVE BC clinics they developed contact and sample management databases and also expanded and upgraded sample inventories for over 30,000 specimens and 150,000 aliquots. The Lung Registry, under the direction of Drs. Hogg and Hackett, underwent migration, including updating 30 years of data. In addition, all block and freezer core samples were inventoried with data management. Our spectrum image server was expanded with over 30,000 images. Secure two factor authentification was added for registries and the BC and Canadian Familial Hypercholesterolemia (FH) registry expanded and underwent data integration. Just a few of the projects that await in 2017 are high speed data networking for the Confocal, Aperio and Micro CT scanners, remote high resolution graphical analysis installation, new and expanded storage for imaging scanners and a web portal for secure high-resolution analyses.


Left: A bank of newly installed IT servers, Right: The IT team takes a break from overseeing a long list of projects for HLI and other groups at St. Paul's Hospital. Right: Nghia Tran, Dean English, Kyle Johnson, Joe Comeau and Andrew Ferris.

Laboratory Safety in 2016

The Health and Safety Team held its second HLI Safety Day in 2016 with presentations on personal security, biomedical waste disposal, emergency preparedness, spill cleanup procedures and, in addition, gave out some well-deserved Safety Awards. Throughout the year, under the leadership of Ivan Leversage, the team continued to achieve their goals including conducting more frequent lab inspections and completing chemical waste cleanup. As a result of this change all HLI laboratories will now be inspected twice per year, instead of once annually.

The HLI Safety team. Front: Mandana Kianian, John Zhang, Lu Wang, Gurpreet Singhera, Amrit Samra, Chun Seow. Back: Beth Whalen, May Fouadi, Ivan Leversage, Mary Zhang, Claire Smits

A new chemical waste disposal inventory system was implemented in 2016. These changes were made to improve compliance with BC hazardous waste regulations and UBC's waste inventory and tracking, further reducing HLI's chemical waste production. The first disposal from HLI under this new system realized a reduction of 347.36 kg of chemical waste.

The Safety Committee would like to thank Rich Wambolt for his outstanding leadership as Safety Coordinator over the past five years.

Above: Rich Wambolt (left) accepts an award for Safety Leadership and Amrit Samra (right) accepts the award for Safety Documentation from Ivan Leversage (middle), the HLI Safety and Education Coordinator. Right: Dr. Gurpreet Singhera demonstrates appropriate Personal Protective Equipment (PPE) for working with liquid nitrogen.

Maintenance and Equipment Management Services

The Maintenance and Equipment Management Team continued with a busy schedule handling over 50 equipment repair tickets. They also provided expertise to renovation projects and opened our new freezer room housing -80°C freezers for cold storage samples for biobanking and clinical research programs.

Left: Maintenance Assistant Jesse Melito (left) and Maintenance and Facilities Manager, Dan Vikse (right), keep busy maintaining a large inventory of equipment and seventy -80°C freezers, containing over 30,000 irreplaceable samples, Right: Renovations for our third freezer room were completed, allowing for further expansion of our cold storage program with the addition of more -80°C freezers.

HERE WE GROW AGAIN

In 2016, Dr. Dermot Kelleher, the Dean of the Faculty of Medicine, announced an initiative to unite heart and lung research in BC. As a global leader in heart and lung research, the HLI will be at the centre of this initiative. Key to the HLI's success and leadership has been our ability to amplify our facilities and influences. This includes expansion of both the HLI Tissue Registries thanks to a Canada Foundation for Innovation (CFI) Award, expansion of wet lab facilities to other collaborating institutes, continued support for the SAVE-BC project, and growth of our clinical research support group.

Expansion of Tissue Registry

The HLI is built upon a rich history of Lung and Cardiovascular registries that collectively contain over 90,000 biospecimens and associated clinical data, donated to research by patients undergoing heart or lung surgery over the past 33 years at St. Paul's Hospital. The HLI Lung and Cardiovascular Tissue registries are currently directed by Drs. Tillie Hackett and Michael Seidman who, with their teams, enable academic and industry researchers from around the world access with ethical approval to these important samples for biomedical and translational research questions.

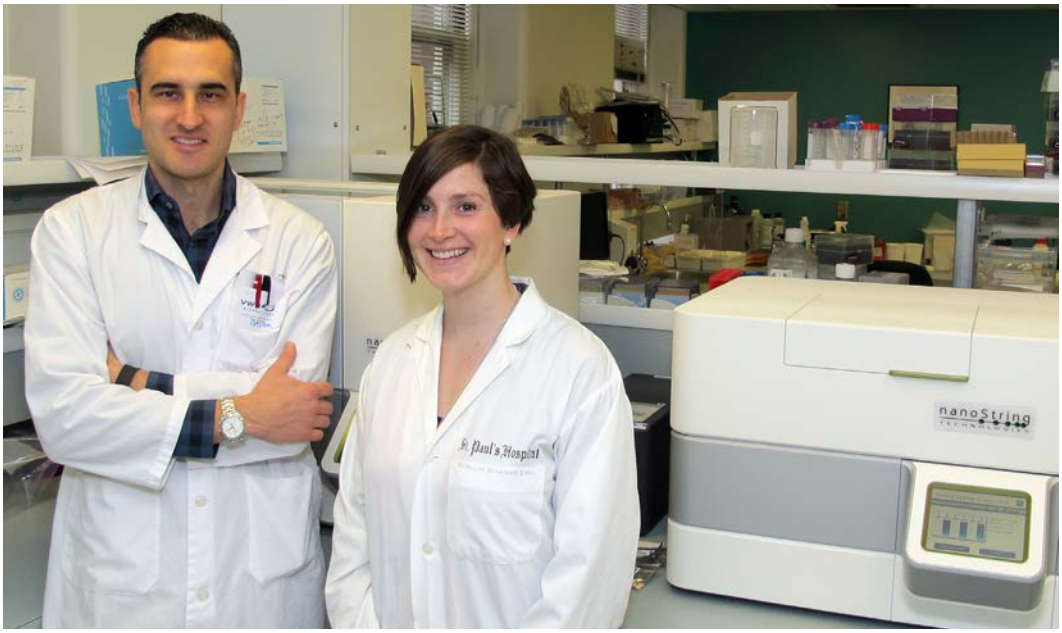
The Heart and Lung registries in the last year alone provided human samples for research worldwide to investigators both ***Provincially*** (BC Cancer (Drs. Gilks, Huntsman, Hoodless, Lam, and Wan), Centre for Heart Lung Innovation (Drs. Dorscheid, Francis, Hackett, Hogg, Luo, Sin, Seow, Van Eeden), St. Paul's Hospital (Drs. Leipsic, Ostry) Vancouver General Hospital (Drs. Carlsten, Granville, & Hirota), Simon Fraser University (Dr. Choy)), ***Nationally*** (McGill University, Sick Kids Toronto, University of Manitoba) and ***Internationally*** (Duke University, Stanford University, University of Cincinnati, University of Edinburgh, University of Florida, University of Pittsburgh) to as far as the University of Tasmania.

Wet Lab Facility Growth to Collaborating Institutes

In addition to expansion of our Tissue Registries, in 2016 HLI wet lab facilities expanded to include satellite and collaborative facilities. This includes the move of Dr. David Granville's lab to the International Collaboration on Repair Discoveries (iCord) facilities at Vancouver General Hospital (VGH), to join existing satellite facilities of Dr. Chris Carlsten's lab to the Occupational Lung Disease Clinic at The Lung Centre at VGH, and Dr. Stephen Lam's group at the BC Cancer Research Centre (BCCRC).

SAVE BC Patient Recruitment

The HLI's growth can also be seen in the increase in patient recruitment studies from VGH and other facilities. For example, the HLI and St. Paul's Hospital recently provided support to the Study to Avoid cardioVascular Events in British Columbia (SAVE BC). SAVE BC is led by HLI investigators Drs. Liam Brunham and Simon Pimstone and is a first-of-its kind research program in BC and Canada. The study is aimed at reducing the burden of heart disease in families affected by early-onset atherosclerotic heart disease. It involves medical specialists identifying, managing and providing long term follow-up to individuals with early atherosclerotic cardiovascular disease in BC, and their first-degree relatives and spouses who are known to be at increased risk. SAVE BC is recruiting patients for clinical research at both St Paul's and VGH.



SAVE BC researcher Dr. Liam Brunham and genetic counsellor Kelsey Lynch.

Expansion of Translational Research

Under the management of Lynda Lazosky, the HLI Clinical Research group has made great strides in aiding principal investigators to initiate over 40 new and manage over 50 ongoing clinical projects. The team has been instrumental in clinical research project management, ethics applications and study coordination to help HLI realize translational research plans. In 2016, the team saw an increase of 86% project requests from 2015.

Lynda Lazosky

Kelly Haller, Alicia Murdoch, Kristen Bowden and Jennifer Lee

Five new clinical research projects initiated since 2016 were in collaboration with investigators at UBC, three with VGH, and one with BC Children's, and the Sick Kids and St. Michael's Hospitals in Toronto, respectively. In addition, there are over fourteen projects ongoing that were initiated prior to 2016 in collaboration with investigators at the above institutions. These include nine projects at VGH, as well as other individual projects at BC Cancer, BC CDC and multiple sites across Canada.

Centre for Heart Lung Innovation

What we can do for you

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

The Centre for Heart Lung Innovation technicians have extensive training and experience to ensure that results are consistent and reliable with minimal turnover time.

