ANNUAL REPORT 2013

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

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

PROVIDENCE HEALTH CARE
Research Institute

At A Glance

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

Established:	1977 by Drs. Jim Hogg and Peter Pare
Director:	Dr. Keith Walley
Associate Directors:	Dr. Gordon Francis
	Dr. Tillie-Louise Hackett
Principal Investigators:	33
Associate Members:	16
Research Associates:	10
Visiting Scientists:	5
Post-Doctoral Fellows:	17
Graduate Students:	52
Other Students:	60
PI Staff:	56
Core/Operations Staff:	32
TOTAL :	281
Funding in FY 2012-13:	$10,969,776.07
Funding in FY 2013-14:	$8,408,159.57 to Feb. 28, 2014
Space:	over 50,000 square feet
Biotech / Spin off companies:	5 since 2001

CORE facilities include:

Molecular Phenotyping (genomics, proteomics, florescence activated cell sorting)
Microscopy (transmission electron microscopy, atomic force microscopy, confocal and multiphoton microscopy)
Histology (tissue processing, sectioning, and immuno staining)
Genetically Engineered Models (GEM Preclinical Facility)

Shared platforms include:

Registry – Cardiovascular & Pulmonary
Cell Models
Technology Development
Biobanking
Clinical research office
IT Services
Database support services

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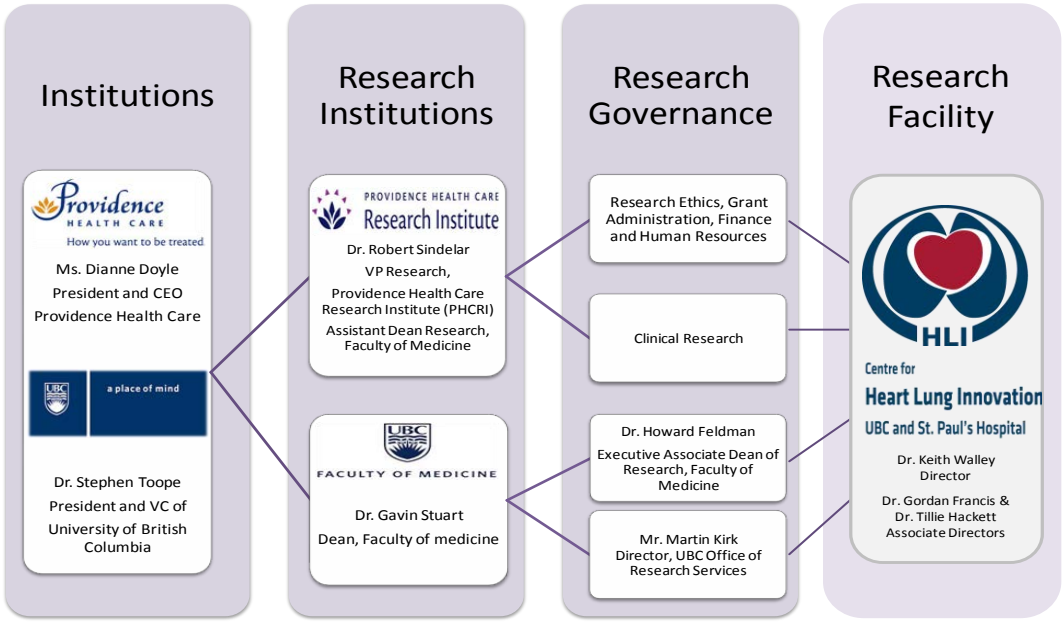
About the Centre for Heart Lung Innovation

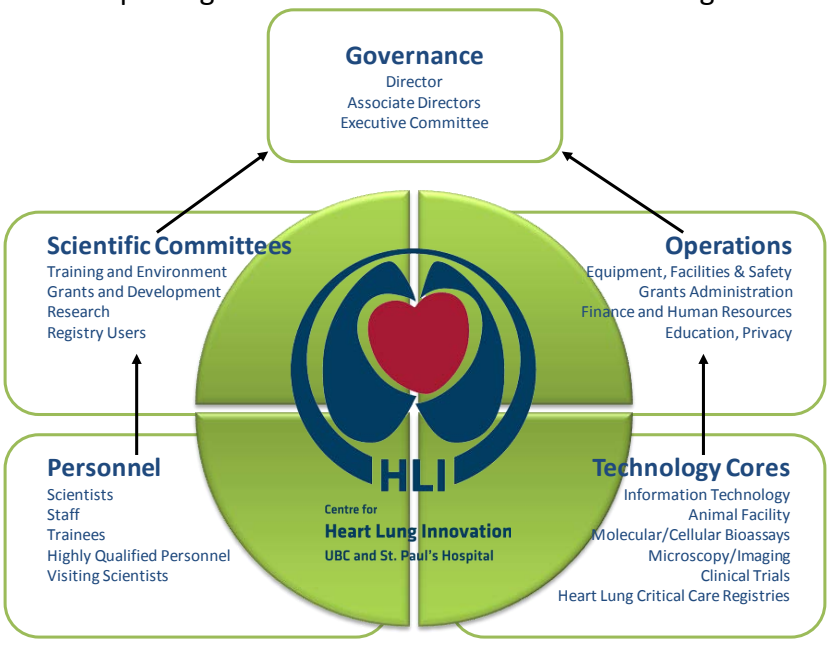
The Centre for Heart Lung Innovation (HLI) (also named James Hogg Research Centre) is a University of British Columbia (UBC) Senate-approved Centre of Cardiovascular, Pulmonary, and Critical Care expertise, housed within Providence Health Care - St Paul's Hospital. The HLI dual reporting structure is shown below in **Figure 1.** This ensures that the research conducted within the HLI adheres to both the UBC Strategic Research Plan and aligns with Providence Health Care populations of emphasis in heart, lung and aging.

Figure 1. Governance structure with the Centre for Heart Lung Innovation.



The management structure under the HLI Executive involves a team approach led by Principal Investigators, Operations staff and the Technology Cores (**Figure 2**).

Figure 2. Management reporting structure of the Centre for Heart Lung Innovation (HLI)



Message from the Director

Dear Colleagues,

What a whirlwind year it has been! This 2013 Annual Report highlights the scientific achievements of the Centre for Heart Lung Innovation (HLI) scientific leaders and trainees and updates you on operational changes since my appointment began January 1, 2013. I would also like to take this opportunity to thank Dr. Darryl Knight for his exemplary leadership of the Centre until I arrived.

Our successes as a world-class research facility continue with the release of 157 publications and receipt of $8,408,159.57 in funding for fiscal 2013/2014 to date. We have rebranded the Centre to simplify our fundraising goals, restructured internal teams, overhauled existing policies and procedures and began the implementation of our third Canada Foundation for Innovation award. This large federal award will provide us with a much needed renovation of the remaining original laboratory space on the first floor and new technology to advance our scientific programs; all important endeavours in the race against cardiovascular/pulmonary/critical care disease.

The Centre for Heart Lung Innovation (HLI) scientists, trainees and staff would like to thank 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 & 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 are proud of our progress to date and look forward an equally successful 2014.

With kind regards,

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

Research Highlights

Improving outcomes for patients with severe infections

Members of the Centre for Heart Lung Innovation are pursuing an exciting new lead that will make a tangible difference in the lives of patients with severe infections. In these individuals, bacteria and other infectious organisms trigger an injurious inflammatory response because our bodies react to lipid (fat-related) molecules released from the infectious organism's cell walls. Our liver cells normally get rid of fat-related molecules (like cholesterol lipids) by using cholesterol receptors on the surface of liver cells. PCSK9 is a molecule produced by our bodies that gets in the way of this normal lipid clearance mechanism so that, very recently, many scientists and drug companies have developed drugs that inhibit PCSK9, resulting in increased clearance of cholesterol lipid. **Drs. Jim Russell, John Boyd, and Keith Walley** have found early evidence that inhibition of PCSK9 also increases the clearance of infectious organism lipids and appears to reduce the inflammatory response to severe infection. Their data suggest that decreased PCSK9 (the hot new lipid-lowering drug class) activity increases pathogen lipid clearance. These scientists are eager to determine exactly how PCSK9 inhibition does this so that knowledge can be applied to improve patient outcomes. (Source: 2012-2013 Research Annual Report | UBC Faculty of Medicine)

microRNAs: Potential targets for antiviral drug development for heart disease

Virally caused heart disease called myocarditis (heart muscle cell injury) is one of the common heart diseases, particularly in children, young adults, and pregnant women. Coxsackie virus, a virus that was discovered in a small town called Coxsackie near New York City, is the primary causal agent of viral myocarditis. This virus can infect multiple organs of humans, but the degrees of infection are different. For example, heart and pancreas can be easily infected by this virus and develop deadly diseases shortly after infection, particularly in the heart. However, kidney and lung are hardly infected by this virus. This phenomenon cannot be explained very well with current knowledge. **Dr. Decheng Yang** and his team are actively searching for the genes or molecules in the body that determine why Coxsackie virus can easily infect the heart but not the kidney. Recently, a group of small genetic molecules called microRNAs (miRNA) has been found to play an important role in controlling virus infection in different types of diseases. They suspected that miRNAs may control the degree of easiness of infection in different organs, such as the heart and kidney. To test this hypothesis, they performed research to evaluate the miRNA production in different cell cultures and heart of mice after coxackievirus B3 (CVB3) infection. They found that several important miRNAs either produced a lot (upregulated) or produced a little (downregulated). With further testing their results suggest that upregulated miR-126 during CVB3 infection varies targeting preferences at different stages, enabling a single microRNA to support the viral infection by targeting multiple genes. To the best of their knowledge, this study is the first report on the signal networking among miR-126, SPRED1, LRP6 and WRCH1 in CVB3 infection. The findings (published in *Cellular and Molecular Life Sciences*, June 30, 2013) will greatly improve the understanding of CVB3-host interactions, especially how

the virus hijacks host small RNA molecules to benefit its own replication and cause heart damage, and show huge potential for the development of antiviral drugs that can target the microRNAs. (Source: 2012-2013 Research Annual Report | UBC Faculty of Medicine)

Biomarkers bring hope for heart transplant patients

Heart transplant patients know the risks. At least half of them are at risk for developing cardiac allograft vasculopathy (CAV), a "hardening of the arteries" process that can especially develop after the first year post transplant. Current screening involves the use of coronary angiography or intravascular ultrasound; invasive, expensive, and risky procedures. The Biomarker in Transplantation Team from the Centre of Excellence for Prevention of Organ Failure (PROOF Centre) led by **Dr. Bruce McManus** is keen to find another way - a less invasive blood test - to answer the same question. Recently this multidisciplinary team has identified an 18-plasma protein biomarker classifier panel that was able to classify and identify patients with angiographically significant coronary artery stenosis in transplanted hearts. The biomarkers identified may also help improve our understanding of CAV pathophysiology. This new minimally invasive test is promising news for all transplant patients. In collaboration with clinical leaders, scientists, and pharmaceutical and medical device companies, the PROOF Centre's goal is to accelerate development of these cost-effective biomarker-based blood tests and bring them to market as soon as possible. (Source: 2012-2013 Research Annual Report | UBC Faculty of Medicine)

Granzyme B – An essential enzyme for wound healing and repair

As we age, our ability to repair tissues is reduced. Healing is further impaired by factors such as smoking, obesity, immobility, cardiovascular disease and diabetes. **Dr. David Granville's** laboratory has been investigating how such factors affect chronic inflammation and how this dysregulated immune cell accumulation orchestrates tissue damage and impedes tissue repair. In their search for factors, his team identified an enzyme known as Granzyme B that degrades structural proteins known as *extracellular matrix proteins* that are critical for normal wound healing to proceed. When these proteins are degraded by Granzyme B, wounds do not close properly . In diseases associated with age, smoking, diabetes and chronic inflammation, Granzyme B is abundant. Further, Granzyme B inhibition results in a marked improvement in tissue repair and integrity in models of aortic aneurysm, diabetic wound healing and aging. Dr. Granville's research program has led to the formation of the UBC spin-off company, viDA Therapeutics, that is working with him to develop novel therapeutics against Granzyme B that will be used initially for the treatment of non-healing skin ulcers including diabetic skin ulcers and pressure ulcers. Non-healing skin wounds affect approximately 20-25% of patients in hospitals and long-term care facilities and costs are estimated at $4-6 billion per year in North America alone. Led by Mr. Alistair Duncan, CEO, viDA Therapeutics, viDA has successfully completed two venture-capital-led financings which has allowed them to attract a highly experienced Board of Directors, management team and highly skilled scientific team, including 12 full-time employees. In collaboration with Dr. Granville, viDA is developing and testing lead

compounds in models of impaired wound healing and other inflammatory disorders that will hopefully be used one day in the future to eliminate such devastating conditions that are in dire need of better treatment options.

