Report on the first British Columbia Summit on Heart and Lung Health

Restoring and Sustaining Heart and Lung Health in the 21st Century

From Vision to Action to Impact

PROVIDENCE
HEART + LUNG INSTITUTE
AT ST. PAUL'S HOSPITAL
New solutions for health

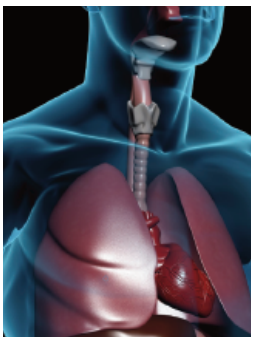



Held on Thursday, February 21, 2008
Morris J. Wosk Centre,
Vancouver, BC

Goal of the Summit

The primary goal of the Summit was to achieve clarity and common purpose among heart and lung researchers, educators, clinicians, policy makers, private sector leaders, and the public-at-large about 1) how we can place British Columbia at the forefront in heart and lung health, 2) which strategic opportunities, needs and directions are the most important for us to pursue and when, and 3) how resources and relationships can be optimized in order to yield the greatest returns socially and economically.

The report that follows was prepared by Dr. Bruce McManus with the assistance of Ms. Johanna Ward, and with input from attending participants. This synopsis of ideas and recommendations will provide helpful guidance as major programs like the Providence Heart + Lung Institute at St. Paul's Hospital advance towards a vision of restoring and sustaining heart and lung health for British Columbians and especially for susceptible and vulnerable peoples. The output of the Summit includes a much fuller picture of the opportunities and challenges British Columbians face in heart and lung health, and how we can lead in creatively addressing these burdens.



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EXECUTIVE SUMMARY

British Columbia is poised for a leadership role at the forefront of the global fight against the oppressive burden of heart and lung diseases. Risk, presence and progression of failure of these vital organs is being addressed through innovative research aimed at more personalized prevention and treatment. Greater consideration of the broader determinants of health and disease must be made as well. The swift translation of research advances through the commercial and health system pipelines is front and centre.

In February 2008, the Providence Heart + Lung Institute at St. Paul's Hospital hosted a pioneering Summit that brought together leaders from across all sectors for a day of deliberations as to how to capitalize on our human, programmatic and infrastructural resources to accelerate advances in heart and lung research, education and care. The output of the discussions is captured here, as one record of ideas and information, which if applied vigorously, will enable the British Columbia community to enhance its leadership role in reversing the devastating global trend of heart and lung disease and related organ failure. The central thrust is to improve the health and quality of life for all British Columbians, as well as for Canadians in general, and people in other countries.

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Summit participants addressed framing questions, and produced a list of recommendations that are outlined at the end of this document. The recommendations include innovative ways to attract and retain top-class researchers to BC, approaches to breaking down existing silos, approaches to the exploitation and sharing of knowledge and databases, and strategies for creation of an environment here that allows British Columbia to achieve a new profile as a heart and lung discovery and care leader in a worldwide context. These recommendations will be addressed in heart-lung planning processes throughout 2008.

INTRODUCTION

On February 21st, 2008, heart and lung researchers, educators, clinicians, policy makers, private sector leaders, and members of the public met for a one-day Summit in Vancouver, hosted by the Providence Heart + Lung Institute (HLI) at St. Paul's Hospital. This inaugural British Columbia Summit provided stakeholders from the HLI and its major partners, from near and far, an opportunity to provide perspective, advice, and suggestions regarding the essential ingredients for success and positive impact on health. The ultimate goal of the Summit was to achieve clarity, a deepened sense of common purpose, and a new level of engagement among diverse, and yet crucial, individuals and groups.

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For the Summit, three overarching questions were posed:

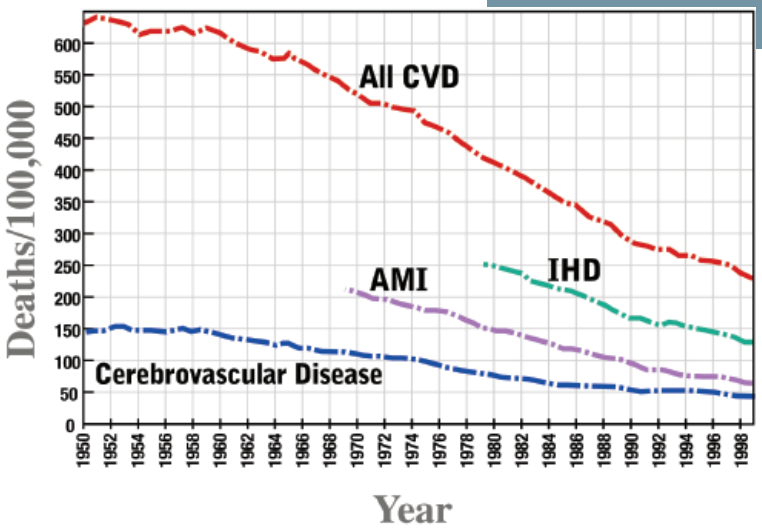
1. How can we position British Columbia at the forefront in heart and lung health?
2. Which strategic opportunities, needs and directions are most important for us to pursue, and when?
3. How can resources and relationships be optimized in order to yield the greatest returns socially and economically?

Representatives from BC's Ministry of Advanced Education, the University of British Columbia, Providence Health Care, the Provincial Health Services Authority, Vancouver Coastal Health, the Healthy Heart Society and the BC Lung Association were each invited to share their perspectives and insights. The Summit was also privileged to receive external perspectives from Dr. Peter Liu, Scientific Director of the CIHR Institute of Circulatory and Respiratory Health, and Dr. Arden Pope, Mary Lou Fulton Professor of Economics at Brigham Young University. Participants later broke into four discussion groups to examine eight themes of importance (*Appendix A*). The groups then reconvened to share their results.

The benefits of bringing together leaders from across multiple sectors was immediately evident in the insightful and lively debate and discussion, and this interchange resulted in a number of innovative recommendations for restoring and sustaining heart and lung health in the 21st century.

Figure 1:

Illustration of the Decline in Death Rates in Canada since 1950



Mortality over Time due to Circulatory Diseases

(both sexes combined, all ages, Canada, 1950 - 1999 age-standardized rate per 100,000 to both sexes, Canada 1991)

Source: Mortality Data: Laboratory Centre for Disease Control, Statistics Canada, 2002)

BACKGROUND & KEY FACTS

Figure 2:

All Countries: World Health Organization 2007

Disease Burdens for 2020
WHO Projection
Disability-Adjusted Life - Years

Rank		Percent
1	Ischemic heart disease	5.9
2	Unipolar major depression	5.7
3	Road traffic accidents	5.1
4	Cerebrovascular disease	4.4
5	Chronic obstructive lung disease	4.2
6	Lower respiratory infections	3.1
7	Tuberculosis	3.0
8	War	3.0
9	Diarrheal disease	2.7
10	HIV	2.6

2007
Chronic Diseases Worldwide
Top 10 Causes of Death

		Total (thousands)	Percent
1	Ischemic heart disease	7,208	12.6
2	Stroke	5,509	9.7
3	Respiratory infections	3,884	6.8
4	HIV/AIDS	2,777	4.9
5	COPD	2,748	4.8
6	Diarrhea	1,798	3.2
7	TB	1,566	2.7
8	Malaria	1,272	2.2
9	Lung cancer	1,243	2.2
10	Motor vehicle crashes	1,192	2.1

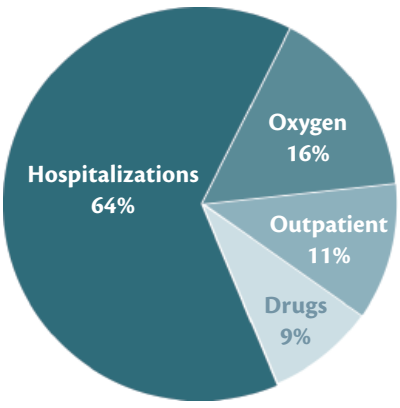
We have made enormous progress over the past 50 years in reducing the burden of cardiovascular disease in Canada (*Figure 1*). Yet, heart disease is the biggest killer of Canadians, with eight out of every 10 Canadians at risk of developing some kind of cardiovascular disease in their lifetimes. In BC, management of patients with cardiovascular risk factors and disease consumes more resources than any other condition. Cardiovascular diseases are the leading causes of death in Canada (74,626 in 2002) and incur by far the largest costs (>15% of totals; $20 billion) in the health care system. As an exemplary condition, heart failure outstrips the medical, social and economic impact of other causes of disability, illness, and death in Canada and now throughout the world. By 2020, the World Health Organization (WHO) projects ischemic heart disease alone to be even more important as the leading global cause of morbidity and mortality (*Figure 2*).