Some of our services, equipment and tools are:

HLI Cardiovascular and Lung Tissue Registries

- Tissue and sample archiving
- Gross and microscopic specimen images
- Gross specimen photography
- New expanded formalin storage facility

Cellular Imaging & Biophysics

- Zeiss Inverted Confocal Fluorescence Microscope with Airyscan Super-resolution Imaging
- Nikon Model XTH225ST Micro Computed Tomography System
- Pelco BioWave Microwave Processor
- Leica Upright Fluorescence Microscope with Fast Confocal Scanner and CCD camera
- Tunable Ultra-short Infrared Laser for Super-resolution Two-Photon Excitation
- Deep tissue live cell imaging
- Li-cor Odyssey CLx Near-infrared Fluorescent Scanner

Imaging Services

- Digital slide scanning
- Poster and banner printing

Histology

- Processing and embedding
- Staining and Sectioning
- Immunohistochemistry
- Immuno-peroxidase
- Immuno-alkaline phosphatase
- FITC immunofluorescence
- TUNEL staining
- In situ Hybridization (ISH)

Molecular Phenotyping

- BeckmanCoulter Astrios EQ® high speed cell sorter
- Laser Capture Microdissection Pixcell II
- Siemens Advia 2120 Hematology analyzer
- BeckmanCoulter Gallios® Flow Cytometer
- Miltenyi AutoMACS
- ABI ViiA 7 Real-Time PCR
- Luminex IS100 XYP
- NanoString nCounter Analysis system
- Biobanking services
- SpectraMax i3 Multi-mode plate reader

Preclinical Services

- Contract animal research projects
- Flexivent Lung Function system and DSI Telemetry
- Echocardiography
- Level 2 Containment suite
- Colony management services
- Micro surgical services

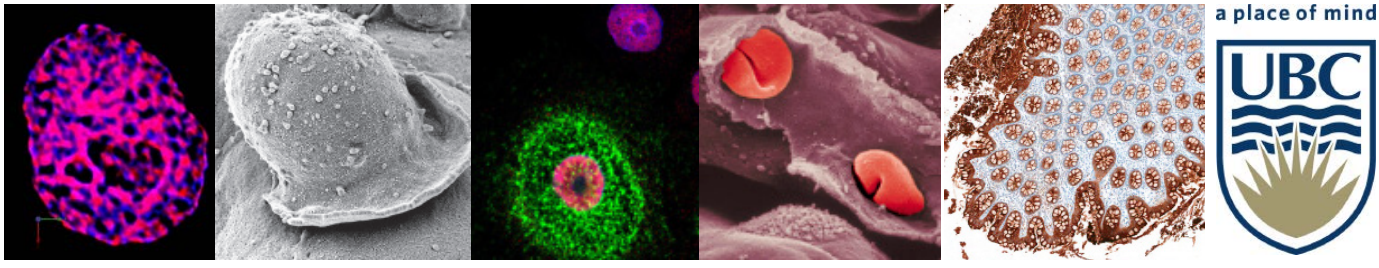
Clinical Research

- Available for consultation and project management
- Assistance with ethics applications submissions

Information Technology

- Advanced computing services
- Hosting of physical servers, virtual servers
- Secured and controlled access
- Long term storage
- Custom database and data management services
- Secure web development

For more information on our research capabilities and services, please contact Claire Smits, HLI Operations Director
t: 604.806.8852
e: claire.smits@hli.ubc.ca



a place of mind
UBC

Facility Users

36 Scientists at the HLI and **728 external users** (table below) access the HLI's Technology Cores each year to contribute to external national and international research projects. 96% of users are external to the HLI, 74% of users are external to UBC and 54% of users are external to British Columbia.

Table 1. Geographic distribution and number of facility users in 2016.

Demand	Total number of users 2014-2015	
	Request for Access	Access Accommodated
HLI Biobank	63	63
HLI Databases (DNA, RNA, Protein, Phenotype)	203	203
HLI Technology Cores	462	462
Geographic Distribution of Users		
Non-HLI UBC	188	188
Non-UBC Local	144	144
Rest of British Columbia	5	5
Alberta	16	16
Manitoba	14	14
Newfoundland and Labrador	1	1
Nova Scotia	6	6
Ontario	44	44
Quebec	48	48
Saskatchewan	11	11
International	251	251
Total	728	728

Events at the HLI

HLI Engagement

HLI Operations conducts numerous tours and educational information sessions every year with a goal of educating partner organizations and special interest groups with a firsthand view into our research activities. In 2016 we organized a number of tours and demonstrations, a few photo excerpts are below.

During an appreciation event for St. Paul's Hospital Foundation staff, Dr. Jordan Guenette explains how his exercise physiology lab works with a patient (on bike), to track cardiopulmonary function.

Dr. Paul Hanson supervises a tour participant (Sarah Burgess) handling a preserved donor heart.

Lights of Hope

The HLI supports the St. Paul's Foundation and the lights of Hope Campaign. The HLI again achieved a GOLD STAR and reached its goal of $20,000 in donations in 2016. Thanks to all who helped with fundraising events!

St. Paul's Hospital Lights of Hope campaign image by Brian K. Smith - available in the St. Paul's Gift Shop.

HLI in the News

HLI's Dr. John Boyd discusses the potential for PCSK9 inhibitors to treat sepsis

In April 2016, Dr. John Boyd, Principal Investigator at the HLI and Co-founder of Cyon Therapeutics, was featured in an article in the Vancouver Sun where he discusses the tremendous burden of sepsis and the hope of a new treatment.

> *If a patient arrives with an infection we can give this medication and have an immediate effect and that is something we have never been able to do before.*

Sepsis, a complication of bacterial infection, kills almost 10,000 Canadians each year and millions of people worldwide. Sepsis has proven difficult to treat and no new treatments have been developed since antibiotics over a century ago, until recently. Dr. Boyd, along with Co-founders of Cyon Therapeutics and fellow PIs at the HLI Drs. Keith Walley and Jim Russell, hope to exploit the effects of PCSK9 inhibitors - a new class of drugs approved last year to lower LDL cholesterol. Bacterial toxins that cause sepsis naturally bind to LDL cholesterol in the blood, so the hope is that by lowering LDL cholesterol in the blood stream, the harmful bacterial toxins that bind to LDL cholesterol will also be lowered. The drugs will be tested on 300 sepsis patients at five centres across Canada and up to 40 centres in the U.S. The researchers will also collect DNA from participants to see if people with certain genetic markers related to PCSK9 are more or less likely to respond to the treatment.

The Vancouver Sun
Doctors hope to repurpose cholesterol drug to treat often-deadly sepsis reactions
http://vancouversun.com/news/local-news/doctors-hope-to-repurpose-cholesterol-drug-to-treat-often-deadly-sepsis-reactions

Dr. Bruce McManus discusses biosignature discovery

The HLI's Dr. Bruce McManus was interviewed at the Canadian Science Policy Conference (CSPC) in 2016. The goal of the CSPC is to promote dialogue, provide training and advance science and innovation policy in Canada. Dr. McManus discussed the role of the PROOF Centre in enhancing innovation in the development and use of biosignatures. Primarily focused on blood based (plasma proteome, serum metabolome and whole blood transcriptome) biosignatures, the PROOF Centre aims to provide detection of end-organ disease (heart, lung, skeletal muscle, kidney, etc) risk, progression, decline and response to therapy. Dr. McManus was also asked about his thoughts on the future for young researchers in Canada. He remains optimistic about the future for young researchers in Canada and stressed the importance of maintaining flexibility in combination with ensuring that mentors are providing information about the variety of career possibilities for their trainees.

Canadian Science Policy Conference
CSPC 2016: Bruce McManus
http://sciencepolicy.ca/cspc-2016-bruce-mcmanus

Dr. Don Sin inspiring COPD patients through the INSPIRED Program

The HLI's Dr. Don Sin appeared on Global News in March 2016, to discuss a pilot project underway at St. Paul's Hospital. The project, called the INSPIRED Program, aims to follow COPD patients, admitted due to an exacerbation of their condition, once they are released from the hospital. The goal is to follow up with patients in the community to help them manage their disease better. Currently, COPD patients are the highest users of hospital resources due to the complications that arise from COPD exacerbations, which are triggered by infections. Once patients leave the hospital they are at high risk of another infection, and some patients may be admitted to the hospital 10-15 times per year. It is estimated that if the INSPIRED program were available to all COPD patients in BC, in just five years hospital admissions could be reduced by half and over 100 million dollars could be saved. Dr. Sin explains that this is extremely important because rates of COPD are on the rise, and it is anticipated that if nothing changes in the next 10 years hospitals will be full of COPD patients making it difficult for patients with other conditions to receive treatment.

If the INSPIRED Program was available to all patients in BC, within five years it could save over 100 million dollars

Global News
Vancouver aims to improve COPD treatments
http://globalnews.ca/news/2559505/vancouver-team-aims-to-improve-copd-treatments/

Drs. Denise Daley and Chris Carlsten discuss respiratory disease epigenetic research

The research of two of the HLI's Principal Investigators, Drs. Denise Daley and Chris Carlsten, was highlighted in an article by UBC's Trek Magazine about "Emerging Fields and Breakthrough Discoveries". Both are currently working on projects investigating how epigenetic processes (changes in gene expression due to environmental factors) impact lung function. Dr. Carlsten, a Chair in Occupational and Environmental Lung Disease, discussed his follow-up study on the effects of breathing diesel fumes on a select panel of genes and the possible health-related outcomes. Dr. Daley, a Canada Research Chair in Genetic Epidemiology of Common Complex Diseases, highlighted her work investigating the possibility of a link between smoking, DNA methylation and the development of asthma in the offspring of smokers.

Their respective studies in respiratory disease epigenetics have helped make the university a leader in this emerging field

UBC Trek Magazine
What are the health risks of inhaling smoky air?
http://trekmagazine.alumni.ubc.ca/2016/spring-2016/in-short/emerging-fields-and-break-through-discoveries/

Dr. Peter Paré announced as inaugural Editor-in-Chief of new Canadian Thoracic Society journal

The Canadian Journal of Respiratory, Critical Care, and Sleep Medicine is the new journal of the Canadian Thoracic Society that will be launched in 2017. Dr. Peter Paré has been appointed as the journal's inaugural Editor-in-Chief. This new journal will publish evidence-based guidelines and position papers, research and clinical articles, reviews, case studies and editorials, as well as a "pulmonary image feature". Importantly, the journal and associate editors will cover a broad range of backgrounds and specialties, including respiratory, critical care and sleep medicine. Research areas will cover observational studies, clinical trials, epidemiology, health services and outcomes studies, and translational basic research. Dr. Paré was chosen to lead the development of this new journal due to his leadership in helming the previous journal of the Canadian Thoracic Society, which he helped grow in scope and impact factor during the five years he spent as its Editor-in-Chief.

Canadian Thoracic Society and Taylor & Francis Publishing
CTS Journal announces new publishing partnership
https://cts.lung.ca/canadian_respiratory_journal

HLI's Dr. Don Sin discusses web tool that can predict the prognosis of COPD patients

An estimated 300 million people worldwide suffer from chronic obstructive pulmonary disease (COPD), a chronic lung disease that causes shortness of breath and persistent cough. A key component of treating COPD is making sure the right patient gets the right therapy. In a CityNews interview in August 2016, Dr. Don Sin, a PI at the HLI and the Head of Respiratory Medicine at Providence Health Care, discussed how a new web-tool based on computer algorithms developed by him and a team of researchers allows doctors to do just that. The website serves as a "crystal ball" for helping doctors calculate how progression of COPD could be delayed with therapies tailored to the needs of individual patients. The study involving researchers from Canada, the US, and Europe was published in the Canadian Medical Association Journal and is based on data from over 5,800 patients. This online tool is extremely important given that COPD is growing and is expected to increase in prevalence by 50% in the next 20 years due to an aging population.