Statins: A novel treatment in subjects with COPD

Chronic Obstructive Pulmonary Disease or COPD (emphysema and chronic bronchitis) is an inflammatory condition of the lung that slowly destroys the lung tissue and makes it hard to breath. Recently **Dr. Stephan van Eeden's** group showed that statins, a common drug used by physicians to lower blood cholesterol, reduces the type of inflammation in the lung that is associated with COPD. This opens the door to the use of statins as a novel treatment in patients with COPD to prevent disease progression and prevent "lung attacks", a common complication of COPD. In addition, this research showed that statins reduce blood vessel activation and reduces atherosclerosis, the commonest cause for heart attacks and stroke; conditions frequently associated with COPD. This research was done in an animal model and is now being tested in humans. This potential new treatment for subjects with COPD could potentially improve quality of life and lower mortality in patients suffering from COPD.

Canada Research Chair in Chronic Obstructive Pulmonary Disease (COPD)

Dr. Don Sin, the country's first Tier 1 Canada Research Chair in COPD, is committed to fighting the global epidemic of this disease and bringing new solutions to millions of Canadians who suffer from it. His team will be working to increase awareness of COPD by public and health care professionals. Most importantly, they plan to develop and implement a simple blood test to diagnose lung attacks—the main reasons for hospitalizations and deaths related to COPD—at their earliest stages. By enabling early intervention with effective therapies that already exist, this approach has tremendous potential to reduce patient symptoms and prevent hospitalizations and deaths. (Source: 2012-2013 Research Annual Report | UBC Faculty of Medicine)

A novel inhibitor for the treatment for virus-induced heart failure

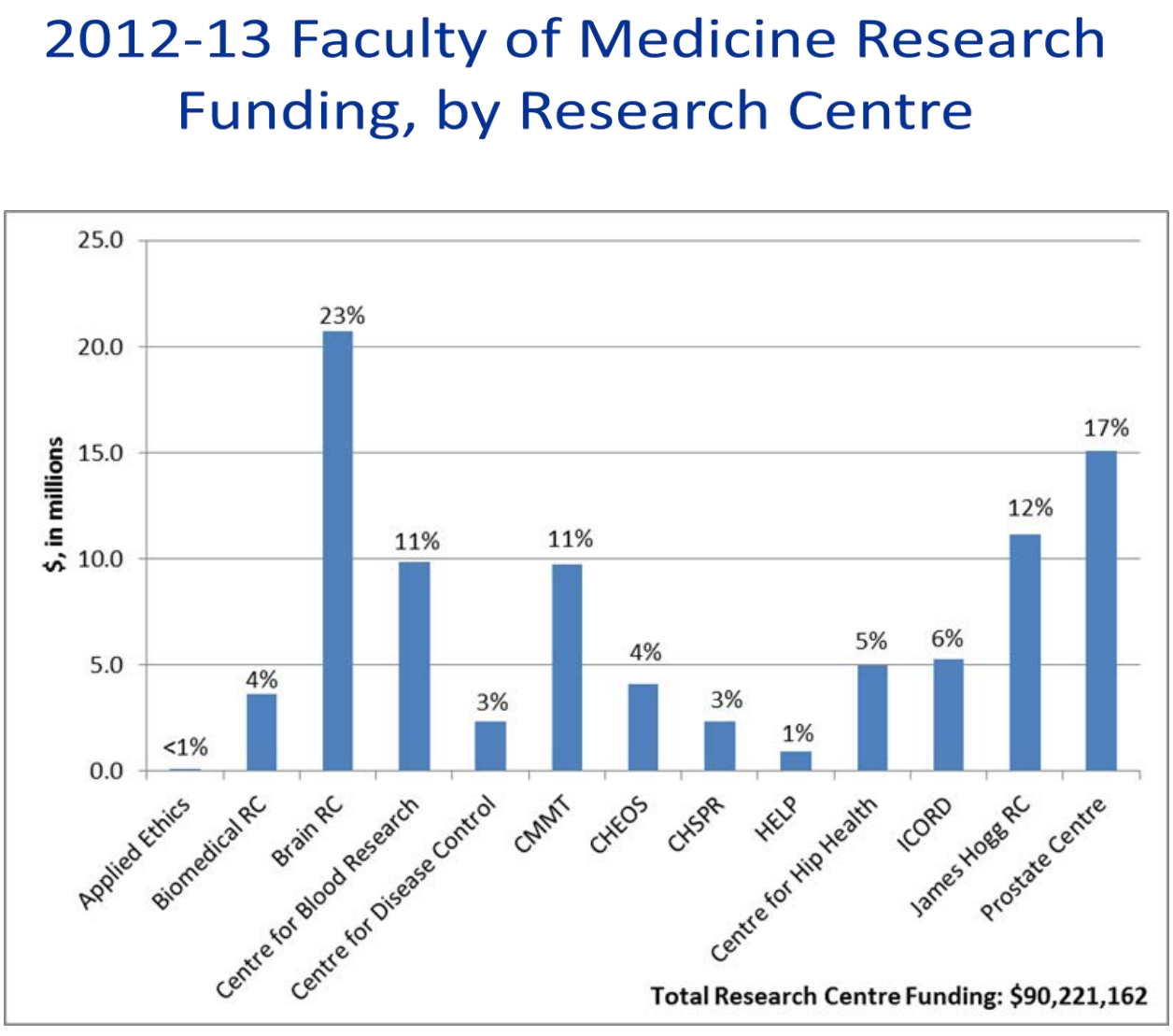
Viral myocarditis, the most common cause of heart failure in children and young adults worldwide, is caused by the viral infection of heart muscle. In many cases, viral myocarditis is attributable to enteroviral infection, and in particular to Coxsackie virus infection. The only definitive treatment for virus-induced damage of the heart is heart transplantation. **Dr. Honglin Luo** and her research team strive to develop new therapies to treat this disease. Serum response factor (SRF), a muscle-enriched protein, is known to play a central role in heart development and function. It regulates the gene levels of heart proteins which control the contraction of the heart. Destruction of SRF has been associated with several heart diseases. Dr. Luo and her team have recently found that Coxsackie virus infection led to a cleavage and subsequent dysfunction of SRF in the heart. They further demonstrate that cleavage of SRF during virus infection plays an important role in the progression of the disease to heart failure.

Most excitingly, they have recently developed a chemical inhibitor based on the identified SRF cleavage site to prevent the cleavage of SRF. Their findings will facilitate the development of novel therapeutic agents to protect against viral myocarditis and the progression to heart failure.

Comparative Data

The Centre for Heart Lung Innovation (HLI); listed as the *James Hogg RC* below in **Figure 3** was successful in attracting 12% of all of the UBC Faculty of Medicine funding for 2012/2013.

Figure 3. Centre for Heart Lung Innovation (HLI) funding in relation to other UBC Faculty of Medicine Research Centres in 2012/2012.

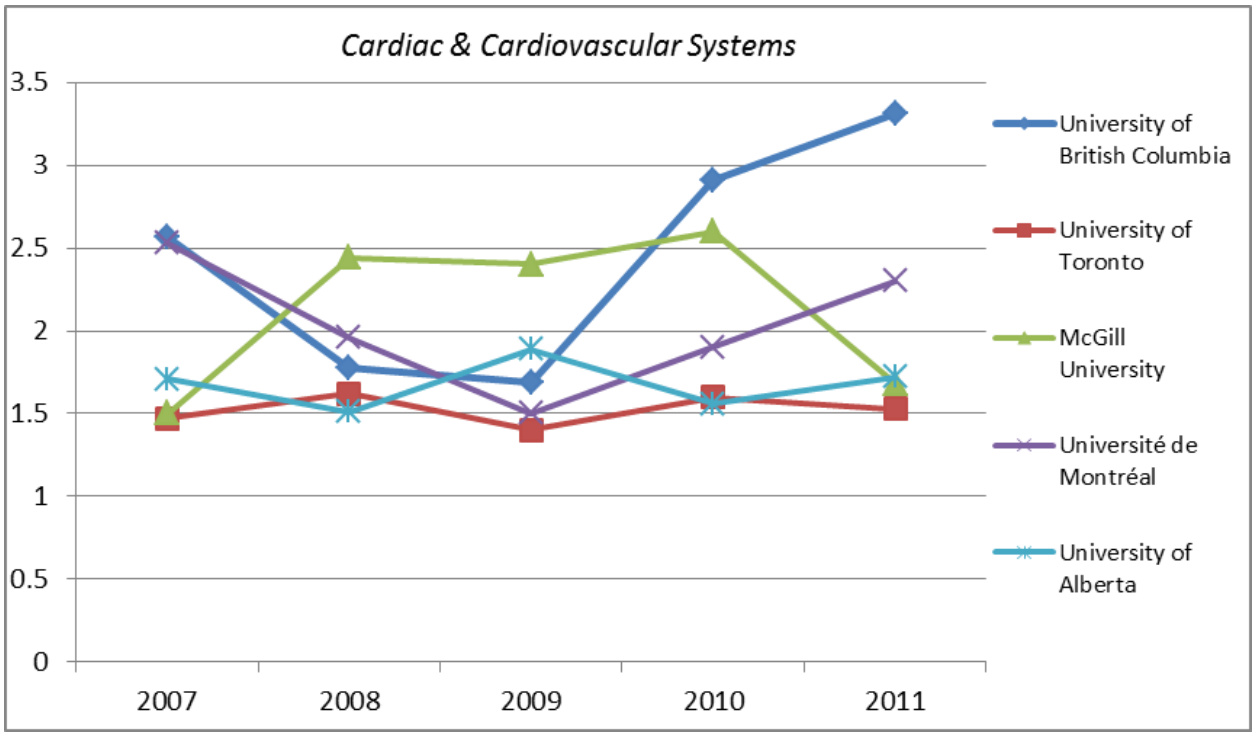


Source: UBC Faculty of Medicine

Figure 4 below represents the contribution of the Centre for Heart Lung Innovation (HLI) cardiac and cardiovascular system research publications in the ranking in comparison to other national facilities.

Figure 4. Centre for Heart Lung Innovation (HLI) cardiac and cardiovascular system research publications support the University of British Columbia high ranking in comparison to other national facilities.