The WHO projects that respiratory diseases will be the third leading cause of death in the world by 2020. Chronic and infectious lung diseases are on the rise and already affect one in five Canadians, and are responsible for most emergency room visits in British Columbia of any condition; one Canadian dies of lung disease every 20 minutes. In BC alone, 14% of hospitalizations are due to COPD, and of those, 26% of patients had more than one hospitalization within a year; 9% were re-admitted within 15 days of discharge. Transplantation is the only treatment for lung failure and five year survival rates post-transplant are ~40%. Respiratory disease costs the Canadian economy an estimated $15 billion per year. Smoking is a key risk factor for chronic bronchitis, emphysema and asthma, and causes a progressive decline in lung function for both smokers and affected non-smokers. Air pollution both directly causes and augments this burden significantly. The costs of hospitalization due to COPD in this country and in the United States are huge (*Figure 3*).

Figure 3:

Allocation of Direct Costs for COPD Care in the United States

National Institutes of Health (USA) www.nhlbi.nih.gov/meetings/images/copd_fig 1.gif



The interactions of genes and environments (physical, ethnic, educational, economic, cultural, social) with behaviours are important determinants of risk and disease. Heart and lung diseases share numerous causative inducing and accelerating factors such as tobacco smoke, indoor and outdoor pollution, viruses, obesity, hemodynamic disorders, metabolic disorders, immunological disorders, and wasting disorders. As well, heart and lung diseases are often governed by the same biological processes of injury and defective repair, offering lessons to be learned reciprocally by comparison of in-common and destructive features of these two organ systems in disease. The growing strain on health care resources devoted to heart and lung diseases demands a new way of thinking about research and care delivery. Given the inter-relationship between cardiovascular and lung disorders, there are many common resources and approaches for predictive, diagnostic, management, preventative, therapeutic and rehabilitative innovations in the cardio-pulmonary realm that can be exploited with value and efficiency.

While innovation and productivity indices often have Canada toward the bottom of G8 nations, we have a national framework and environment in which the attention to the burden heart and lung disease should be vigorous and robust. Our aging population, combined with an increase in complex, co-morbid chronic diseases, is straining our health care system and that of other countries like never before. This growing economic and social burden, with a correspondent high incidence of both heart and lung disease in one-in-the-same patients, necessitates novel thinking in this area, reaching from discovery to application in health care and prevention. The present Summit marks an important first step along that path to positive change and impact.

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British Columbia at a Crossroads

British Columbia (BC) is uniquely prepared to lead the way in reducing the enormous burden of heart and lung disease, both in our province and on the international stage. BC has a proud tradition of being a research pioneer, and the province is viewed at the national level as being able to apply knowledge and turn it into action. In the next decade, BC's goal is to become a global leader in the application of new knowledge to health care, and as the province's cardiovascular and pulmonary strategies evolve over the next few years, BC is poised to have enormous impact.

The BC government has invested and continues to invest heavily in the arena of health care. Two-thirds of all new provincial spending over the next three years has been earmarked for health care; nearly 3 billion additional dollars will be put into health budgets, on top of more than $2 billion worth of increases announced in previous budgets, for a total of $5 billion in new health funding in the next three years. A new $300-million Transformation Fund has been set up within the Ministry of Health to help drive change in the province's technology, procurement, information and service delivery systems, and a new Innovation and Integration fund of $75 million over two years will also be available to introduce patient-focused funding models. An additional $25 million has been set aside to create a Centre for Brain Health, which will include stroke as a major focus.

The singling out of health care and advanced education as funding priorities in this province underscores the integral role that science and research play in the lives of all British Columbians, and spurs us to ask several related questions: Are we getting value for our investment? How is care different at the bedside because of the scientific advances? How can we best leverage these monies into improved quality of life and longevity for those at risk for or suffering from heart and lung diseases?

A closer look at the healthcare landscape provides some heartening examples of knowledge application in action. At St. Paul's Hospital, the Centre for Health Evaluation and Outcomes Sciences (CHÉOS) along with the Centre for Clinical Epidemiology and Evaluation (C2E2) at the Vancouver General Hospital recently received $1 million in endowed funding to create a respiratory health economics unit. This practical, evidence-

seeking project is just one example of how BC clinician scientists are taking the initiative and garnering information to support the translation of research into tangible, measurable results.