> *If a patient arrives with an infection we can give this medication and have an immediate effect and that is something we have never been able to achieve before.*

Publication: Zafari Z, Sin DD, Postma DS, Löfdahl CG, Vonk J, Bryan S, Lam S, Tammemagi CM, Khakban R, Man SF, Tashkin D, Wise RA, Connett JE, McManus B, Ng R, Hollander Z, Sadatsafavi M. Individualized prediction of lung-function decline in chronic obstructive pulmonary disease. CMAJ. 188(14): 1004-1011, 2016.

St. Paul's Foundation and Providence Health Care websites
Crystal ball-like web tool could help patients with lung disease
http://www.helpstpauls.com/app/uploads/2015/04/Promise-Sprg_Summ2015_PhotoEssay.pdf

http://www.providencehealthcare.org/news/20160828/new-online-tool-predicts-trajectory-lung-disease-dr-don-sin

Knowledge Translation

The HLI currently hosts five UBC spin-off companies including Cyon Therapeutics, viDA Therapeutics Inc, Aspect Biosystems, Black Tusk, and PROOF Centre.

Cyon Therapeutics: Better Outcomes in Sepsis

Driven by the knowledge that better outcomes in sepsis are possible, Cyon Therapeutics Inc. was formed in 2014 to make this a reality. Led by a team of HLI scientists and critical care physicians, Drs. Keith Walley, Jim Russell and John Boyd, and supported by two CEOs, the goal of the spin-off is to bring a novel treatment platform to sepsis. Through their groundbreaking scientific discoveries, the team is developing the means to boost the body's natural ability to clear infectious toxins from the bloodstream.
Source: cyontherapeutics.com/about

viDA Therapeutics: Novel Treatments for Inflammatory and Age-related Diseases

Founded in 2008 by Dr. David Granville, viDA Therapeutics is committed to the discovery, development and commercialization of novel and targeted therapeutics for the treatment of inflammatory and age-related diseases. Their unique discovery platform is based on novel research regarding a distinctly different and recently identified, extracellular role for Granzymes in the destruction and inflammation of tissues. Source: vidatherapeutics.com

Aspect Biosystems: Human Tissues on Demand

Dr. Sam Wadsworth, leading cell biologist at the HLI, co-founded the award-winning biotechnology company, Aspect Biosystems Ltd., in November 2013 with Dr. Konrad Walus' research group. Aspect Biosystems specializes in 3D bioprinting and tissue engineering, bringing together a multi-talented team of individuals to develop cutting-edge custom human tissue technology for use in the life sciences. Source: aspectbiosystems.com

PROOF Centre: Biomarkers to prevent organ failure

The PROOF (Prevention of Organ Failure) Centre is a not-for-profit organization that develops blood tests to better predict, diagnose, manage and treat heart, lung and kidney disease. PROOF is a cross-disciplinary biosignature development engine of partners representing academia, health care, government, industry, patients and the public. The PROOF Centre, led by HLI PI and former HLI Director Dr. Bruce McManus, was initially established by the Networks of Centres of Excellence Secretariat under the Centre of Excellence for Commercialization and Research (NCE CECR) Program, and is co-hosted by the University of British Columbia and Providence Health Care in Vancouver, British Columbia, Canada. Source: proofcentre.ca

Black Tusk Research Group Inc.

Founded in 2014, by HLI Clinical Research Core Manager Ms. Lynda Lazosky and HLI PI Dr. John Boyd, Black Tusk Research Group Inc. is a site monitoring organization supporting clinical trials and biobanking. BTRG supports Principal Investigators and helps them to initiate and manage pharmaceutical phase II, III and IV clinical trials and academic grant funded clinical research projects.

Partnerships and Acknowledgements

The HLI is grateful to our funding partners: Canada Foundation for Innovation, British Columbia Knowledge Development Fund, Providence Health Care, University of British Columbia, Heart and Stroke Foundation of BC and Yukon, BC Lung Association, the St. Paul's Hospital Foundation and many vendors and industrial collaborators, for their crucial support of our ongoing programs.

We wish to thank our current partners:

Adiga Life Sciences Inc.
Agartee Technology Inc.
AllerGen
Alpha-1 Foundation
Alzheimer Society of Canada
Amarin Pharma Inc.
AMGEN Canada Inc.
Asahi Kasei Pharma America
AstraZeneca Canada Inc.
Bayer AG
Boehringer Ingelheim (Canada) Ltd.
British Columbia Knowledge Development Fund (BCKDF)
British Columbia Lung Association
British Columbia Proteomics Network
Canada Foundation for Innovation
Canada Research Chairs
Canadian Diabetes Association
Canadian Foundation for AIDS Research
Canadian Institutes of Health Research (CIHR)
Cyon Therapeutics Inc.
Cystic Fibrosis Canada
Cystic Fibrosis Foundation (US)
Genentech Inc.
Genome British Columbia
Gilead Sciences Inc.
GlaxoSmithKline
Grifols Shared Services North America Inc.
Heart and Stroke Foundation of British Columbia and Yukon
Heart and Stroke Foundation of Canada
Hoffmann-La Roche Ltd. (Canada)
Networks of Centres of Excellence (NCE)
Industry Canada
InterMune Inc.
Ionis Pharmaceuticals, Inc.
Janssen Inc.
Juvenile Diabetes Research Foundation International
La Jolla Pharmaceutical Company
Leading Biosciences Inc.
MedImmune LLC
Merck Sharp & Dohme Corp.
Michael Smith Foundation for Health Research
National Institutes of Health
National Research Council
Natural Sciences and Engineering Research Council of Canada (NSERC)
Novartis Pharmaceuticals Canada Inc.
Octapharma Canada Inc.
Pfizer Canada Inc.
Pharmaxis Ltd.
ProMetic Life Sciences Inc.
PROOF Centre of Excellence
Providence Health Care Research Institute (PHCRI)
Province of British Columbia
Respivert Ltd.
RxSource Corp.
sanofi-aventis Canada Inc.
St. Paul's Hospital Foundation
The Lung Association
Trius Therapeutics Inc.
UBC Department of Medicine
UBC Department of Physical Therapy
University of Calgary
Vertex Pharmaceuticals Inc.
viDA Therapeutics Inc.

We are grateful to the following individuals for their assistance in the creation of this report: Nicole Rosin, Kim Schmidt, Claire Smits, Abbie Wright, Emily MacLean, Kasia Celler, Effie Pow, Kelly Ceron, Chris Robinson, Jo-Lynn Mervyn, Gwen Sin, Ivan Leversage, Dean English, Dr. Keith Walley and all the HLI Principal investigators.

Supporting our Fight against Heart and Lung Diseases

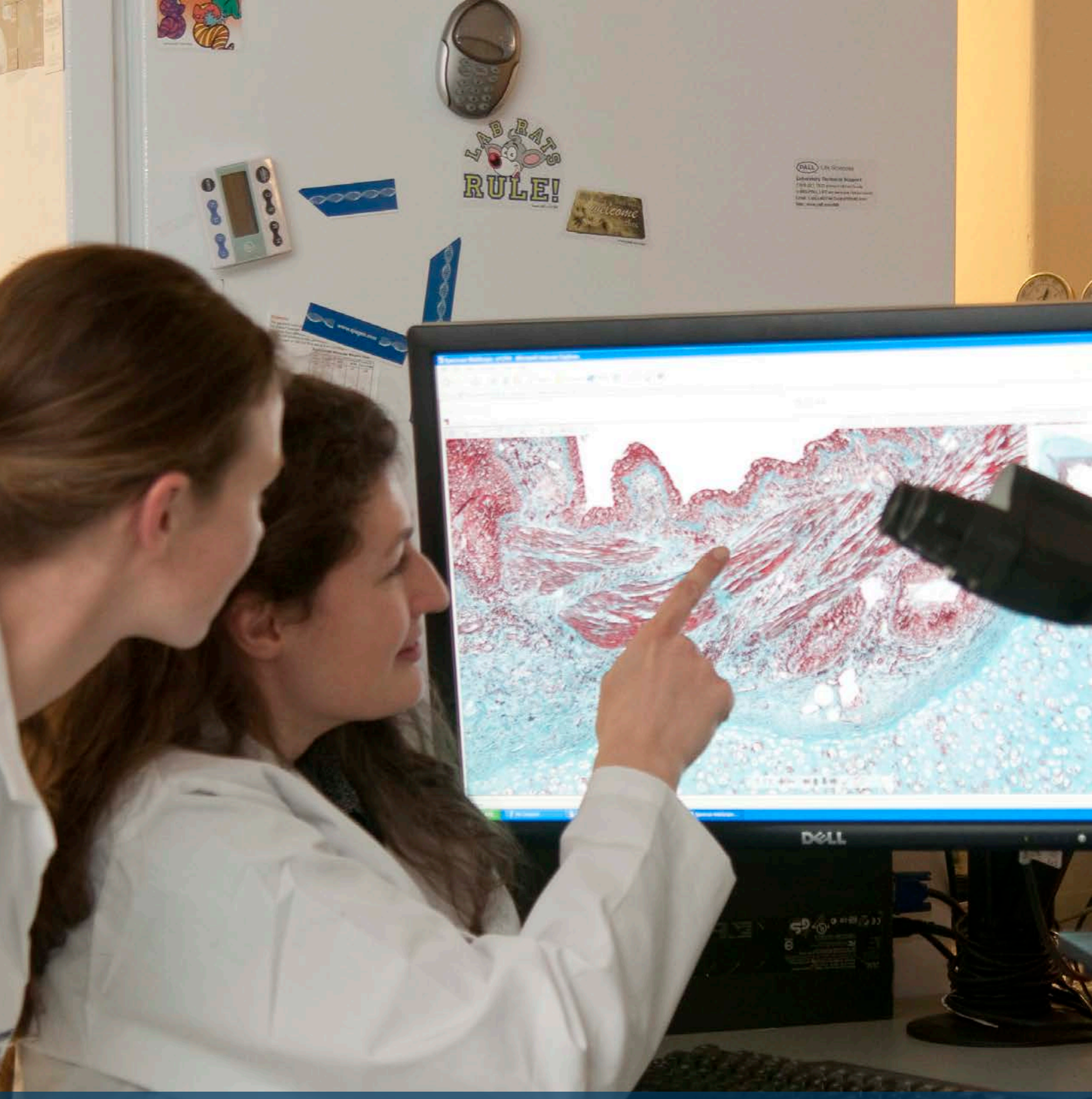
Heart and lung diseases combined are still the world's number one cause of death and disability. Help us win this fight.