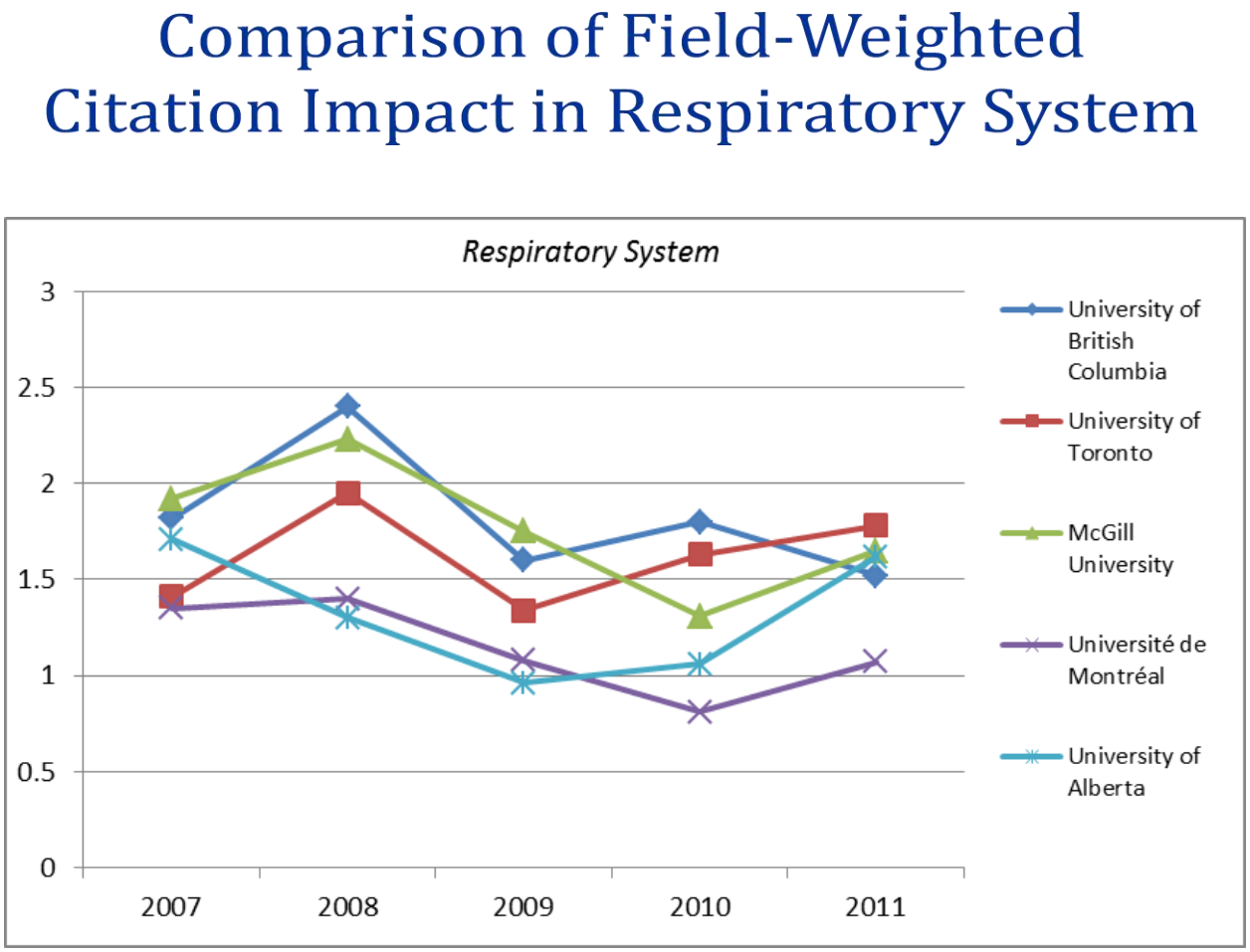
Comparison of Field-Weighted Citation Impact in Cardiac and Cardiovascular Systems



Source: UBC Faculty of Medicine
From: *InCites* TM, Thomson Reuters (2012). Source of data: Thomson Reuters *Web of Science*

Likewise, **Figure 5** represents the contribution of the Centre for Heart Lung Innovation (HLI) respiratory system research publications in the University of British Columbia ranking in comparison to other national facilities.

Figure 5. Centre for Heart Lung Innovation (HLI) respiratory system research publications support the University of British Columbia ranking in comparison to other national facilities.



Source: UBC Faculty of Medicine
From: *InCites* TM, Thomson Reuters (2012). Source of data: Thomson Reuters *Web of Science*

New Principal Investigators

Jordan A. Guenette, PhD

Assistant Professor, Department of Physical Therapy, University of British Columbia

Dr. Guenette received his BHK (2004), MSc (2006) and PhD (2010) in Exercise and Respiratory Physiology in the School of Kinesiology at the University of British Columbia. His graduate training was conducted in the Health and Integrative Physiology Laboratory under the mentorship of Dr. A. William Sheel. Dr. Guenette received additional research training in Cardiovascular and Respiratory Physiology at the Copenhagen Muscle Research Centre (University of Copenhagen) and in the Department of Critical Care Medicine and Pulmonary Services (University of Athens). Following his graduate training, Dr. Guenette completed a postdoctoral fellowship (2012) in clinical exercise physiology in the Department of Medicine at Queen's University under the mentorship of Dr. Denis E. O'Donnell.

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. The lab uses a number of novel measurement techniques to simultaneously assess the respiratory, cardiovascular, muscular and neuro-physiological responses to exercise. The long term goal of this research program is to develop more effective rehabilitation interventions to improve exercise performance and quality of life for those suffering from chronic lung diseases.

His research is funded by the CIHR, BC Lung Association, Providence Health Care Research Institute, St. Paul's Hospital Foundation, NSERC, Canada Foundation for Innovation, BC Knowledge Development Fund and UBC Department of Physical Therapy.

Source: Guenette Lab website

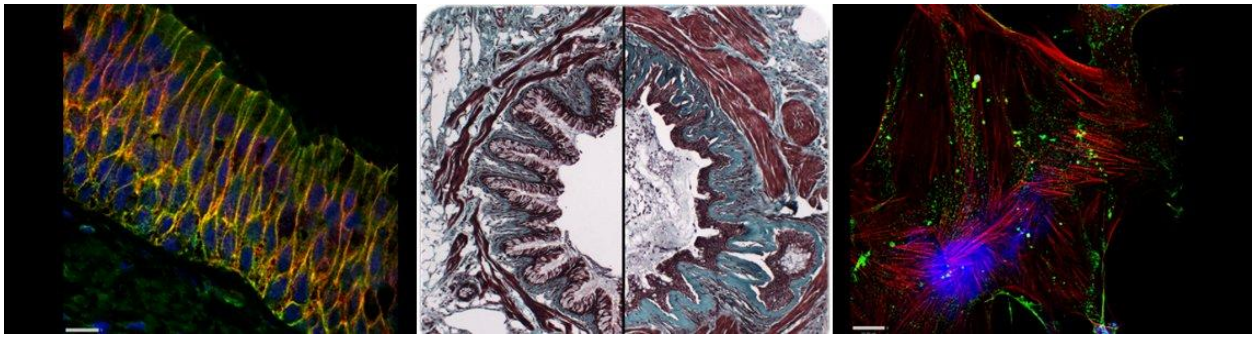
Tillie-Louise Hackett, Ph.D.

Assistant Professor, Department of Anesthesiology, Pharmacology and Therapeutics,

Dr. Hackett received her BSc. (2002) in Biochemistry and Pharmacology and her Ph.D. (2006) in Cellular and Biological Sciences from the University of Southampton, in the UK under the mentorship of Dr. J.A. Warner and Prof. S.T. Holgate. In 2006, Dr Hackett joined the James Hogg Research Centre at the University of British Columbia, Canada funded by a Canadian Institutes for Health, Canadian Lung Association and Michael Smith Foundation for Health Research post doctoral fellowships with Drs D.A. Knight and T. Bai. Dr. Hackett then undertook additional postdoctoral training at the University Medical Centre Groningen funded by the European Respiratory Society, with Prof. D.S. Postma and Dr. H.I. Heijink.

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. This resource, The Human Lung Cell Repository, aims to provide highly characterized cells representative of a variety of lung disease states and healthy individuals for use in clinical bio-assays of disease. The goal of this research program is to further understand the airway microenvironment to determine therapeutic targets to prevent the initiation and perpetuation of pathological processes which contribute to obstructive airway diseases like asthma and chronic obstructive pulmonary disease.

Her research is funded by the Canadian Institutes for Health Research, Canadian Lung Association, Parker B. Francis Foundation, Providence Health Care Research Institute and UBC Faculty of Medicine.

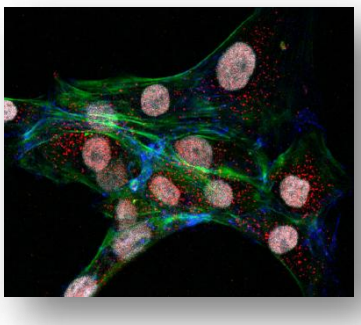


Source: Hackett Lab website

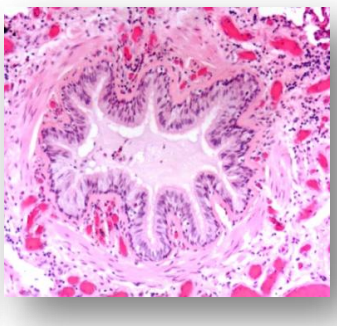
Centre for Heart Lung Innovation
Principal Investigators

(click on name to view profile)

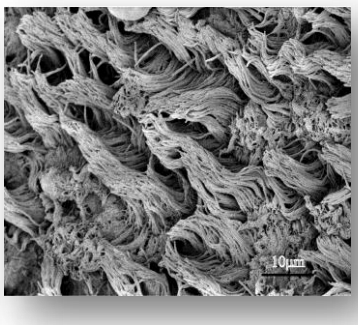
Dr. Michael Allard	Dr. Bruce McManus
Dr. Pascal Bernatchez	Dr. Raymond Ng
Dr. John Boyd	Dr. Peter Pare
Dr. Pat Camp	Dr. James Russell
Dr. Harvey Coxson	Dr. Chris Ryerson
Dr. Denise Daley	Dr. Andrew Sandford
Dr. Del Dorscheid	Dr. Bob Schellenberg
Dr. Gordon Francis	Dr. Chun Seow
Dr. Jiri Frohlich	Dr. Don Sin
Dr. David Granville	Dr. Wan Tan-Hogg
Dr. Jordan Guenette	Dr. Scott Tebbutt
Dr. Tillie-Louise Hackett	Dr. Stephan van Eeden
Dr. John Hill	Dr. David Walker
Dr. James Hogg	Dr. Keith Walley
Dr. Honglin Luo	Dr. Pearce Wilcox
Dr. Paul Man	Dr. Decheng Yang