This can-do attitude is exemplified by BC's strong not-for-profit sector, which also aims to reduce the burden of heart and lung disease through support of high-quality research, stellar personnel and educational programs. In comparison to other Canadian provinces, BC has a very proactive, effective Lung Association, which works closely with its parent organization (the Canadian Lung Association), hospitals and researchers to share knowledge, educate the public, and improve the health of British Columbians. The BC Lung Association also cooperates with the Heart & Stroke Foundation and the Canadian Cancer Society, and the provincial and federal governments. Similarly, the Heart & Stroke Foundation of BC and Yukon has a formidable history of preventative, investigative and educational program support across the province. Many researchers, clinicians, patients and the public at large have benefited from the perennial leadership shown insofar as heart and blood vessel diseases. The network of not-for-profit institutions, health care researchers, care providers and educators is strong, and results in synergistic consequences of crucial importance to all British Columbians, in an efficient fashion. More joint programming would facilitate further interactions among heart and lung professionals here.

Meanwhile, changes in the province's healthcare and health research landscapes over the past quarter-century are staggering. There has been a huge growth of activity – on university campuses, in hospitals, and as part of research coalitions. The successes that have come out of these powerful groups are clear evidence that BC is very successful at putting together collaborative partnerships. Yet old rivalries and silos – particularly at the hospital level – remain, and are especially noticeable at the care-giving level. These must be broken down as we move forward.

Another contributing factor to BC's strong position is the existence of a single medical school in the province, which, combined with a number of respected teaching hospitals, research laboratories and universities, mean innovation and research are centralized, and research advances can be swiftly disseminated and translated into clinical action.

The UBC Division of Cardiology currently includes 35 cardiologists spread across Vancouver General Hospital (VGH) and St. Paul's Hospital. Both sites have well-developed cultures of critical thought and are home to sought-after training systems. They have excellent senior and junior faculty, with six new recruits from Columbia, NYU, Harvard, Stanford, and the Cleveland Clinic. The Divisions of Cardiovascular and Thoracic Surgery and Critical Care, and several other key departments like Pathology & Laboratory Medicine, Pharmacology & Anesthesiology, Radiology and Family Medicine bring a legacy of achievement in clinical care and in the generation of new knowledge that is comparable to that observed in Cardiology, and far reaching in its significance. The UBC

Division of Critical Care Medicine currently includes nine excellent clinical intensivists at Vancouver General Hospital and nine clinician-scientists at St. Paul's Hospital including recruits in the past calendar year. St. Paul's Hospital, part of Providence Health Care, has a long history of peer-reviewed and funded research programs including outcomes research and basic to translational programs on heart and lung injury through to and including multi-centered clinical trials. VGH has one of the few computerized robotic training simulators for the development of acute medical skills.

Publications from these various units frequently appear in high-impact forums such as the *New England Journal of Medicine*, *Circulation*, *Journal of Cardiovascular and Thoracic Surgery*, *Lancet*, *Journal of the American College of Cardiology*, *American Journal of Radiology*, *American Journal of Respiratory and Critical Care Medicine*, *American Journal of Pathology*, *American Journal of Physiology*, *Nature* and many others.

Yet this province's long tradition as a research and translation innovator could reach much higher climes if contact between teams doing translational research and the mainstream clinicians could be enhanced. Clinicians have expended thousands of hours of time and effort, and gathered phenotypic information to build enviable clinical databases. Linking these resources through appropriate information technology and ethics frameworks would move us forward in a world that is crying out for integration across disciplines, interests and geographies.

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Research Landscape & World-Class Talent

BC's global reputation as a science and research leader is well established. The high calibre of research being conducted and knowledge being generated by our scientists is evident in the province's many biotechnology and technology spin-off companies that contribute to the local economy, recognition, and amplification observed. The scientists responsible for the innovation that leads to spin-offs populate our public institutions of higher learning, and these talented individuals and teams routinely are competitive in national and international competitions for grants and awards. Scientists, scholars, and clinicians from around the world are attracted to this province, drawn by our international reputation as a land of excellence and opportunity. A number of programs developed by the Michael Smith Foundation for Health Research along the career path of life scientists have made a huge difference. The 2008 federal budget introduced new graduate student scholarships aimed at attracting the best students to Canada, offering 500 students $50,000 per year for up to three years. However, real stumbling blocks remain: Attracting and retaining world-class people is becoming more difficult as the economic and housing landscape in BC evolves.