The Centre for Heart Lung Innovation has been extremely successful at attracting infrastructure grants and government research dollars. However, attracting funds to allow us to retain our expertly trained staff and purchase new equipment remains a challenge. We actively seek interest and donations from private and individual donors whose interests are in alignment with our research, with the help of the following organizations.

St. Paul's Foundation
178 – 1081 Burrard Street
Vancouver, BC V6Z 1Y6
Phone (for residents of Metro Vancouver): 604-682-8206
Phone (toll-free number for residents of rest of BC): 1-800-720-2983
sphfoundation@providencehealth.bc.ca
www.helpstpauls.com

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

University of British Columbia
Development and Alumni Engagement
500 - 5950 University Blvd
Vancouver, BC Canada V6T 1Z3
Phone: 604-822-8900
info@startanevolution.ubc.ca
https://startanevolution.ubc.ca/category/projects-by-faculty/faculty-of-medicine



APPENDICES

Appendix A: Centre for Heart Lung Innovation Grants, Contracts, Clinical Trials* and Agreements (April 2016 – March 2017)

* Data from the UBC RISe (Research Information Services) list.

Principal Investigator	Funding Agency	Award Amount	Project Title	Award Type
Bernatchez, Pascal	Heart and Stroke Foundation of Canada	$88,412.00	Aberrant endothelial mechano-sensing is a cause of early atherosclerosis and a pharmacological target	Grant
Boyd, John	Trius Therapeutics Inc	$1,331.30	A Phase 3 Randomized Double-Blind Study Comparing TR701 FA and Linezolid in Ventilated Gram-positive Nosocomial Pneumonia (TR701-132)	Clinical Trial
Boyd, John	Cubist Pharmaceuticals Inc.	$5,499.45	A prospective, randomized, double-blind, multicenter, phase 3 study to assess the safety and efficacy of intravenous ceftolozane/ tazobactam compared with meropenem in adult patients with ventilated nosocomial pneumonia	Clinical Trial
Boyd, John	Cyon Therapeutics Inc.	$95,904.00	PCSK9 Inhibitors for SIRS, Sepsis and Septic Shock	Contract
Boyd, John	Leading Biosciences Inc.	$1,748.96	Treatment of Septic Shock by Inhibiting Autodigestion and Preserving Gut Integrity with Enteric LB1148 (SSAIL Study)	Clinical Trial
Boyd, John	La Jolla Pharmaceutical Company	$84,837.50	A Phase 3, Placebo-Controlled, Randomized, Double-Blind, MultiCenter Study of LJPC-501 in Patients with Catecholamine-Resistant Hypotension (CRH)	Clinical Trial
Boyd, John	Transplant Research Foundation of British Columbia	$25,000.00	The donor heart after withdrawal of life support	Grant
Brunham, Liam	Heart and Stroke Foundation of Canada	$49,420.00	Genomic markers of leukoaraiosis in patients with premature vascular disease	Grant
Brunham, Liam	UBC Department of Medicine	$32,000.00	Startup funds	Grant
Brunham, Liam	UBC Department of Medicine	$20,000.00	Startup funds	Grant
Brunham, Liam	Providence Health Care Research Institute (PHCRI)	$40,000.00	Startup funds	Grant
Brunham, Liam	AMGEN Canada Inc.	$1,500.00	Guidelines Oriented Approach to Lipid lowering in Canada (GOAL I & II)	Clinical Trial
Brunham, Liam	Cerenis Therapeutics	$23,184.68	Phase III, Multi-Center, Randomized, 48 Weeks, Double-Blind, Parallel-Group, Placebo-Controlled Study to Evaluate Efficacy and Safety of CER-001 on Vessel Wall Area in Patients with Genetically Defined Familial Primary Hypoalphalipoproteine	Clinical Trial

Brunham, Liam	Stem Cell Network, Inc.	$50,000.00	Using human pluripotent stem cell derived cardiomyocytes to investigate the mechanisms of ibrutimib-associated atrial fibrillation	Agreement
Brunham, Liam	British Columbia Knowledge Development Fund (BCKDF)	$123,693.00	Harnessing advances in genomics to improve the care of patients with dyslipidemias	Grant
Brunham, Liam	Canada Foundation for Innovation	$2,439.94	Harnessing advances in genomics to improve the care of patients with dyslipidemias	Grant
Brunham, Liam	Canada Foundation for Innovation	$123,692.00	Harnessing advances in genomics to improve the care of patients with dyslipidemias	Grant
Brunham, Liam	Genome British Columbia	$100,000.00	SAVE BC, the Study to Avoid cardioVascular Events in British Columbia	Agreement
Brunham, Liam	Canadian Institutes of Health Research (CIHR)	$25,000.00	Understanding patient priorities in cardiovascular prevention research	Grant
Brunham, Liam	Providence Health Care Research Institute (PHCRI)	$100,000.00	Co funding: SAVE BC, the study to avoid cardiovascular events in British Columbia	Grant
Camp, Pat	UBC Department of Physical Therapy	$25,000.00	Safe and effective prescription of exercise in acute exacerbations of chronic obstructive pulmonary disease: a consensus of experts	Grant
Camp, Pat	Canada Foundation for Innovation	$7,500.00	CFI Infrastructure Operating Fund	Grant
Camp, Pat	Boehringer Ingelheim (Canada) Ltd.	$18,750.00	Using the Knowledge-to-Action Process to Develop quality Criteria for pulmonary Rehabilitation - A Community Health Care Focused Approach	Agreement
Camp, Pat	British Columbia Lung Association	$12,500.00	Pulmonary rehabilitation in rural BC: Engaging with communities to create novel telehealth approaches	Grant
Camp, Pat	Interior Health Authority	$15,000.00	Pulmonary tele-rehabilitation for Interior Health. Part One: A participatory research approach to understand physical activity of residents living in remote and rural locations	Grant
Camp, Pat	Canadian Institutes of Health Research (CIHR)	$55,023.95	Randomized controlled trial of balance training for fall reduction in individuals with COPD	Agreement
Daley, Denise	Canadian Institutes of Health Research (CIHR)	$250,000.00	Epigenetic mechanisms for the development of asthma	Grant
Daley, Denise	Genome British Columbia	$50,000.00	Epigenetic Mechanisms for the Development of Asthma	Agreement
Daley, Denise	Canadian Institutes of Health Research (CIHR)	$100,000.00	Get-facts: Genetics, environment and therapies: Food allergy clinical tolerance studies	Agreement
Daley, Denise	Canadian Institutes of Health Research (CIHR)	$5,000.00	Development of bioinformatics tools to study DNA methylation in and around long non-coding RNA genes	Grant
Daley, Denise	Michael Smith Foundation for Health Research	$16,708.33	Development of hierarchical models to investigate the role of long non coding RNA regions in the etiology of asthma	Grant

DeMarco, Mari	Alzheimer's Drug Discovery Foundation	$105,009.38	Quantitation of TDP-43 isoforms in CSF by mass spectrometry	Agreement
Dorscheid, Delbert R.	Novartis Pharmaceuticals Canada Inc.	$2,544.00	"REal-LIfe" EFfectiveness and safety of omalizumab in patients with severe allergic asthma: The Latin American and Canadian experience (RELIEF)	Clinical Trial
Dorscheid, Delbert R.	British Columbia Lung Association	$25,000.00	Conjugated linoletic acid (CLA) – A novel and natural anti-viral and anti-inflammatory molecule in asthma	Grant
Dorscheid, Delbert R.	AstraZeneca Canada Inc.	$21,115.34	A Multicentre, Randomized, Parallel Group, Phase 3 Safety Extension Study to Evaluate the Safety and Tolerability of Benralizumab (MEDI-563) in Asthmatic Adults and Adolescents on Inhaled Corticosteroid Plus Long-acting β2 Agonist	Clinical Trial
Dorscheid, Delbert R.	Sanofi-aventis Canada Inc.	$8,893.00	A randomized, double blind, placebo controlled, parallel group study to evaluate the efficacy and safety of dupilumab in patients with severe steroid dependent asthma	Clinical Trial
Dorscheid, Delbert R.	Novartis Pharmaceuticals Canada Inc.	$8,669.00	A 52-week, multicenter, randomized, double-blind, placebo- controlled study to assess the efficacy and safety of QAW039 when added to existing asthma therapy in patients with uncontrolled severe asthma	Clinical Trial
Dorscheid, Delbert R.	Novartis Pharmaceuticals Canada Inc.	$7,000.00	A multicenter, randomized, 52-week, double-blind, parallel-group, active controlled study to compare the efficacy and safety of QVM149 with QMF149 in patients with asthma	Clinical Trial
Francis, Gordon A.	Canada Foundation for Innovation	$586,482.66	Molecules to man: enhanced phenotyping for the discovery, prevention and treatment of heart, lung and blood vessel disease	Grant
Francis, Gordon A.	Canada Foundation for Innovation	$96,108.00	Molecules to human: enhanced phenotyping for discovery, prevention, & treatment of heart, lung, & blood vessel disease	Grant
Francis, Gordon A.	Ionis Pharmaceuticals, Inc.	$19,086.10	A Randomized, Double-Blind, Placebo-Controlled, Phase 3 Study of ISIS 304801 Administered Subcutaneously to Patients with Familial Chylomicronemia Syndrome (FCS) - The APPROACH study	Clinical Trial
Francis, Gordon A.	Ionis Pharmaceuticals, Inc.	$46,960.62	A Randomized, Double-Blind, Placebo-Controlled Phase 3 Study of ISIS 304801 Administered Subcutaneously to Patients with Hypertriglyceridemia	Clinical Trial
Francis, Gordon A.	Michael Smith Foundation for Health Research	$41,500.00	The role of arterial smooth muscle cells in foam cell formation in atherosclerosis	Grant
Francis, Gordon A.	Michael Smith Foundation for Health Research	$25,000.00	Lipid and Lipoprotein Metabolism	Grant