Aortic smooth muscle cell

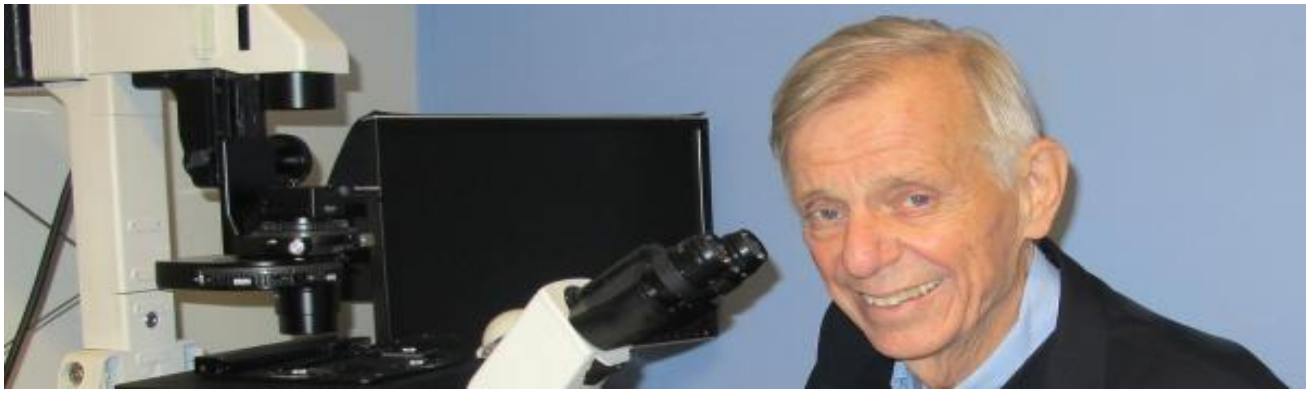


Airway



Airway epithelial cell cilia

Recognizing Research Excellence – Investigator Awards



Brian Smith photography courtesy of St. Paul's Hospital Foundation

HLI investigators have been successful in competing for a number of awards in 2013. Here are some highlights:

- On May 10, 2013, a special event was held in honour of **Dr. James Hogg** and his stellar career as a leader, researcher and educator. At the event Dr. Hogg, received the 2013 Canada Gairdner Wightman Award; the premier award for leadership in medical science in Canada.
  Please see links below for more information:
  UBC Media Release
  UBC Department of Medicine Release
  Gairdner Website Release
  A video of this presentation is available for viewing at
  http://www.youtube.com/watch?v=NKH6kOFC0J8

- **Dr. David Walker** received the "Philip E. Reid Memorial Cup Award" from the Department of Pathology and laboratory Medicine. This Award was given as recognition to a faculty member who demonstrated excellence and outstanding contributions to the Department and its students in a given year. Clinical and academic faculty members of the Department were selected from top-ranked individuals identified through the annual Departmental Merit review as well as by nomination. Since 1983, Dr. Walker has been teaching courses like Pathology 305 (Microscopy course) in the Bachelor of Medical Laboratory Sciences Program (BMLSc) and other ones in the Department. He also played the role as a valuable graduate students' advisor for many years.

- **Dr. Don Sin,** Canada Research Chair in Chronic Obstructive Pulmonary Disease (COPD) and Head, Division of Respiratory Medicine, Providence Health Care, was recently ranked as the second leading COPD expert in the world by Expertscape.com, a medical search and ranking website that ranks physicians, clinicians and researchers worldwide

using a PubMed-based algorithm. Dr. Sin's research interests include finding new solutions to reduce the growing burden of COPD in Canada by discovering a simple blood test to diagnose acute lung attacks early in their course and new therapies to treat COPD-related co-morbidities such as cardiovascular disease.

- Congratulations to **Dr. Chris Ryerson**, the 2013 recipient of the Dr. W. Thurlbeck Fellowship and the Grzybowski Fellowship in Respiratory Medicine.

- Congratulations to **Dr.Don Sin** on his appointment as a Canada Research Chair Tier 1 and also to **Dr. Denise Daley** on her Canada Research Chair Tier 2 renewal.


Brian Smith photography courtesy of St. Paul's Hospital Foundation

Research Funding

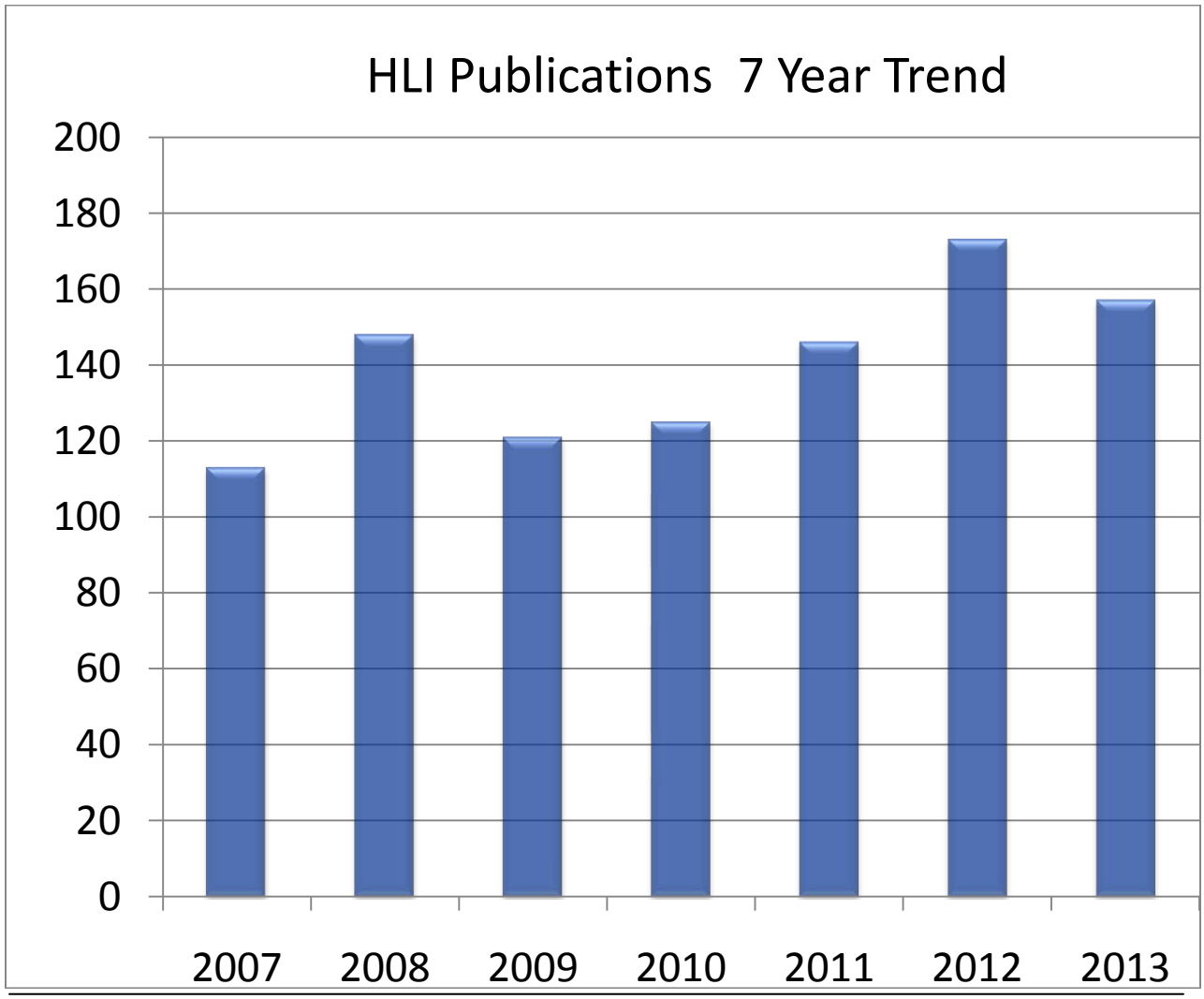
During fiscal year 2012 – 2013, the Centre for Heart Lung Innovation Investigators were successful in attracting $10,969,776.07 in research grants and contracts.

Available data for fiscal year 2013 – 2014, up to February 28, 2014, indicates that the Centre for Heart Lung Innovation Investigators were successful in attracting $8,408,159.57 in research grants and contracts.

Details about the 2013 Centre for Heart Lung Innovation funding can be found in **Appendix A.**

Peer Reviewed Publications

The Centre for Heart Lung Innovation Investigators and students produced **157** publications in 2013. The 7 year trend of publications can be seen below.



Full details about the 2013 Centre for Heart Lung Innovation publications can be found in **Appendix B.**

The Centre for Heart Lung Innovation (HLI); was also instrumental in the marked increase of citations from University of British Columbia cardiac and cardiovascular system publications. Papers such as: Boyd, JH; Forbes, J; Nakada, TA; Walley, KR; Russell, JA; Fluid resuscitation in septic shock: A positive fluid balance and elevated central venous pressure are associated with increased mortality, published in Critical Care Medicine in 2011 was cited 100 times. (Citation counts are as of November 14, 2013.)

Recent High-Impact Papers Published by Faculty of Medicine Investigators - Heart & Lung Health

Article Title	Authors	Journal Title	Year Published	Impact Factor of Journal	Total Citations
Fluid resuscitation in septic shock: A positive fluid balance and elevated central venous pressure are associated with increased mortality	**Boyd, JH**; Forbes, J; Nakada, TA; **Walley, KR; Russell, JA**	CRITICAL CARE MEDICINE	2011	6.330	100
Small-Airway Obstruction and Emphysema in Chronic Obstructive Pulmonary Disease	McDonough, JE; Yuan, R; Suzuki, M; Seyednejad, N; Elliott, WM; Sanchez, PG; Wright, AC; Gefter, WB; Litzky, L; **Coxson, HO**; **Pare, PD**; **Sin, DD**; Pierce, RA; Woods, JC; McWilliams, AM; Mayo, JR; Lam, SC; Cooper, JD; **Hogg, JC**	NEW ENGLAND JOURNAL OF MEDICINE	2011	53.298	72

Data from: Thomson Reuters *Web of Science*, Version 5.12. **Citation counts are as of November 14, 2013**

Source: UBC Faculty of Medicine

Training the Next Generation

Centre for Heart Lung Innovation Summer Student Research Program

Throughout the year, numerous undergraduate students are trained at the Centre for Heart Lung Innovation through co-operative education programs, directed studies programs or various employment opportunities. Our busiest time of year is May to August when 25 - 35 undergraduate students participate in our summer student research program. 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 4-month or 8-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.

From May to August, students participate in a research in progress seminar series and attend professional development seminars as well as Pathology 521 (the Introduction to the Pathogenesis of Human Disease) course lectures. In addition to technical and intellectual training, students learn to present their original work at the end-of-summer Student Research Day, a one day conference featuring both oral and poster presentations by student researchers. This integrated program, that includes the ability to perform novel and innovative technologies, will provide our next generation of scientific leaders with a wide range of career options.

2013 Summer Student Research Day Winners:

1st Place Oral Presentation:	Kevin Lee (Hackett Lab)
2nd Place Oral Presentation:	Brice Aminou (Pare Lab)
3rd Place Oral Presentation:	Devyn Parsons (Walley Lab)
Honourable Mention:	Jari Ullah (Hackett Lab)
Honourable Mention:	Damian Kayra (Dorscheid Lab)

1st Place Poster Presentation:	Paulina Piesik (Luo Lab)
2nd Place Poster Presentation:	Brian Cho (Yang Lab)
3rd Place Poster Presentation:	Rayleigh Chan (Bernatchez Lab)
Honourable Mention:	Amanda Cunningham (Jackson Lab (CBR))

IMPACT

The Integrated and Mentored Pulmonary and Cardiovascular Training (IMPACT) program is a CIHR supported strategic training program at the University of British Columbia and the University of Manitoba. The IMPACT program provides funding to high quality clinical and basic science post-doctoral fellows and gives these fellows the opportunity to join focused teams of researchers in unique multidisciplinary research groups. In 2013, the IMPACT program provided funding to 13 postdoctoral fellows. 8 of these fellows were located at the University of British Columbia and 5 were located at the University of Manitoba.

IMPACT is helping train the next generation of investigators capable of developing and translating knowledge from bench to bedside with the outcome of improved cardio-pulmonary health status of the Canadian population.

IMPACT
Integrated and Mentored
Pulmonary and Cardiovascular Training
A CIHR Strategic Training Program

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 involves the invitation of experts in specific fields from the all over the world to give talks which encourage education and collaboration. Detailed information about the 2013 HLI Friday Seminars can be found in **Appendix C.** Sponsors for this seminar series include the HLI Principle Investigators, the UBC Faculty of Medicine, BC Lung Association, Heart and Stroke Foundation of BC & Yukon.

The Research In Progress seminar series gives the graduate students and post-doctoral fellows at HLI the opportunity to present their "research in progress" 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 2013 Research in Progress Seminars can be found in **Appendix D.**

Trainee Awards

IHLH Heart + Lung Health FEST 2013

Source: IHLH

Source: IHLH

Congratulations to:

Cardiovascular Graduate Category:
Jinelle Gelinas, **Seti Boroomand**

Cardiovascular PDF/RA Category:
Sahana Suresh

Pulmonary Grad Category:
Cleo Leung, Aabida Saferali

Pulmonary PDF/RA Category:
Dragos Vasilescu

Those selected were invited to speak to the FEST Scientific Symposium about their research in a five minute oral presentation. Their presentations provided a small glimpse into the vast range of research topics the next generation of scientists are investigating.

Dr. Jeremy Hirota awarded Banting Fellowship

Source: IHLH

The Canadian Banting Postdoctoral Fellowship program is awarded annually to 70 outstanding postdoctoral candidates. Each two-year fellowship is valued at $140,000.00.

Further details can be found at:
http://www.heartandlung.ca/dr-jeremy-hirota-awarded-banting-fellowship/

The following trainees also received awards during 2013.

First Name	Last Name	Title	Awarding Body
Gabriel	Fung	Poster Presentation Award	CIHR/ICRH YI Forum 2013
Gabriel	Fung	Graduate Award	Faculty of Medicine, UBC
Kunihiko	Hiraiwa	Fellowship	Canadian Institutes of Health Research (CIHR)
Jeremy	Hirota	International Trainee Research Visit Award	AllerGen NCE Inc.
Jeremy	Hirota	Canada Banting Fellowship	Government of Canada
Ivy	Hsu	Diabetic Wound Healing Award	UBC Dermatology Research Day
Ivy	Hsu	UBC 4 Year Doctoral Fellowship (4YF)	University of British Columbia
Daisuke	Kinose	Karl K. Pump Fellowship	Lung Association
Miranda	Kirby	Bisby Fellowship	Canadian Institutes of Health Research (CIHR)
Miranda	Kirby	Post-doctoral Award	Michael Smith Foundation for Health Research (MSFHR)
Cleo	Leung	First Prize Poster Award at Genomics Forum and Poster Competition	Genome BC
Janice	Leung	Post-doctoral Award	Michael Smith Foundation for Health Research (MSFHR)
Maen	Obeidat	Post-doctoral Award	Michael Smith Foundation for Health Research (MSFHR)
Leigh	Parkinson	MITACS Accelerate Post-Doctoral Fellowship	MITACS
Ye	Qiu	International Tuition Award	
Ye	Qiu	Graduate Award	Faculty of Medicine, UBC
Bradley	Quon	Clinician Scientist Award	Cystic Fibrosis of Canada
Amritpal	Singh	Institute Community Support Travel Award	Canadian Institutes of Health Research (CIHR)
Amritpal	Singh	Third Prize Poster Award at Genomics Forum and Poster Competition	Genome BC
Marc	Sze	Studentship	Canadian Thoracic Society Research Committee of the Lung Association
Anthony	Tam	Tuition Award	UBC Graduate studies
Dragos	Vasilescu	Postdoctoral Fellowship	IMPACT
Dragos	Vasilescu	Fellowship	Canadian Thoracic Society Research Committee of the Lung Association

Centre Operational Highlights

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:

Biobank

- Tissue and sample archiving
- Specimens for collaborative research
- Gross specimen photography

Cellular Imaging & Biophysics

- Automatic Tissue Processing Capabilities
- MicroCT services in 2014
- Tecnai 12 Transmission Electron Microscope
- Bioscope Atomic Force Microscope with Nanoscope IIIa Controller
- Pelco BioWave Microwave Processor
- Image Processing Work Stations
- Wide Field Fluorescence Microscope
- Leica Upright Fluorescence Microscope with Fast Confocal Scanner and CCD camera
- Leica Inverted Fluorescence microscope with Confocal Scanner
- Tunable Ultra-short pulse Infrared Laser for Two-Photon Excitation Microscopy

Digital Slide Scanning Service

- Aperio ScanScope XT: brightfield scanner that digitizes whole microscope slides at 20x and 40x magnification

Histology

- Processing and Embedding
- Sectioning
- Immunohistochemistry
- Immuno-peroxidase
- Immuno-alkaline phosphatase
- FITC immunofluorescence
- TUNEL Staining
- in situ Hybridization (ISH)

Molecular Phenotyping & Genotyping

- Beckman Coulter MoFlo® High Speed Cell Sorter
- Laser Capture Microdissection Pixcell II
- Abbott Cell Dyn 3700
- Beckman Coulter EpicsXL-MCL Flow Cytometer
- Miltenyi AutoMACS
- ABI ViiA 7 Real-Time PCR
- Luminex IS100 XYP

Poster Printing Service

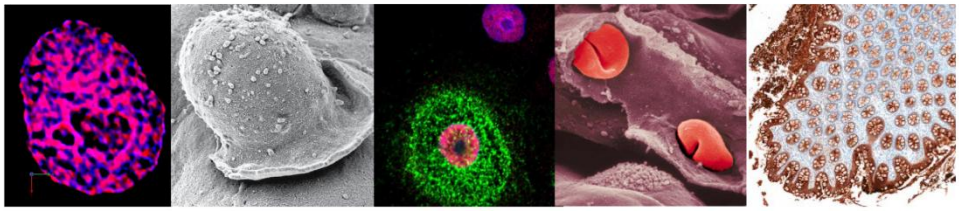
Preclinical Services

- Available for contract or collaborative animal research project opportunities
- Flexivent and Telemetry
- Echocardiology
- Level 2 biocontainment suite
- Colony management services
- Surgical services

Technology Development

- Engineering consultation services
- 3D design
- Machining tools for rapid prototyping
- Data collection software
- Software to generate printed circuit boards
- Data collection software

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



a place of mind
UBC

The following operational highlights occurred during 2013.

- The implementation of our third **Canada Foundation for Innovation (CFI) Award** is well underway. Drawings have been developed for the laboratory renovation currently in progress, new equipment has been sourced and orders have been placed.
- **IT Services:** The IT Services Team worked hard this year to replace all aging general use desktop computers, upgrade the network, storage and server systems, implement email support for mobile devices, provide file sharing capabilities through a web collaboration portal and created numerous custom databases for HLI PI.
- The **CV Registry** relocated all materials to safe storage containers and shelving. This is a mammoth task to undertake. They also launched the first draft of the new electronic inventory management system to encompass general and specimen inventory.
- The **Molecular Phenotyping Core** was able to upgrade the Flow Cytometry facility with a new analyzer and a cell sorter with bio-containment thanks to the CFI funding.
- **Histology** was able to upgrade the facility with a new Cryostat, Tissue Processor and Autostainer thanks to the CFI funding.
- **Cellular Imaging & Biophysics group** was able to upgrade the facility with a new EM Tissue Processor thanks to the CFI funding.
- **GEM (Preclinical Services)** received an exemplary site visit report from the UBC Animal Care Committee and continued to excel in developing new models of heart and lung disease.
- **Digital Slide Scanning Service** continues to attract more users and support international research programs.
- **HLI Operations Team** updated Exit Protocols for laboratory decommissioning, implemented a Centre Code of Conduct and organized Training Sessions on Efficient Inventory Control for Freezers.
- **HLI Safety** kept us all safe with chemical inventory cataloguing and reduction programs.

Code Red/Green Drill May 2013

Facility Users

Thirty Scientists at the HLI and 705 external users (table below) access the Centre'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 the past year (Jan – Dec 2013)

Geographic Distribution of Users	Total number of users (in 2013)
From host institution (UBC)	181
From local institutions/organizations	140
From Provinces (excluding users at Host Institution)	
From Alberta	15
From British Columbia	5
From Manitoba	14
From New Brunswick	0
From Newfoundland & Labrador	1
From Northwest Territories, Nunavut and Yukon	0
From Nova Scotia	5
From Ontario	43
From Prince Edward Island	0
From Quebec	48
From Saskatchewan	11
From outside Canada (USA and international)	242
TOTAL	**705**

NOTE: The numbers above reflect ACTUAL EXTERNAL USERS of the facility/services and DO NOT reflect facility usage by HLI scientists.

Communicating Our Results

New Investigator Awards are funding groundbreaking medical research by two of St. Paul's Hospital's brightest young doctors

St. Paul's Hospital Promise Magazine: Spring/Summer 2013 - At the UBC James Hogg Research Centre at St. Paul's, which specializes in medical research related to the heart and lungs, Drs. Tillie-Louise Hackett and Jordan Guenette are exploring different aspects of a common interest – the study of chronic obstructive pulmonary disease (COPD). Close to three million Canadians currently live with COPD, a disease that is characterized by deadly "lung attacks" and is the fourth-leading cause of death worldwide. **(**Link - Meeting of the minds: New Investigator Awards are funding groundbreaking medical research)

Watch a video of Dr. Jordan Guenette.

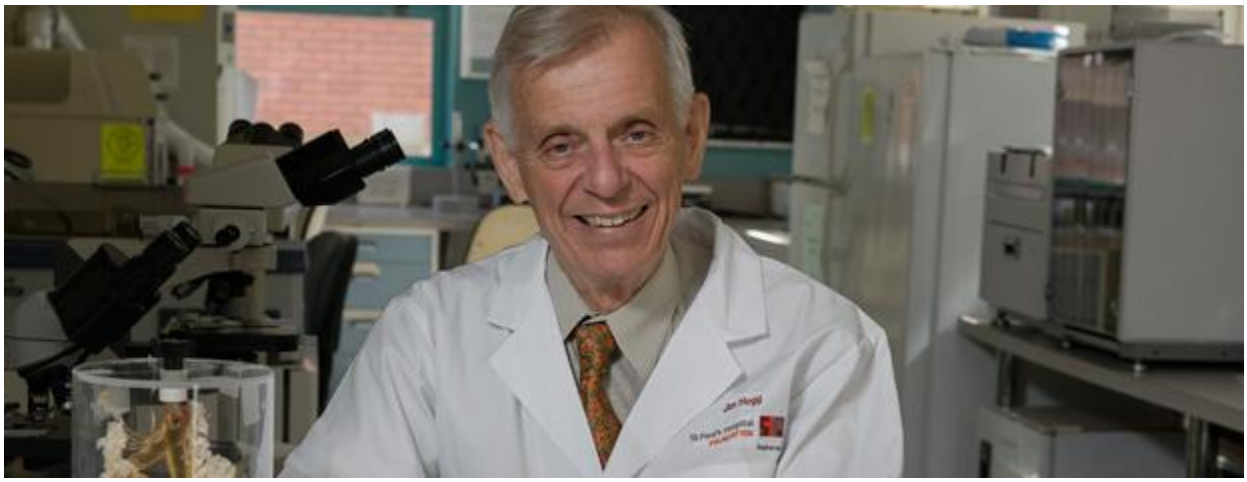
Watch a video of Dr. Tillie-Louise Hackett.