Francis, Gordon A.	The Medicines Co.	$28,010.00	A placebo-controlled, double-blind, randomized trial to compare the effect of different doses of ALN-PCSSC given as single or multiple subcutaneous injections in subjects with high cardiovascular risk and elevated LDL-C	Clinical Trial
Francis, Gordon A.	Canadian Institutes of Health Research (CIHR)	$181,951.00	The unrecognized importance of smooth muscle foam cells in atherosclerosis development and treatment	Grant
Francis, Gordon A.	Ionis Pharmaceuticals, Inc.	$12,500.00	An Open-Label Extension Study of Volanesorsen Administered Subcutaneously to Patients with Familial Chylomicronemia Syndrome (FCS)	Clinical Trial
Frohlich, Jiri	AMGEN Canada Inc.	$16,344.70	A Multicentre, Controlled, Open-label Extension (OLE) Study to Assess the Long-term Safety and Efficacy of AMG 145.	Clinical Trial
Frohlich, Jiri	Pfizer Canada Inc.	$8,392.40	A 52 Week, Phase 3 Double-Blind, Randomized, Placebo-Controlled, Parallel-Group Study to Assess the Efficacy, Safety and Tolerability of PF-04950615 in Subjects With Heterozygous Familial Hypercholesterolemia	Clinical Trial
Frohlich, Jiri	AMGEN Canada Inc.	$144,000.00	Creation and implementation of a Registry for Familial Hypercholesterolemia	Grant
Granville, David J.	Diabetes Canada	-$41,503.20	Granzyme B in non-healing diabetic skin ulcer pathogenesis	Grant
Granville, David J.	Rick Hansen Institute	$185,000.00	Granzyme B Inhibition to Accelerate Pressure Ulcer Wound Closure and Reduce Recurrence	Clinical Trial
Guenette, Jordan A.	Natural Sciences and Engineering Research Council of Canada (NSERC)	$30,000.00	Respiratory and locomotor muscle blood flow regulation during physiological stress	Grant
Guenette, Jordan A.	Canada Foundation for Innovation	$7,500.00	CFI Infrastructure Operating Fund	Grant
Guenette, Jordan A.	Canadian Respiratory Research Network	$50,000.00	Mechanisms of dyspnea and exercise intolerance in patients with chronic respiratory diseases	Grant
Guenette, Jordan A.	Agartee Technology Inc.	$7,500.00	Modification of wake/sleep identification algorithms in an innovative actigraph platform against polysomnography in patients with chronic obstructive pulmonary disease	Grant
Guenette, Jordan A.	Innovation, Science and Economic Development Canada	$7,500.00	Modification of wake/sleep identification algorithms in an innovative actigraph platform against polysomnography in patients with chronic obstructive pulmonary disease	Grant
Guenette, Jordan A.	Canadian Respiratory Research Network	$2,400.00	The effects of diesel exhaust on pulmonary physiology in mild chronic obstructive pulmonary disease (COPD) and 'at risk' smokers	Grant
Hackett, Tillie Louise	Canadian Institutes of Health Research (CIHR)	$136,618.00	Resetting epithelial differentiation as a novel therapeutic approach to treating asthma	Grant

Hackett, Tillie Louise	National Institutes of Health	$379,666.98	Integrative omics to discover molecular determinants of COPD	Agreement
Hackett, Tillie Louise	Canadian Institutes of Health Research (CIHR)	$110,785.00	Molecular determinants of small airway obstruction in COPD	Grant
Hackett, Tillie Louise	The Lung Association	$45,000.00	Multimodal characterization of airway remodeling with label-free nonlinear optical imaging	Grant
Hackett, Tillie Louise	Canada Foundation for Innovation	$3,387.04	Molecular determinants of obstructive lung disease	Grant
Hackett, Tillie Louise	Michael Smith Foundation for Health Research	$34,000.03	Multimodal characterization of airway remodeling with label-free nonlinear optical imaging	Grant
Hogg, James C.	National Institutes of Health	$110,535.82	Parametric response mapping in COPD	Agreement
Hogg, James C.	Grifols Shared Services North America Inc.	$91,203.98	The Mechanism of Lung Tissue Destruction in Alpha One Anti trypsin Deficiency	Contract
Hogg, James C.	British Columbia Lung Association	$25,000.00	Molecular determinants of panlobular emphysema: A stereology based approach	Grant
Hogg, James C.	Respivert Ltd.	$143,403.60	Characterising the Molecular Alterations Associated with Structural Progression of Small Airways Disease and Emphysema in COPD	Contract
Hogg, James C.	Genentech Inc.	$319,820.00	PHASE I: Pilot Study to Assess Effects of uCT Imaging on RNA Quality in Lung Tissue Samples; PHASE II: Analysis of Gene Expression Patterns in IPF and Normal Lung Tissues	Contract
Hogg, James C.	Alpha-1 Foundation	$61,187.03	Molecular determinants of small airway disease in AATD	Grant
Hogg, James C.	Gilead Sciences Inc.	$20,649.71	Determine the Prevalence and Distribution of LOXL2.MMP-9 and phosphor-p38 at Sites of Active Fibrogenesis and Fibrotic Remodeling in Lung Explant Tissue from Patients with IPF and COPD	Contract
Hogg, James C.	National Institutes of Health	$110,206.61	Genomic Analysis of Tissue and Cellular Heterogeneity in IPF	Agreement
Hogg, James C.	British Columbia Lung Association	$25,000.00	K.K. Pump Fellowship	Grant
Leung, Janice	The Lung Association	$25,000.00	Accelerated aging and oxidative stress: Mechanisms of lung disease in HIV	Grant
Luo, Honglin	Canadian Institutes of Health Research (CIHR)	$105,967.00	Cleavage of serum response factor in viral cardiomyopathy	Grant
Luo, Honglin	Heart and Stroke Foundation of Canada	$90,960.00	Molecular chaperones in viral cardiomyopathy	Grant
Luo, Honglin	Natural Sciences and Engineering Research Council of Canada (NSERC)	$44,000.00	Understanding the interplay between coxsackieviruses and the host ubiquitin-proteasome system	Grant
Luo, Honglin	British Columbia Lung Association	$25,000.00	Development of a novel coxsackievirus B3-based oncolytic virus for lung cancer therapy	Grant

Luo, Honglin	Amyotrophic Lateral Sclerosis Society of Canada	$100,000.00	Role of enterovirus infection in amyotrophic lateral sclerosis	Grant
Man, S.F. Paul	Canadian Institutes of Health Research (CIHR)	$117,086.00	Epigenetic and transcriptomic disturbances in HIV-associated COPD	Grant
McManus, Bruce M.	Genome British Columbia	$100,000.00	Canadian International Data Sharing Initiative (Can-SHARE) - User-centric genomics data exchange and aggregration with BlockChain technolgoies	Agreement
McManus, Bruce M.	UBC Strategic Excellence Fund	$100,000.00	Data analytics and systems science (DASS) to optimize heart + lung health	Grant
McManus, Bruce M.	British Columbia Knowledge Development Fund (BCKDF)	$74,639.00	Frontiers in molecular laboratory medicine at St. Paul's	Grant
McManus, Bruce M.	Canada Foundation for Innovation	$74,640.00	Frontiers in molecular laboratory medicine at St. Paul's	Grant
McManus, Bruce M.	PROOF Centre of Excellence	$22,381.00	Frontiers in molecular laboratory medicine at St. Paul's	Grant
Pare, Peter D.	Michael Smith Foundation for Health Research	$17,291.67	Unraveling the molecular mechanisms for variation in lung function	Grant
Pare, Peter D.	British Columbia Lung Association	$25,000.00	Integrative genomics approach to unravel the molecular mechanisms underlying lung function measures and lung cancer (Ma'en Obeidat)	Grant
Quon, Bradley S.	Cystic Fibrosis Canada	$72,985.00	External replication of a plasma protein biosignature of predict cystic fibrosis pulmonary exacerbations	Grant
Quon, Bradley S.	PTC Therapeutics Inc	$11,009.25	A Phase 3 Efficacy and Safety Study of Ataluren (PTC124®) in Patients with Nonsense Mutation Cystic Fibrosis (ACT CF)	Clinical Trial
Quon, Bradley S.	Vertex Pharmaceuticals Inc.	$73,853.00	A Phase 3, Randomized, Double-Blind, Placebo-Controlled, Parallel-Group Study to Evaluate the Efficacy and Safety of VX-661 in Combination With Ivacaftor in Subjects Aged 12 Years and Older With Cystic Fibrosis, Homozygous for the F508del-C	Clinical Trial
Quon, Bradley S.	Vertex Pharmaceuticals Inc.	$20,803.00	A Phase 3, Randomized, Double-Blind, Placebo-Controlled, Crossover Study to Evaluate the Efficacy and Safety of Ivacaftor and VX-661 in Combination With Ivacaftor in Subjects Aged 12 Years and Older With Cystic Fibrosis, Heterozygous for the F508del-C	Clinical Trial
Quon, Bradley S.	Pharmaxis Ltd.	$18,362.42	Long Term Administration of Inhaled Mannitol in Cystic Fibrosis – A Safety and Efficacy Trial in Adult Cystic Fibrosis Subjects	Clinical Trial
Quon, Bradley S.	Cystic Fibrosis Foundation (US)	$3,207.91	Utilizing the CFFT biorepository to identify and validate CF biomarkers	Grant