PHCRI research study gives hope to those with chronic non-healing wounds

Released August 19, 2013, VANCOUVER, BC — New research tackles a major problem plaguing long-term care facilities and hospitals. The study, published in the Nature Publication Group journal Cell Death and Differentiation, gives hope to those with chronic non-healing wounds, a problem affecting as many as 20-25 percent of patients in long-term care facilities. As we age, the skin becomes thinner and weaker reducing its capacity to heal. The elderly and people affected with immobility, diabetes and/or obesity are highly susceptible to developing skin wounds that do not close and heal properly. The article entitled "Granzyme B degrades extracellular matrix and contributes to delayed wound closure in apolipoprotein E knockout mice" shows that inhibition of Granzyme B improves the healing of chronic, non-healing wounds. This is the first study to show that inhibiting this protein-degrading enzyme, that builds up with age and chronic inflammation, can restore normal wound healing. The study was funded in part through a Canadian Institutes for Health Research Industry Partnership grant. The study was led by Dr. Paul Hiebert, a former PhD candidate in the laboratory of **Dr. David Granville**, Principal Investigator at the Centre for Heart and Lung Innovation at St. Paul's Hospital, Professor in the Department of Pathology and Laboratory Medicine at the University of British Columbia and Founder and CSO, viDA Therapeutics, Inc.

Source: IHLH

Breathing new life into medicine: Celebrating the extraordinary achievements of Dr. James Hogg



Brian Smith photography, Providence Health Care

St. Paul's Hospital Promise Magazine: Fall/Winter 2013 - When **Dr. James Hogg** was awarded the $100,000 Canada Gairdner Wightman Award in March, the most prestigious biomedical prize in Canada, no one in the global medical science community was surprised, except perhaps for Hogg himself. "I was flabbergasted, but honoured," says Hogg, a St. Paul's Hospital-based researcher, teacher, lecturer and colleague who has arguably contributed more to modern medicine's knowledge of chronic obstructive pulmonary disease (COPD) than any other individual in the world. "It's a lifetime award, so I really accept it as recognition of the work that's going on in the respiratory field in Canada. And I hope it draws attention to COPD and the enormous world health problem that it is." (Link - Breathing new life into medicine: Celebrating the extraordinary achievements of Dr. James Hogg)

Watch a video of Dr. James Hogg.

Changing Lives Through Research

Drs. Tillie-Louise Hackett, Jordan Guenette and Stephan van Eeden were profiled in the Fall & Winter 2013 BC Lung Association *Your Health* publication.

Dr. Guenette's *current research relates to how exercise can improve quality of life in patients living with chronic respiratory conditions.*

Dr. Hackett's *research centres on developing a better understanding of COPD (chronic obstructive pulmonary disease), one of the leading causes of death worldwide.*

Dr. van Eeden *and his team are studying how air pollutants like cigarette smoke and particulate matter damage lung cells and how to reduce their impact.*

Next Steps

The Centre for Heart Lung Innovation (HLI) is grateful to the continued support of 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 look forward to a very active year ahead. Within the coming year we will be finalizing the implementation of our third CFI award and hoping for successful results on our third and fourth submissions, establishing new committee structures to guide internal projects, evolving our IT capabilities to support the growing needs of all investigators and as always, increasing our fundraising presence in the community.

We are grateful to the following individuals for their assistance in the creation of this report: Melanie Hanson, Shemim Manji, Yuliya Shapova, Jane Ebreo, Dean English, Leah Lockhart, Chloe Scott, Lindsay Lynch, Hansen Chou, Dr. Keith Walley, Dr. Tillie-Louise Hackett, Dr. Jordan Guenette, Dr. David Granville, Dr. Stephan van Eeden, Dr. Honglin Luo, Dr. Deceheng Yang and Dr. Don Sin.

Partnerships

We wish to thank our current partners:

BC Knowledge Development Fund
BC Lung Association
Canada Foundation for Innovation
Canada Research Chairs
Canadian Institutes of Health Research
Genome British Columbia
Genome Canada
GlaxoSmithKline
Heart and Stroke Foundation of BC and Yukon
Merck Frosst Canada
Michael Smith Foundation for Health Research
National Institutes of Health (USA)
National Sanitarium Association
Novartis
Providence Health Care Research Institute
Providence Health Care, St. Paul's Hospital
St. Paul's Hospital Foundation
University of British Columbia

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 but attracting funds to allow us to retain our expertly trained staff and purchase new equipment remains a challenge. We encourage corporate, private and individual donors to look into our research and our capabilities with the help of the following organizations.

St Paul's Hospital FOUNDATION

Inspired care.

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
Tel 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 2013; to February 28, 2014

AGENCY	AMOUNT	RESEARCHER	TITLE	AWARD TYPE
Heart and Stroke Foundation of British Columbia and Yukon	103,955.00	Bernatchez, Pascal	Pharmacological and translational analysis of the eNOS/Caveolin-1 interaction	Grant
Canadian Institutes of Health Research (CIHR)	15,000.00	Bernatchez, Pascal	Cellular mechanisms underlying vascular dysfunction and aortic aneurysm in Marfan syndrome	Grant
Canadian Institutes of Health Research (CIHR)	5,000.00	Bernatchez, Pascal	Increased nitric oxide bioavailability and re-vascularization in aging vasculature: validation of a drug target	Grant
Canadian Institutes of Health Research (CIHR)	5,000.00	Bernatchez, Pascal	Research Allowance: The role of angiotensin II receptor Type 1 in aortic aneurysm and vascular dysfunction in marfan syndrome	Grant
National Sanitarium Association	200,000.00	Boyd, John	Cell free RNA in plasma: disease-specific transcriptomes will provide diagnostic molecular signatures to differentiate severe pneumonia from congesetive heart failure	Grant
Canadian Institutes of Health Research (CIHR)	200,000.00	Boyd, John	SON RIS: Sepsis Outcomes National Registry to improve survival	Grant

British Columbia Lung Association	40,000.00	Camp, Pat	Equipment Grant: Promoting Physical Activity for British Columbians with Chronic Lung Disease	Grant
Canadian Institutes of Health Research (CIHR)	101,771.00	Coxson, Harvey O.	Thoracic Imaging Network of Canada (TIN_CAN)	Grant
Canada Foundation for Innovation	11,999.00	Daley, Denise	CFI Infrastructure Operating Fund	Grant
Allergy, Genes and Environment Network (AllerGen) - Networks of Centres of Excellence (NCE)	60,000.00	Daley, Denise	Genome-wide association results	Grant
Canadian Institutes of Health Research (CIHR)	250,000.00	Daley, Denise	Epigenetic mechanisms for the development of asthma	Grant
Genome British Columbia	300,000.00	Daley, Denise	Epigenetic Mechanisms for the Development of Asthma	Agreement
National Sanitarium Association	186,518.00	Dorscheid, Delbert R.	Bio-airway research offering new concepts in health (BRONCH) Partnership.	Grant
ALL Phase Clinical Research	6,975.00	Dorscheid, Delbert R.	A Canadian, 12-month, multicentre, open-label study evaluating the oral corticosteroid sparing effect of Xolair* (omalizumab) therapy in inadequately-controlled moderate to severe allergic asthma patients	Clinical Trial
Canada Foundation for Innovation	3,753.00	Francis, Gordon A.	CFI Infrastructure Operating Fund	Grant
Canadian Institutes of Health Research (CIHR)	129,875.00	Francis, Gordon A.	The role of lyososomal cholesterol in the regulation of ABCA1 expression and HDL formation	Grant

Heart and Stroke Foundation of British Columbia and Yukon	102,828.00	Francis, Gordon A.	The role of arterial smooth muscle cells in intimal foam cell formation	Grant
Canadian Institutes of Health Research (CIHR)	127,708.00	Francis, Gordon A.	Cellular lipid efflux and HDL formation	Grant
Synageva Biopharma	12,500.00	Francis, Gordon A.	Cholesteryl Ester Storage Disease Case Finding Screening Program	Agreement
AMGEN Canada Inc.	2,000.00	Francis, Gordon A.	A Double-blind, Randomized, Placebo-controlled, Multicenter Study Assessing the Impact of Additional LDL-Cholesterol Reduction on Major Cardiovascular Events When AMG 145 is Used in Combination With Statin Therapy in Patients with Clinicall	Clinical Trial
Merck Frosst Canada Ltd.	12,823.00	Frohlich, Jiri	A 1-Year, Worldwide, multicenter, Double-Blind, Randomized, Parallel, Placebo-Controlled Study to Assess the Efficacy and Tolerability of Anacetrapib When Added to Ongoing Statin Therapy With or Without Other Lipid Modifying Medication(s)	Clinical Trial

AMGEN Canada Inc.	41,023.18	Frohlich, Jiri	A double-blind, Randomized, Placebo-controlled, Multicenter Study to Evaluate Safety, Tolerability and Efficacy of AMG 145 on LDL-C in Subjects with Heterozygous Familial Hypercholesterolemia	Clinical Trial
AMGEN Canada Inc.	9,035.50	Frohlich, Jiri	A Multicentre, Controlled, Open-label Extension (OLE) Study to Assess the Long-term Safety and Efficacy of AMG 145.	Clinical Trial
Providence/St. Paul's Hospital Foundation	53,000.00	Frohlich, Jiri	A Cohort Clinical Study of Patients with Elevated Lipoprotein(a) in Healthy Heart Program	Grant
Pfizer Canada Inc.	100,000.00	Frohlich, Jiri	Creation and Implementation of a Registry for Familial Hypercholesterolemia.	Clinical Trial
Canadian Institutes of Health Research (CIHR) Industry Partnership	623,930.00	Granville, David J.	Research and Development of Granzyme B Inhibitors	Grant
Canadian Institutes of Health Research (CIHR)	103,475.00	Granville, David J.	Granzyme B in abdominal aortic aneurysm	Grant
Canadian Diabetes Association	74,024.00	Granville, David J.	Granzyme B in non-healing diabetic skin ulcer pathogenesis	Grant
Mathematics of Information Technology and Complex Systems (MITACS) - Networks of Centres of Excellence (NCE)	7,500.00	Granville, David J.	Granzyme B in Tissue Remodeling	Grant
Canadian Institutes of Health Research (CIHR) Pilot Grant	11,250.00	Granville, David J.	The effect of Granzyme B on photoaging	Grant

Western Economic Diversification Canada	15,000.00	Granville, David J.	The effect of Granzyme B on photoaging	Grant
UBC Department of Physical Therapy	5,000.00	Guenette, Jordan A.	Does pulmonary rehabilitation reduce neuromechanical uncoupling of the respiratory system in COPD	Grant
Natural Sciences and Engineering Research Council of Canada (NSERC)	30,000.00	Guenette, Jordan A.	Respiratory and locomotor muscle blood flow regulation during physiological stress	Grant
British Columbia Lung Association	30,000.00	Guenette, Jordan A.	Mechanisms of external dyspnea in fibrotic interstitial lung disease	Grant
British Columbia Knowledge Development Fund (BCKDF)	125,000.00	Guenette, Jordan A.	Sex, gender and cardio-respiratory limitations during exercise in health and chronic lung disease	Grant
Canada Foundation for Innovation	125,000.00	Guenette, Jordan A.	Sex, gender and cardio-respiratory limitations during exercise in health and chronic lung disease	Grant
Providence Research Institute	54,801.00	Guenette, Jordan A.	Sex, gender and cardio-respiratory limitations during exercise in health and chronic lung disease	Grant
Canadian Institutes of Health Research (CIHR)	136,143.00	Hackett, Tillie- Louise	Resetting epithelial differentiation as a novel therapeutic approach to treating asthma	Grant
National Institutes of Health	3,662.01	Hackett, Tillie-Louise	Epithelial Mitotic Dyssynchrony in Fibrotic Disease	Agreement
British Columbia Lung Association	30,000.00	Hackett, Tillie-Louise	Molecular determinants of small airway obstruction in COPD	Grant

Canadian Institutes of Health Research (CIHR)	41,689.00	Hackett, Tillie-Louise	Molecular determinants of small airway obstruction in COPD	Grant
Allergy, Genes and Environment Network (AllerGen) - Networks of Centres of Excellence (NCE)	10,000.00	Hackett, Tillie-Louise	Innate immune responses of the airway epithelium	Grant
UBC Faculty of Medicine	4,995.16	Hackett, Tillie-Louise	Molecular determinants of small airway obstruction in COPD.	Grant
Parker B. Francis Foundation	169,000.00	Hackett, Tillie-Louise	The role of Angiotensin II-mediated TGFβ1 signaling in COPD pathogenesis	Grant
International Klosterfrau Foundation for Asthma Research	45,000.00	Hackett, Tillie-Louise	The role of apical junction complex proteins in airway remodeling in asthma	Grant
National Institutes of Health (NIH)	854,450.00	Hackett, Tillie-Louise	Molecular determinants of COPD	Grant
Merck Frosst Canada Ltd.	100,000.00	Hogg, James C.	Role of the Host Response to the Lung Microbiome in the Pathogenesis of COPD	Agreement
British Columbia Lung Association	21,000.00	Hogg, James C.	The interaction between the lung bacterial microbiome and host response in chronic obstructive pulmonary disease	Grant
Canadian Lung Association	45,000.00	Hogg, James C.	Phenotyping small airway disease in patients with COPD	Grant
Boehringer Ingelheim (Germany)	30,552.00	Hogg, James C.	Expression of Components of the Cholinergic and ß-Symphathomimetic System in Lung Tissue Samples of COPD Patients and Healthy Smokers	Contract

Grifols	93,024.00	Hogg, James C.	The Mechanism of Lung Tissue Destruction in Alpha One Anti trypsin Deficiency	Contract
Canadian Institutes of Health Research (CIHR)	6,666.67	Knight, Darryl	Salary: The role of the airway epithelium inflammasome in asthma pathogenesis	Grant
Michael Smith Foundation for Health Research	1,167.00	Knight, Darryl	The role of the airway epithelium NLRP3 inflammasome in asthma pathogenesis	Grant
British Columbia Lung Association	21,700.00	Knight, Darryl	The airway epithelium NLRP3 inflammasome: Central player in air pollution mediated innate and adaptive immune responses	Grant
Canadian Institutes of Health Research (CIHR)	108,058.00	Luo, Honglin	Cleavage of serum response factor in viral cardiomyopathy	Grant
Canadian Institutes of Health Research (CIHR)	75,000.00	Luo, Honglin	Interaction between REGgamma and p53 in heart infectious disease	Grant
Canadian Institutes of Health Research (CIHR)	123,691.00	Man, S.F. Paul	Emphysema and inflamm-aging in HIV-seropositive patients	Grant
Michael Smith Foundation for Health Research	27,417.00	Man, S.F. Paul	Investigation of aging-related pathways associated with an increased risk of emphysema in HIV-infected patients	Grant
Canadian Institutes of Health Research (CIHR)	60,249.00	McManus, Bruce M.	Mechanisms of allograft vasculopathy	Grant
Canadian Institutes of Health Research (CIHR)	133,369.00	McManus, Bruce M.	Dysregulated STAT-3 activation underlies lung fibroblast heterogeneity: Implications for idiopathic pulmonary fibrosis.	Grant

Genome British Columbia	188,544.00	McManus, Bruce M.	Clinical implementation of diagnostic biomarker assays in heart and kidney transplantation	Agreement
PROOF Centre of Excellence	179,250.00	McManus, Bruce M.	Clinical implementation of diagnostic biomarker assays in heart and kidney transplantation	Agreement
Michael Smith Foundation for Health Research	2,000.00	McManus, Bruce M.	BC PRoteomics Network - Training program	Agreement
Michael Smith Foundation for Health Research	24,208.00	Pare, Peter D.	Unraveling the molecular mechanisms for variation in lung function	Grant
PPD Development, LP	5,864.77	Ryerson, Chris	A Phase 2, Randomized Dose-ranging Study to Evaluate the Efficacy of Tralokinumab in Adults with Idiopathic Pulmonary Fibrosis	Clinical Trial
Allergy, Genes and Environment Network (AllerGen) - Networks of Centres of Excellence (NCE)	6,600.00	Sandford, Andrew J.	Alternate Theme Leader/ Theme Coordination Support: Theme I - Genes and early life determinates	Grant
Janssen Inc.	3,750.00	Schellenberg, Robert	A Phase 2a, Randomized, Double-Blind, Placebo-Controlled, Multicenter, Parallel Group Study of JNJ-38518168 in Symptomatic Adult Subjects with Uncontrolled, Persistent Asthma	Clinical Trial

Canadian Institutes of Health Research (CIHR)	132,211.00	Seow, Chun	Mechanical properties of human airway smooth muscle in vitro and in vivo: Normal structure and function and abnormalities in asthma	Grant
Natural Sciences and Engineering Research Council of Canada (NSERC)	47,000.00	Seow, Chun	Visualization and assessment of physical and chemical interactions among smooth muscle proteins	Grant
Canadian Institutes of Health Research (CIHR)	119,118.00	Seow, Chun	Plasticity in airway smooth muscle	Grant
Canadian Institutes of Health Research (CIHR)	138,014.00	Sin, Don	Why are women at increased risk of COPD?	Grant
Boehringer Ingelheim (Canada) Ltd.	20,537.83	Sin, Don	A randomised, double-blind, parallel group study to assess the efficacy and safety of 52 weeks of once daily treatment of orally inhaled tiotropium + olodaterol fixed dose combination (2.5 µg / 5 and 5 µg / 5 µg) (delivered by the Respimat®	Clinical Trial
Genome British Columbia	25,937.00	Sin, Don	Development of novel biomarker blood tests for COPD	Agreement
PROOF Centre of Excellence	174,500.00	Sin, Don	Development of novel biomarker blood tests for COPD	Agreement

Canadian Institutes of Health Research (CIHR)	2,500.00	Sin, Don	Research Allowance: Characterizing the evolution of symptoms, lung function, bacteriology and inflammation throughout the course of treatment of acute pulmonary exacerbations in cystic fibrosis	Grant
Canadian Institutes of Health Research (CIHR)	37,500.00	Sin, Don	Stipends: Characterizing the evolution of symptoms, lung function, bacteriology and inflammation throughout the course of treatment of acute pulmonary exacerbations in cystic fibrosis	Grant
Canadian Institutes of Health Research (CIHR)	122,715.00	Sin, Don	Inhaled corticosteroids as risk factors for severe viral infections in asthmatics: lessons from the H1N1 epidemic	Grant
British Columbia Lung Association	22,500.00	Sin, Don	Identification of novel plasma biomarkers to predict treatment response in acute exacerbations of cystic fibrosis	Grant
St. Paul's Hospital Foundation	152,066.00	Sin, Don	Clinical implementation and outcomes evaluation of blood-based biomarkers for COPD management	Grant
Providence Research Institute	15,000.00	Sin, Don	Clinical implementation and outcomes evaluation of blood-based biomarkers for COPD management	Grant

Genome British Columbia	1,800,000	Sin, Don	Clinical implementation and outcomes evaluation of blood-based biomarkers for COPD management	Agreement
Canadian Institutes of Health Research (CIHR)	900,000.00	Sin, Don	Clinical implementation and outcomes evaluation of blood-based biomarkers for COPD management	Grant
Allergy, Genes and Environment Network (AllerGen) - Networks of Centres of Excellence (NCE)	14,102.70	Tebbutt, Scott	Genetics of the early and late responses to AllerGen challenge	Grant
Allergy, Genes and Environment Network (AllerGen) - Networks of Centres of Excellence (NCE)	33,750.00	Tebbutt, Scott	Allergic asthma functional and pharmaco-genomics for early and late phase response biomarkers	Grant
Canadian Institutes of Health Research (CIHR)	5,000.00	Tebbutt, Scott	Molecular determinants of early and dual asthmatic responses	Grant
Canadian Institutes of Health Research (CIHR)	6,000.00	Tebbutt, Scott	Statistical methods for the integration of high-dimensional omics data sets	Grant
National Institutes of Health	5,726.75	Van Eeden, Stephanus F.	Diesel Exhaust, Vascular Response, and Systemic Inflammation	Agreement
British Columbia Lung Association	30,000.00	Van Eeden, Stephanus F.	The impact of HMG-CoA reductase inhibitors on lung inflammation in COPD	Grant
Canadian Institutes of Health Research (CIHR)	30,000.00	Van Eeden, Stephanus F.	Novel mechanisms to control lung inflammation by clearnce of air pollutants via lung cells	Grant

Canadian Institutes of Health Research (CIHR)	5,000.00	Van Eeden, Stephanus F.	Novel mechanisms to control lung inflammation by clearnce of air pollutants via lung cells	Grant
Canadian Institutes of Health Research (CIHR)	107,767.00	Walley, Keith	Toll-like receptor anti-inflammatory response in cardiac inflammatory states	Grant
Canadian Institutes of Health Research (CIHR) Strategic Training Grant	325,000.00	Walley, Keith	IMPACT	Grant
Canadian Cystic Fibrosis Foundation	14,800.00	Wilcox, Pearce G.	Identification of novel plasma biomarkers in exacerbations of cystic fibrosis	Grant
Canadian Institutes of Health Research (CIHR)	130,560.00	Yang, Decheng	MicroRNA-mediated gene regulation as a determinant of tissue tropism and pathogenesis in coxsackievirus infection	Grant
Heart and Stroke Foundation of Canada	10,000.00	Yang, Decheng	MicroRNA-regulated cardiac tropism and pathogenesis in coxsackievirus infection	Grant
Canadian Institutes of Health Research (CIHR)	100,442.00	Yang, Decheng	IRES-dependent translation of heat shock proteins in the pathogenesis of coxsackievirus myocarditis	Grant
TOTAL	**$8,408,159.57**			

Appendix B: Centre for Heart Lung Innovation Publications for 2013

1. Aaron SD, Vandemheen KL, Maltais F, Field SK, Sin DD, Bourbeau J, Marciniuk DD, Fitzgerald JM, Nair P, Mallick R. TNFalpha antagonists for acute exacerbations of COPD: a randomised double-blind controlled trial. *Thorax* 2013;68:142-148.

2. Agusti A, Edwards LD, Celli B, Macnee W, Calverley PM, Mullerova H, Lomas DA, Wouters E, Bakke P, Rennard S, Crim C, Miller BE, Coxson HO, Yates JC, Tal-Singer R, Vestbo J, for the Evaluation of CLtIPSEi. Characteristics, stability and outcomes of the gold 2011 copd groups in the eclipse cohort. *The European respiratory journal* 2013.