Quon, Bradley S.	Vertex Pharmaceuticals (Canada) Inc.	$38,843.00	A Phase 3, Open-label, Rollover Study to Evaluate the Safety and Efficacy of Long-term Treatment WithVX-661 in Combination With Ivacaftor in Subjects Aged 12 Years and Older With Cystic Fibrosis, Homozygous or Heterozygous for the F508del-C	Clinical Trial
Quon, Bradley S.	British Columbia Lung Association	$22,500.00	Discovery of blood protein biomarkers to monitor treatment response during CF pulmonary exacerbations	Grant
Russell, James A.	Grifols, S.A.	$69,668.71	Is Heparin-binding Protein a Mechanism of Albumin's Efficacy in Human Septic Shock?	Contract
Ryerson, Chris	Gilead Sciences Inc.	$4,147.12	A Phase 2, Randomized, Double-Blind, Placebo-Controlled, Multi-Center Study to Assess the Efficacy and Safety of GS-6624 in Subjects with Idiopathic Pulmonary Fibrosis (RAINIER)	Clinical Trial
Ryerson, Chris	InterMune Inc.	$2,967.00	A Prospective Observational Study to Evaluate Adherence and Treatment Outcomes in Patients with Idiopathic Pulmonary Fibrosis (IPF) treated with Esbriet® (pirfenidone) in Canada	Clinical Trial
Ryerson, Chris	Boehringer Ingelheim (Canada) Ltd.	$79,364.99	A double blind randomized placebo controlled trial evaluating the effect of oral nintedanib 150 mg twice daily on high resolution computerized tomography quantitative lung fibrosis score, lung function, six minute walk test distance and St.	Clinical Trial
Ryerson, Chris	InterMune Inc.	$19,200.00	UBC Interstitial Lung Disease Summer Studentship	Grant
Ryerson, Chris	British Columbia Lung Association	$25,000.00	Researching fraility, sarcopenia and healthcare costs in fibrotic interstitial lung disease (the "REFREsSH-ILD Study")	Grant
Ryerson, Chris	Boehringer Ingelheim (Canada) Ltd.	$287,142.86	The Canadian Cohort for Pulmonary Fibrosis	Clinical Trial
Ryerson, Chris	ProMetic Life Sciences Inc.	$52,594.99	A Phase 2, Open-label, Single Arm, Exploratory, Observational Study to Evaluate the Safety and Tolerability of PBI-4050 in Patients with Idiopathic Pulmonary Fibrosis (IPF)	Clinical Trial
Ryerson, Chris	Boehringer Ingelheim (Canada) Ltd.	$100,000.00	High Oxygen Delivery to Preserve Exercise Capacity in PIF Patients Treated with Nintedanib: The HOPE-IPF Study	Clinical Trial
Ryerson, Chris	Boehringer Ingelheim (Canada) Ltd.	$34,215.08	A twelve week, open-label, randomised, parallel-group study evaluating safety, tolerability and pharmacokinetics (PK) of oral nintedanib in combination with oral pirfenidone, compared to treatment with nintedanib alone, in patients with idi	Clinical Trial
Ryerson, Chris	Seattle Genetics, Inc.	$11,650.00	Biomarkers in autoimmune and inflammation trial (BAIT) Protocol number: 35-BIO-001	Clinical Trial

Ryerson, Chris	Boehringer Ingelheim (Canada) Ltd.	$11,351.41	A 24-week, double-blind, randomized, parallel-group study evaluating the efficacy and safety of oral nintedanib coadministered with oral sildenafil, compared to treatment with nintedanib alone, in patients with idiopathic pulmonary fibrosis	Clinical Trial
Sandford, Andrew J.	British Columbia Lung Association	$25,000.00	Genetic determinants of obstructive sleep apnea	Grant
Schellenberg, Robert	Hoffmann-La Roche Ltd. (Canada)	$250.00	A prospective, single arm, longitudinal cohort study to assess biomarkers in real world patients with severe asthma	Clinical Trial
Seow, Chun	Natural Sciences and Engineering Research Council of Canada (NSERC)	$47,000.00	Visualization and assessment of physical and chemical interactions among smooth muscle proteins	Grant
Seow, Chun	Canadian Institutes of Health Research (CIHR)	$122,890.00	Plasticity in airway smooth muscle	Grant
Sin, Don	St. Paul's Hospital Foundation	$178,914.00	Clinical implementation and outcomes evaluation of blood-based biomarkers for COPD management	Grant
Sin, Don	PROOF Centre of Excellence	$125,857.00	Clinical implementation and outcomes evaluation of blood-based biomarkers for COPD management	Grant
Sin, Don	Genome British Columbia	$245,337.00	Clinical implementation and outcomes evaluation of blood-based biomarkers for COPD management	Agreement
Sin, Don	Canadian Institutes of Health Research (CIHR)	$404,592.00	Clinical implementation and outcomes evaluation of blood-based biomarkers for COPD management	Grant
Sin, Don	AstraZeneca Canada Inc.	$31,457.00	A randomised, double-blind, chronic dosing (56 week), placebo-controlled, parallel group, multicentre, phase III study to evaluate the efficacy and safety of 2 doses of benralizumab (MEDI-563) in patients with moderate to very severe Chroni	Clinical Trial
Sin, Don	Canada Foundation for Innovation	$10,343.00	Creating an infrastructure to better understand COPD as a systemic disease	Grant
Sin, Don	Canadian Institutes of Health Research (CIHR)	$120,000.00	The Canadian Respiratory Research Network: Origin and Progression of Airway Disease	Agreement
Sin, Don	AstraZeneca Canada Inc.	$105,000.00	A Study to Investigate the Differential Effects of Inhaled Symbicort and Advair on Lung Microbiota	Clinical Trial
Sin, Don	Boehringer Ingelheim (Canada) Ltd.	$22,795.23	A randomised, double-blind, active-controlled parallel group study to evaluate the effect of 52 weeks of once daily treatment of orally inhaled tiotropium + olodaterol fixed dose combination compared with tiotropium on Chronic obstructive P	Clinical Trial
Sin, Don	Canadian Institutes of Health Research (CIHR)	$483,553.00	Using multi-omics to discover novel biomarkers and therapeutic targets fo chronic obstructive pulmonary disease	Grant

Sin, Don	GlaxoSmithKline	$6,110.00	A randomized, double-blind (sponsor un-blinded), placebo-controlled study to evaluate the safety, efficacy and changes in induced sputum and blood biomarkers following daily repeat doses of inhaled GSK2269557 for 12 weeks in adult subjects	Clinical Trial
Sin, Don	Boehringer Ingelheim (Germany)	$34,619.35	Airway Epithelian Barrier Function and Otodaterol	Contract
Sin, Don	Merck Sharp & Dohme Corp.	$301,004.42	Integrative Genomics to Identify Therapeutic Targets for COPD	Contract
Sin, Don	Canadian Institutes of Health Research (CIHR)	$75,000.00	Personalizing inhaler therapy for men and women with chronic obstructive pulmonary disease (COPD)	Grant
Sin, Don	British Columbia Lung Association	$20,000.00	Serum immunoglobulins and risk of exacerbations in COPD	Grant
Sin, Don	IKOMED Technologies Inc.	$96,622.05	Frequency Treatment for Emphysema Rat Model	Contract
Sin, Don	Providence/St. Paul's Hospital Foundation	$50,000.00	Providence Airway Centre (PAC)	Grant
Tan-Hogg, Wan C.	Canadian Institutes of Health Research (CIHR)	$53,596.03	The Canadian Cohort Obstructive Lung Diseases (CanCOLD)	Clinical Trial
Tan-Hogg, Wan C.	Various Companies	$118,305.16	The Canadian Cohort Obstructive Lung Diseases (CanCOLD)	Clinical Trial
Tebbutt, Scott	Natural Sciences and Engineering Research Council of Canada (NSERC)	$34,000.00	When human and fungal worlds collide - a systems biology approach to understanding the dynamic interactions between human bronchial epithelial cells and conidiospores of Aspergillus fumigatus	Grant
Tebbutt, Scott	British Columbia Lung Association	$25,000.00	Validation of predictive biomarkers of the phase asthmatic response	Grant
Tebbutt, Scott	Allergy, Genes and Environment Network (AllerGen) - Networks of Centres of Excellence (NCE)	$5,000.00	Predictive biomarkers of the late-phase response	Grant
Tebbutt, Scott	Adiga Life Sciences Inc.	$10,000.00	Discovering the mechanism of action of a novel immunotherapy, Cat-SPIRE, using a network analysis	Grant
Tebbutt, Scott	Province of British Columbia	$10,000.00	Discovering the mechanism of action of a novel immunotherapy, Cat-SPIRE, using a network analysis	Grant
Tebbutt, Scott	Innovation, Science and Economic Development Canada	$10,000.00	Discovering the mechanism of action of a novel immunotherapy, Cat-SPIRE, using a network analysis	Grant
Tebbutt, Scott	National Institutes of Health	$81,025.92	Systems biology to identify biomarkers of neonatal vaccine immunogenicity: Project 1 - Innovative OMIC integration to predict immunogenicity	Agreement
Tebbutt, Scott	National Institutes of Health	$28,862.02	Systems biology to identify biomarkers of neonatal vaccine immunogenicity: DMC	Agreement

Tebbutt, Scott	Allergy, Genes and Environment Network (AllerGen) - Networks of Centres of Excellence (NCE)	$50,000.00	Biomarker development for monitoring responses in CIC clinical trials	Grant
Tebbutt, Scott	Human Vaccine Project Initiative Inc. (HVPI)	$11,575.00	Identification of Age-dependent Mechanism of Vaccine-induced Immunity to a Single Dose of Hepatitis B Vaccine Using a Systems Biology Approach - A Demonstration Project	Clinical Trial
Walley, Keith	Canadian Institutes of Health Research (CIHR)	$107,767.00	Toll-like receptor anti-inflammatory response in cardiac inflammatory states	Grant
Walley, Keith	Canadian Institutes of Health Research (CIHR)	$129,633.00	Mechanism of improved cardiovascular function and survival during sepsis when PCSK9 function is decreased	Grant
Walley, Keith	Genome British Columbia	$93,944.00	A National Biobank and Database for Patients with Traumatic Brain Injury	Agreement
Wilcox, Pearce G.	Cystic Fibrosis Canada	$75,000.00	Epidemiology and clinical significance of scedosporium pulmonary infection in adults with cystic fibrosis	Grant
Yang, Decheng	Canadian Institutes of Health Research (CIHR)	$125,780.00	IRES-dependent translation of heat shock proteins in the pathogenesis of coxsackievirus myocarditis	Grant
Yang, Decheng	Heart and Stroke Foundation of Canada	$75,932.00	Role of translation initiation factor DAP5 in viral myocarditis	Grant

Appendix B: Publications by Centre for Heart Lung Innovation PIs in 2016

1. Adamson SL, Burns J, **Camp PG**, **Sin DD, van Eeden SF**. Impact of individualized care on readmissions after a hospitalization for acute exacerbation of COPD. Int J Chron Obstruct Pulmon Dis. 11:61-71, 2016.
2. Abbara S, Blanke P, Maroules CD, Cheezum M, Choi AD, Han BK, Marwan M, Naoum C, Norgaard BL, Rubinshtein R, Schoenhagen P, Villines T, **Leipsic J**. SCCT guidelines for the performance and acquisition of coronary computed tomographic angiography: A report of the Society of Cardiovascular Computed Tomography Guidelines Committee: endorsed by the North American Society for Cardiovascular Imaging (NASCI). J Cardiovasc Comput Tomogr. 10(6):435-449, 2016.
3. Ahmadi A, Stone GW, **Leipsic J**, Serruys PW, Shaw L, Hecht H, Wong G, Norgaard BL, O'Gara PT, Chandrashekhar Y, Narula J. Association of coronary stenosis and plaque morphology with fractional flow reserve and outcomes. JAMA Cardiol. 1(3):350-7, 2016.
4. Ahmadi A, Stone GW, **Leipsic J**, Shaw LJ, Villines TC, Kern MJ, Hecht H, Erlinge D, Ben-Yehuda O, Maehara A, Arbustini E, Serruys P, Garcia-Garcia HM, Narula J. Prognostic determinants of coronary atherosclerosis in stable ischemic heart disease: anatomy, physiology, or morphology? Circ Res. 119(2):317-29, 2016.
5. Ajlan AM, Binzaqr S, Jadkarim DA, Jamjoom LG**, Leipsic J**. High-pitch helical dual-source computed tomographic pulmonary angiography: comparing image quality in inspiratory breath-hold and during free breathing. J Thorac Imaging. 31(1):56-62, 2016
6. Al-Mohaissen MA, Carere RG, Mancini GB, Humphries KH, Whalen BA, Lee T, Scheuermeyer FX, Ignaszewski AP. A plaque disruption index identifies patients with non-STE-type 1 myocardial infarction within 24 hours of troponin positivity. PLoS One. 11(10):e0164315, 2016.
7. Amaral AF, Coton S, Kato B, **Tan WC**, Studnicka M, Janson C, Gislason T, Mannino D, Bateman ED, Buist S, Burney PG; BOLD Collaborative Research Group. Lung function defects in treated pulmonary tuberculosis patients. Eur Respir J. 47(1):352-3, 2016.
8. Anand SS, Samaan Z, Middleton C, Irvine J, Desai D, Schulze KM, Sothiratnam S, Hussain F, Shah BR, Pare G, Beyene J**, Lear SA**; South Asian Heart Risk Assessment Investigators. A digital health intervention to lower cardiovascular risk: a randomized clinical trial. JAMA Cardiol. 1(5):601-6, 2016.
9. Anand SS, Tu JV, Awadalla P, Black S, Boileau C, Busseuil D, Desai D, Després JP, de Souza RJ, Dummer T, Jacquemont S, Knoppers B, Larose E, **Lear SA**, Marcotte F, Moody AR, Parker L, Poirier P, Robson PJ, Smith EE, Spinelli JJ, Tardif JC, et al. Rationale, design, and methods for Canadian alliance for healthy hearts and minds cohort study (CAHHM) - a Pan Canadian cohort study. BMC Public Health. 16:650, 2016.
10. Anderson TJ, Grégoire J, Pearson GJ, Barry AR, Couture P, Dawes M, **Francis GA**, Genest J Jr, Grover S, Gupta M, Hegele RA, Lau DC, Leiter LA, Lonn E, Mancini GB, McPherson R, Ngui D, Poirier P, Sievenpiper JL, Stone JA, Thanassoulis G, Ward R. 2016 Canadian Cardiovascular Society guidelines for the management of dyslipidemia for the prevention of cardiovascular disease in the adult. Can J Cardiol. 32(11):1263-1282, 2016.
11. Andrade JG**, Krahn AD**, Skanes AC, Purdham D, Ciaccia A, Connors S. Values and preferences of physicians and patients with nonvalvular atrial fibrillation who receive oral anticoagulation therapy for stroke prevention. Can J Cardiol. 32(6):747-53, 2016.
12. Asfar P, **Russell JA,** Tuckermann J, Radermacher P. Selepressin in septic shock: a step toward decatecholaminization? Crit Care Med. 44(1):234-6, 2016.
13. Auer PL, Reiner AP, Wang G, Kang HM, Abecasis GR, Altshuler D, Bamshad MJ, Nickerson DA, Tracy RP, Rich SS; NHLBI GO Sequencing Project., Leal SM. Guidelines for large-scale sequence-based complex trait association studies: lessons learned from the NHLBI Exome Sequencing Project. Am J Hum Genet. 99(4):791-801, 2016. NHLBI Exome Sequencing Project includes HLI investigators: **Daley D**, **Paré PD**, **Sandford AJ**, **Sin DD**.
14. Auluck A, Walker BB, Hislop G**, Lear SA**, Schuurman N, Rosin M. Socio-economic deprivation: a significant determinant affecting stage of oral cancer diagnosis and survival. BMC Cancer. 16:569, 2016.
15. Azad MB, Konya T, Persaud RR, Guttman DS, Chari RS, Field CJ, Sears MR, Mandhane PJ, Turvey SE, Subbarao P, Becker AB, Scott JA, Kozyrskyj AL; CHILD Study Investigators. Impact of maternal intrapartum antibiotics, method of birth and breastfeeding on gut microbiota during the first year of life: a prospective cohort study. BJOG. 123(6):983-9, 2016. CHILD study Investigators include: **Daley D, Paré PD, Sanford AJ and Tebbutt SJ.**

16. Bardal S, Smith A, **Luo HA**, Zhang T, Groeneweg G, Jimenez Mendez R, Goldman R, Carleton BC. Asthma in British Columbia: Are we finally breathing easier? A population-based study of the burden of disease over 14 years. J Asthma. 14:1-10, 2016.

17. Basoudan N, Shadgan B, **Guenette JA**, Road J, Reid WD. Effect of acute hypoxia on inspiratory muscle oxygenation during incremental inspiratory loading in healthy adults. Eur J Appl Physiol. 116(4):841-50, 2016.

18. Bates MG, **Krahn AD**. Learning to make decisions: Are medical postgraduate trainees getting with the atrial fibrillation guidelines? Can J Cardiol. 32(6):714-6, 2016.

19. Bazett M, Biala A, Huff RD, Bosiljcic M, Gunn H, Kalyan S, **Hirota JA**. A novel microbe-based treatment that attenuates the inflammatory profile in a mouse model of allergic airway disease. Sci Rep. 6:35338, 2016.

20. Behr ER, **Krahn AD**. Arrhythmias: Opening Pandora's Box -- incidental genetic findings. Nat Rev Cardiol. 13(4):187-8, 2016.

21. Bennett M, Parkash R, Nery P, Sénéchal M, Mondesert B, Birnie D, Sterns LD, Rinne C, Exner D, Philippon F, Campbell D, Cox J, Dorian P, Essebag V, **Krahn A**, Manlucu J, Molin F, Slawnych M, Talajic M. Canadian Cardiovascular Society/Canadian Heart Rhythm Society 2016 Implantable Cardioverter-Defibrillator Guidelines. Can J Cardiol. 33(2):174-188, 2016.

22. Bentzer P, Fisher J, Kong HJ, Mörgelin M, **Boyd JH, Walley KR, Russell JA**, Linder A. Heparin-binding protein is important for vascular leak in sepsis. Intensive Care Med Exp. 4(1):33, 2016.

23. Bentzer P, Fjell C, **Walley KR, Boyd J, Russell JA**. Plasma cytokine levels predict response to corticosteroids in septic shock. Intensive Care Med. 42(12):1970-1979, 2016.

24. Bentzer P, Griesdale DE, **Boyd J**, MacLean K, Sirounis D, Ayas NT. Will this hemodynamically unstable patient respond to a bolus of intravenous fluids? JAMA. 316(12):1298-309, 2016.

25. Bérubé JC, Gaudreault N, Lavoie-Charland E, Sbarra L, Henry C, Madore AM, **Paré PD**, van den Berge M, Nickle D, Laviolette M, Laprise C, Boulet LP, Bossé Y. Identification of susceptibility genes of adult asthma in French Canadian women. Can Respir J. 2016:3564341, 2016.

26. Besutti G, Raggi P, Zona S, Scaglioni R, Santoro A, Orlando G, Ligabue G**, Leipsic J, Sin DD, Man SF**, Guaraldi G. Independent association of subclinical coronary artery disease and emphysema in HIV-infected patients. HIV Med. 17(3):178-87, 2016.

27. Bhatt SP, Bodduluri S, Newell JD, Hoffman EA, Sieren JC, Han MK, Dransfield MT, Reinhardt JM; COPDGene Investigators. CT-derived biomechanical metrics improve agreement between spirometry and emphysema. Acad Radiol. 23(10):1255-63, 2016. COPDgene Investigators include: **Coxson HO**

28. Bhatt SP, Soler X, Wang X, Murray S, Anzueto AR, Beaty TH, Boriek AM, Casaburi R, Criner GJ, Diaz AA, Dransfield MT, Curran-Everett D, Galban CJ, Hoffman EA**, Hogg JC**, Kazerooni EA, Kim V, Kinney GL, Lagstein A, Lynch DA, Make BJ, Martinez FJ, et al. Association between functional small airway sisease and FEV1 decline in chronic obstructive pulmonary disease. Am J Respir Crit Care Med. 194(2):178-84, 2016.

29. Bhatt SP, Terry NL, Nath H, Zach JA, Tschirren J, Bolding MS, Stinson DS, Wilson CG, Curran-Everett D, Lynch DA, Putcha N, Soler X, Wise RA, Washko GR, Hoffman EA, Foreman MG, Dransfield MT; Genetic Epidemiology of COPD (COPDGene) Investigators. Association between expiratory central airway collapse and respiratory outcomes among smokers. JAMA. 315(5):498-505, 2016. COPDgene Investigators include: **Coxson HO**

30. Bhatt SP, Wells JM, Kinney GL, Washko GR Jr, Budoff M, Kim YI, Bailey WC, Nath H, Hokanson JE, Silverman EK, Crapo J, Dransfield MT; COPDGene Investigators. Î²-Blockers are associated with a reduction in COPD exacerbations. Thorax. 71(1):8-14, 2016. COPDgene Investigators include: **Coxson HO**

31. Biagioni BJ, Tam S, Chen YW**, Sin DD, Carlsten C**. Effect of controlled human exposure to diesel exhaust and allergen on airway surfactant protein D, myeloperoxidase and club (Clara) cell secretory protein 16. Clin Exp Allergy. 46(9):1206-13, 2016.