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Appendix C - Centre for Heart Lung Innovation 2013 Friday Seminar Series

Centre for Heart Lung Innovation
Friday Seminar Series 2013
Gourlay Conference Room, Fridays, 11:30 am –12:30 pm

2013				
Month	**Day**	**Speaker**	**Host**	**Title of Lecture**
January	11	Dr. Khaled El Emam	Dr. Bruce McManus	"Sharing health data while protecting patient privacy"
	18	Dr. Art Poon	Dr. Tillie Hackett	"Reconstructing the evolution of HIV within a patient"
	25	Dr. John Boyd	N/A	"Portable cardiovascular ultrasound for shock: Clinical research at St Paul's"
February	01	Claire Smits and Dr. Hackett, Francis and Walley	N/A	"What happened to the CFI: Celebrations, Future and Innovation"
	08	Dr. Dina Greene	Dr. Don Sin	"Facilitating the Laboratory Diagnosis of Alpha-1-antitrypsin deficiency"
	15	Dr. David Fedida	Dr. Tillie Hackett	"Late Sodium current as a new therapeutic target for diastolic dysfunction and arrhythmia"
	22	NO SEMINAR SERIES THIS WEEK – FEST 2013		
March	01	Dr. Christopher Mody	Dr. Don Sin	"A Surprising Benefit of Tissue Microenvironment on Microbial Host Defense in Cryptococcus gattii infection"
	08	Dr. Konrad Walus	Dr. Del Dorscheid	"Inkjet and 3D Printable Structures, Devices, and Tissues"
	15	Dr. Joan Reibman	Dr. Del Dorschied	"Pollution and the mucosa: the epithelial-dendritic cell interface"
	22	Dr. Tom Lagace	Dr Gordon Francis	"Regulation of circulating low-density lipoprotein cholesterol by PCSK9"
	29	NO SEMINAR SERIES THIS WEEK – GOOD FRIDAY		
April	05	Dr. Sina Gharib	Dr. Peter Pare	"Order from Chaos? How to Make Sense of the "Systems Approach" to Complex Diseases"
	12	Dr. Jonathan Choy	Dr. Pascal Bernatchez	"Nitric oxide synthases in lung and blood vessel disease"

	19	Dr. Steve Georas	Dr. Chris Carlsten	"Initiation of immune responses in the lung: breaking the epithelial barrier"
	26	Dr. Martin Stampfli	Dr. Don Sin	"Consequences of cigarette smoke as a pro-inflammatory and immune suppressive agent to smoking-related diseases"
May	03	Dr. Bill Mohn	Dr. Jim Hogg	"Vicious cycles: interactions between the immune system and microbiota during the course of disease"
	10	Dr. Shirya Rashid	Dr. Gordon Francis	"The Novel Role of PCSK9 in Liver and Intestinal Apolipoprotein B Dysregulation"
	17	NO SEMINAR SERIES THIS WEEK – ATS		
	24	NO SEMINAR SERIES THIS WEEK – YI FORUM / PATHOLOGY DAY		
	31	Dr. Steve Opal	Dr. Jim Russell	**"**Complex therapies for complex syndromes like sepsis: sirtuins, Thombomodulin and epigenome editors**"**
June	07	Dr. Miranda Kirby	Dr. Harvey Coxson	"Imaging Pulmonary Structure-Function in COPD using Hyperpolarized Noble Gas Magnetic Resonance Imaging"
	14	Dr. Gary Sieck	Dr. Chun Seow	"Endoplasmic Reticulum (ER) Stress in Airway Smooth Muscle: Relation to Asthma Airway Hyper-Responsiveness"
	21	Prof. Linhong Deng	Dr. Chun Seow	"Mechanobiology of the airway smooth muscle cell and its regulations in pathogenesis of asthma"
NO SEMINARS IN JULY AND AUGUST				
September	13	Dr. Murray Huff Director, Vascular Biology Research Group, Robarts Research Institute Professor, Departments of Medicine and Biochemistry, The University of Western Ontario	Dr. Gordon Francis	"Activation of PPAR delta inhibits aortic inflammation and attenuates the progression of atherosclerosis in LDLr-/mice"

	20	Dr. Michael J. Sanderson Professor, Department of Microbiology and Physiological Systems University of Massachusetts Medical School	Dr. Chun Seow	"Ca2+ signaling in airway smooth muscle: exploring lung physiology with lung slices"
	27	Dr. Jean Bourbeau Director, Respiratory, Epidemiology and Clinical Research Unit (RECRU), Montreal Chest Institute, McGill University	Dr. Wan Tan	"Canadian Cohort Obstructive Lung Disease (CanCOLD): What have we learned and where should we go next?"
October	4	Dr. Sverre Vedal Director, Environmental and Occupational Health MPH Program Professor, Environmental and Occupational Adjunct Professor, General Internal Medicine University of Washington	Dr. Don Sin	"Outdoor particulate matter chemical components and subclinical (and clinical) cardiovascular disease"
	11	Dr. Jiri Frohlich Professor, Pathology and Laboratory Medicine, University of British Columbia	N/A	"The rationale for FH registry"
	18	Dr. Sean Fain Associate Professor of Medical Physics University of Wisconsin - Madison Wisconsin Institutes for Medical Research (WIMR)	Dr. Harvey Coxson	"Challenges and opportunities for image assessment of lung structure and function"
	25	Dr. Felix Ratjen Head, Division of Respiratory Medicine Sellers Chair of Cystic Fibrosis Professor, University of Toronto Hospital for Sick Children	Dr. Don Sin	"Functional assessment of early airway disease"
November	1	Dr. Alan Chait Division of Metabolism, Endocrinology and Nutrition Division Head Edwin L. Bierman Professor of Medicine University of Washington	Dr. Gordon Francis	"Adipose tissue inflammation, metabolic syndrome and atherosclerosis"
	8	Dr. John Wilson Professor, Department of Exercise and Nutrition Sciences University of Buffalo	Dr. Keith Walley	"C for Sepsis?: Studies of Vitamin C Therapy in Experimental Sepsis"

	15	Dr. Celia Greenwood Associate Professor Oncology; Epidemiology Centre for Clinical Epidemiology Lady Davis Research Institute Jewish General Hospital	Dr. Denise Daley	"Identifying regions and sites of interest in DNA methylation data: an exploration of possible approaches"
	22	Dr. Niklas Nielsen Consultant, Intensive Care, Helsingborg Hospital, Sweden Clinical Researcher, Lund University, Sweden	Dr. Jim Russell	"Target temperature 33°C versus 36°C after out-of-hospital cardiac arrest-a randomized clinical trial"
	29	Dr. Lee Romer Reader, Human and Applied Physiology, Centre for Sports Medicine and Human Performance, Brunel University	Dr. Jordan Guenette	" Respiratory influences on O2 transport and exercise performance in health"
December	6	Dr. Maarten van den Berge Pulmonary Physician, the University Medical Center Groningen Researcher, the Groningen Research Institute for Asthma and COPD The Netherlands	Dr. Tillie Hackett	"Genome-wide gene expression profiling, a tool for phenotyping in COPD"
	13	Dr. George P. Downey Professor Executive Vice President, Academic Affairs Department of Medicine Division of Pulmonary, Critical Care and Sleep Medicine Integrated Department of Immunology National Jewish Health	Dr. Bruce McManus	"If you can mend a broken heart, why is it so hard to repair the injured lung?"

Thank you to the following sponsors for their ongoing support of this seminar series: HLI Principle Investigators, the UBC Faculty of Medicine, BC Lung Association and the Heart and Stroke Foundation of BC & Yukon.

Appendix D - Centre for Heart Lung Innovation Research In Progress Seminar Series 2013

Centre for Heart Lung Innovation
Research in Progress Seminar Series 2013
Gourlay Conference Room, Mondays – 9:00 am to 10:00 am

January	7	Chris Fjell	"Computational and bioinformatic analysis of factors affecting patient outcomes in sepsis"
	14	Simone Thair	"SNPs involved in NF-kB signaling involved in outcome in septic shock"
	21	Ye Qiu	"The heat shock protein Hsp70 stabilizes CVB3 genome via interacting with an RNA degradation factor"
	28	Sima Allahverdian	"Smooth muscle cells are a major contributor to foam cell and macrophage-like cells in human atherosclerotic lesions"
February	4	David Jaw	"LPS lung exposure induce atheroma destabilization and rupture in mice"
	11	FAMILY DAY	
	18	Sam Wadsworth	"Tissue engineering the airway - changing the way we do research one organ at a time"
	25	Cleo Leung	"Control tumor growth: is disrupting cell membrane remodeling the way to go?"
March	4	Marc Sze	"The Bacterial Microbiome: What's All the Fuss About"
	11	Dragos Vasilescu	"The small airway obstructive phenotype of COPD"
	18	Chris Pascoe	"Smooth muscle gene expression in asthmatic lungs"
	25	Xin Ye	"microRNA-126 in Coxsackievirus Infection-- Small RNA with a BIG Role"
April	1	EASTER	
	8	Tracee Wee	"Integrins alpha v beta 6 and alpha v beta 8 and how they regulate epithelial-mesenchymal transitions"
	15	Paul Hanson	"Regulation of translation initiation factor DAP5 during Coxsackievirus B3 infection"
	22	Ivy Hsu	"Role of Granzyme B in Diabetic Wound Healing"
	29	Liam Brunham - Visiting Professor	"From Rare Diseases to Commonly Used Drugs genes impacting HDL, diabetes, and response to medication"

May	6	Gabriel Fung	“Understanding The Role of AlphaB-Crystallin in Viral-Induced Cardiomyopathy"
	13	Ma'en Obeidat	“"Molecular mechanisms underlying variation in lung function measures”
	20	VICTORIA DAY & ATS	
	27	Adam Linder	"The roles of Heparin-binding protein (HBP) in severe bacterial infections"
June	3	Bradley Quon	“Blood Biomarkers of Disease Activity in Cystic Fibrosis Pulmonary Exacerbations”
	10	Kunihiko Hiraiwa	“Pleiotropic effects of statins on lung diseases"
September	9	Andy Trane	“Promoting Nitric Oxide Release for Treatment of Pulmonary Hypertension and Other Cardiovascular Diseases”
	16	Jasemine Yang	“The role of IL-13 receptors in airway epithelial repair”
	23	Jeffrey Liu	“Myosin filaments in smooth muscle cells do not have a constant length”
	30	Bo Lan	“Cytoskeletal stiffness in active force depleted skinned smooth muscle”
October	7	Loubna Akhabir	“Functional studies of asthma polymorphisms”
	14	THANKSGIVING	
	21	Hyun-Kyoung Koo	“MicroCT analysis of paraffin embedded lung tissue: Is small airway obstruction an early feature of COPD?”
	28	Seti Boroomand	“TGFβ and WNT3a are required for valvular interstitial cell (VIC) calcification, in vitro”
November	4	Leigh Parkinson	"Granzyme B in injury, inflammation and repair - evidence from an UV-induced chronic inflammatory skin model"
	11	REMEMBRANCE DAY	
	18	Michael Seidman	**“**Myocarditis: Is Vancouver the New Dallas?**”**
	25	Melissa Kaufman	"Adverse outcomes associated with Fresh Frozen Plasma transfusion in critically ill patients"
December	2	Daisuke Kinose	“Comprehensive analysis of emphysema in alpha-1 antitrypsin deficiency Project overview"
	9	Loubna Akhabir	Functional characterization of SNPs in two asthma genes”

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