32. Blanke P, Naoum C, Ahmadi A, Cheruvu C, Soon J, Arepalli C, Gransar H, Achenbach S, Berman DS, Budoff MJ, Callister TQ, Al-Mallah MH, Cademartiri F, Chinnaiyan K, Rubinshtein R, Marquez H, DeLago A, Villines TC, Hadamitzky M, Hausleiter J, Shaw LJ, Kaufmann PA… **Leipsic J**. Long-term prognostic utility of coronary CT angiography in stable patients with diabetes mellitus. JACC Cardiovasc Imaging. 9(11):1280-1288, 2016.

33. Blanke P, Naoum C, Dvir D, Bapat V, Ong K, Muller D, Cheung A, Ye J, Min JK, Piazza N, Theriault-Lauzier P, Webb J, **Leipsic J**. Predicting LVOT obstruction in transcatheter mitral valve implantation: concept of the Neo-LVOT. JACC Cardiovasc Imaging. 2016 Mar 9. [Epub ahead of print, PMID: 26971004]

34. Blanke P, Soon J, Dvir D, Park JK, Naoum C, Kueh SH, Wood DA, Norgaard BL, Selvakumar K, Ye J, Cheung A, Webb JG, **Leipsic J**. Computed tomography assessment for transcatheter aortic valve in valve implantation: The Vancouver approach to predict anatomical risk for coronary obstruction and other considerations. J Cardiovasc Comput Tomogr. 10(6):491-499, 2016.

35. Bolduc FV, Lau A, Rosenfelt CS, Langer S, Wang N, Smithson L, Lefebvre D, Alexander RT, Dickson CT, Li L, Becker AB, Subbarao P, Turvey SE, Pei J, Sears MR, Mandhane PJ; CHILD Study Investigators. Cognitive enhancement in infants associated with increased maternal fruit intake during pregnancy: results from a birth cohort study with validation in an animal model. EBioMedicine. 8:331-40, 2016. CHILD study Investigators include: **Daley D, Paré PD, Sanford AJ and Tebbutt SJ.**

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Appendix C: Centre for Heart Lung Innovation 2016 Seminar Series

Month	Day	Speaker	Host	Title of Lecture
January	15	**Monique Gagne and Tim Choi (Senior Data Access Co-ordinators at PopDATA BC)**	Dr. David Granville	Targeting scleraxis: Cardiac fibrosis in the crosshairs
	22	**Jennifer Polk**	Jenn Myers &	Using technology to support patients with chronic diseases
	29	**Williams Jia**	Honglin Luo	Oncolytic viruses and immune therapy for cancer
February	5	**Ewan Goligher**	Keith Walley	Ventilator-Induced Diaphragm Dysfunction: Physiological Mechanisms and Clinical Impact
	19	**Daisy Sahoo**	Paul Hanson	Interactions between HDL and scavenger receptors: A love-hate relationship
	29	**Reinoud Gosens**	James Hogg	Tissue repair and remodelling in the airways: WNT you get it right?
March	04	**Harvey Coxson**	---	Moving COPD Beyond FEV1: The Role of Pulmonary Imaging
	11	**Karen Humphries**	Keith Walley	ICV Health: Using Data to Improve Care"
	18	**Daisuke Kinose**	James Hogg	"A comparison of the tissue repair process in centrilobular and panlobular emphysematous destruction"
April	1	**Cheryl Wellington**	Gordon Francis	HDL: good for the heart and good for the brain
	8	**Nathan Shapiro**	John Boyd	Updates in Sepsis: Where have We Been and Where are We Going?
	15	**Zahra Ezzat Zadeh**	HLI	Healthy eating: strategies to staying motivated and overcoming challenges in a busy professional life
	22	**Scott Lear**	---	The role of physical activity and sitting with cardiovascular disease risk in 17 countries
	29	**Simon Pimstone**	Keith or Liam	Human Channelopathies: Providing Key Insights Into Novel Drug Development

May	6	**Charles Sprung (Israel)**	Jim Russell	Steroids in septic shock- An Update (Steroids in septic shock – history and mechanisms of action)*title updated
	20	**Matthew Farrer**	Denise Daley	Adventures in Molecular Neurogenetics
	27	**Kimberley Wang (Australia)**	Chun Seow	Early origins of cardiorespiratory disease (The Early life origin of Cardiovascular and Respiratory Disease) *title updated
June	3	**Chris Ryerson**	---	Educating the public and healthcare providers on idiopathic pulmonary fibrosis: A failing grade
	10	**Ralph Feuer**	Honglin Luo	Coxsackievirus Targets the Progenitor Cell Pool during Juvenile Infection Leading to Lasting Memory Deficits in the Central Nervous system and Impaired Regenerative Capacity in the Heart
	17	**Michael Stickland**	Jordan Guenette	Understanding cardiovascular risk in asthma and COPD
July - August	**Summer Hiatus**			
September	16	**Dennis Jensen**	Jordan Guenette	Physiological mechanisms of physical activity-related breathlessness in obesity: Weighing up the evidence
	23	**David Stoltz**	Chun Seow	The Origins of Cystic Fibrosis Airway Disease – Lessons Learned from the CF Pig
	30	**Chun Seow**	HLI	How Smooth Muscle Works--Recent Advances
October	7	**Mitra Esfandiarei**	Pascal Bernatchez	Mild Aerobic Exercise & Marfan Syndrome Associated Aneurysm
	14	**Mitsuo Ikebe**	Chun Seow	Cytoskeletal rearrangement, motor proteins and cell motility
	21	**Don Sin**	HLI	Pathway towards Precision Health in COPD
	28	**Simon Pimstone & Liam Brunham**	Keith Walley	Study to Avoid cardioVascular Events in BC (SAVE BC). A Longitudinal Study of Cases and Families with Very Premature Atherosclerotic Cardiovascular Disease (AsCVD) in British Columbia.

November	4	**Michael Seidman**	HLI	Current Research Projects in the HLI Cardiovascular Tissue Registry
	18	**Robert Boushel & Bill Sheel**	Bruce McManus	Introduction to the School of Kinesiology and cardiorespiratory physiology of exercise
	25	**Dao Nguyen from McGill**	Brad Quon	Pseudomonas aeruginosa Modulates Airway Epithelial Responses and Inflammation
December	2	**Edward Fisher (New York University)**	Gordon Francis	Macrophages in many guises in atherosclerosis
	9	**Jonathan Leipsic & Stephanie Sellers**	Harvey Coxson	Transcatheter Valve Replacement (TAVR): From the Evolving Role of Cardiac CT to Biomarker Discovery and Mechanisms of Valve Pathology

Appendix D: Centre for Heart Lung Innovation 2016 Research in Progress Seminars

Month	Day	Speaker	Title of Lecture
January	11	Andrew Ramsook	The effects of upper body movement on parasternal electromyography during exercise
	18	Amrit Singh	Molecular changes in whole blood discriminate allergen-induced early from dual asthmatic responses
	25	Basak Sahin	siRNA Flow-FISH: a breakdown of what, why and how to use them together or standalone
February	1	Daisuke Kinose	Estimation of volume fraction in histological sections. From simulation to automation
	15	Josh Dubland	Lysosomal dysfunction in atherosclerosis
	22	Nafeez Syed	Effects of diesel exhaust on pulmonary function and exercise response in COPD vs healthy subjects
	29	Carmen Sima	Heart rate and arterial stiffness relationship in chronic obstructive pulmonary disease and its implication for pulmonary rehabilitation
March	7	Stephanie Sellers	Aortic Aneurysm and Pulmonary Pathology in Marfan Syndrome: Are the Effects of Losartan Off-Target
	14	Ye Qui	Mutual modulation of cellular stress-responsive proteins and coxsackievirus infection
	21	Nadia Milad	Linking Muscular Dystrophy and Hyperlipidemia - Double Disease Models and Treatments
April	4	Stella Xu	The Microbiome of Small Airway Epithelial Cells in HIV-Infected and Uninfected Individuals
	11	Emmanuel Osei	Mechanisms of epithelial-fibroblast interaction & role in the pathogenesis of COPD & Asthma
	18	*Fernando Studart	Serum Immunoglobulins and Risk of Exacerbations in COPD
	25	Steve Booth	Investigating small airway obstruction in COPD – Terminal bronchioles under the spotlight
May	2	Ma'en Obeidat	"Towards Precision Medicine in COPD: Progress update"
	9	Yolanda Yang	Can we diagnose Western Red Cedar Asthma in blood?
	16	Arash Tehrani	Search for Novel Activators of Nitric Oxide and Relevance in Cardiovascular Disease
	30	Agnieszka Biala	Attenuation of allergic airway immune response by a Klebsiella-derived therapeutic
June	6	Jessica Inskip	Pulmonary Rehabilitation and Physical Activity in Rural BC
	13	Adeleke Fowokan	Cardiovascular disease risk factors in food bank users: a pilot study

September	12	Guilherme Grezelkovski	PCSK9 modulates LPS-induced inflammation in endothelial cells
	19	Dragos Vasilescu	Application of micro CT and stereology to understand differences between centrilobular and panlobular emphysema
	26	Naoye Tanabe	Comparison of the disease in the smallest airways visible using MDCT and the smaller bronchioles only visible using microCT
October	3	Walden Cheung	Quality indicators for pulmonary rehabilitation programs in Canada
	17	Paul Hanson	PSEN1 as a diagnostic adjunct in human lymphocytic myocarditis
	24	Kelly Genga	PCSK9 loss-of-function and outcomes in sepsis
	31	Madelaine Laberge	Development, validation and piloting of a questionnaire which examines personal disaster preparedness in people with Chronic Obstructive Pulmonary Disease
November	7	Michele Schaeffer	Effects of breathing 60% oxygen during an acute bout of exercise in patients with fibrotic interstitial lung disease
	14	Eric (Haoyu) Deng	The development of coxsackievirus B3 as an oncolytic virus against lung cancer
	21	David Jaw	LPS lung exposure induced plaque destabilization and oxidative stress in atherosclerotic plaque in mice
	28	Anthony Tam	Using an integrative genomics approach in the discovery of novel therapeutic targets in patients with Chronic Obstructive Pulmonary Disease
December	5	Carmen Sima	The effect of standard pulmonary rehabilitation on resting heart rate and arterial stiffness in patients with Chronic Obstructive Pulmonary Disease
	12	Nadia Milad	Effect of hyperlipidemia on muscular dystrophy mouse models

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