Vast amounts of data are being collected on patients in the BC health care system, and being deposited into myriad databases. The problem is that most of these databases are not linked with each other or informed by each other. This has resulted in duplication, overlap, and, indeed, in certain situations an absurd reality where scientists and clinicians

who have contributed data to databases are then unable to access them at a later date. There has been, in effect, an impenetrable "data lock" at the provincial level. A need for a new culture of openness to data – enabling access with appropriate attention to privacy – will be an important part of unlocking this data such that it can be viewed in context, in its entirety, and such that its complementarities, similarities and potential for synergies can be identified.

One partial solution to this data dilemma lies in research networking. This approach helps us achieve critical mass and bring creative minds together, supporting communication and collaboration through shared infrastructure and research databases. Through research networking, we can create a platform for knowledge transfer across organizational and structural boundaries and enhance our potential for impact on policy, service and delivery. The mobilization of knowledge and the efficient distribution of these diverse and widely distributed resources will lead to improved outcomes across the board.

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Yet there are challenges in establishing effective networks: by definition, they change the existing dynamics and have the potential to generate or uncover conflicting loyalties and commitments. Their structure is at times nebulous and often difficult to efficiently gauge; there is also a proliferation of existing networks within the health care system, as we have seen. Creating effective networks requires substantial commitment of time and resources, both of which are often in short supply within the system. So the question becomes: How do we harmonize and integrate existing networks? What can be eliminated? What can be done better?

In the same vein, another stumbling block on the path to effective translation of research into clinical action is the clinical workload, described as "suffocating" by one participant, which effectively throws up a barrier for clinicians to conduct clinical research. On another related front, while there is some clinical crossover between the cardiac and respiratory services, there is a sense that the core for a highly successful Heart + Lung Institute will be to build on the backbone of excellent cardiopulmonary research, and now more intently address the interaction between heart and lungs, at the causative level, in terms of physiological coupling, at the molecular and cellular mechanistic levels, and in terms of care strategies and outcomes.

The way in which cardiologists at the teaching hospitals are paid also needs to be restructured, as the current model of reimbursement is focused on fee-for-service acute care. It was noted by the Faculty of Medicine that, in fact, initiatives are currently ongoing in relation to alternative payment plans.

New forums for interaction between clinicians and translational scientists must also be established. Similarly, clinicians at the Summit also highlighted the need for practical applications of shared research projects. When this kind of cooperation does occur – as with the Biomarkers in Transplantation Team (*Figure 4*) and the Gene X Environment

Team – the results are proof positive, reflecting the successes that can be achieved by genuine collaboration between a broad range of clinicians and researchers, working across many institutions and geographies. As well, organizations such as the Michael Smith Foundation for Health Research and Genome British Columbia have had major influences in fostering increased interaction of multi-disciplinary groups, with the realization that tough questions require many skills and expertises, and that there is much more to gain by cooperating than by focusing on differences as a reason to remain separate.

Figure 4:

Biomarkers in Transplantation, A Village of Collaboration

There is also the challenge of the dynamic, fast-changing world of health research juxtaposed with the university and hospital administrative structure. Many of our health researchers are very successful – they are entrepreneurs and they are opportunistic. Often there is not much advance notice of successes. The question becomes: How do we effectively integrate these sudden opportunities, programs and directions into a system that is often slow moving?

UBC, home to the province's only medical school, has strong relationships with BC hospitals and research foundations. The power of the synergy that comes from long-standing affiliation agreements between UBC and the major teaching hospitals like St. Paul's and VGH is reflected in a number of key recruitments that could not have happened without inter-institutional cooperation. The medical school is in a steady expansion mode that will increase the possibilities for links throughout the province, including with the various health care organizations and authorities. Initiatives like the Providence Heart + Lung Institute at St. Paul's Hospital and the UBC Centre for Lung Health are now a reality, and will bring further alignment and potential for strategic recruitments and program developments. Major funding for programs like the NCE Centres of Excellence for Commercialization and Research (CECR), specifically the PROOF (Prevention of Epidemic Organ Failure) CECR, hosted by UBC and anchored at St. Paul's, are now focused on biomarker discovery in the setting of heart, lung and kidney failure, and promise even more synergy and attractiveness for first-rate recruits.

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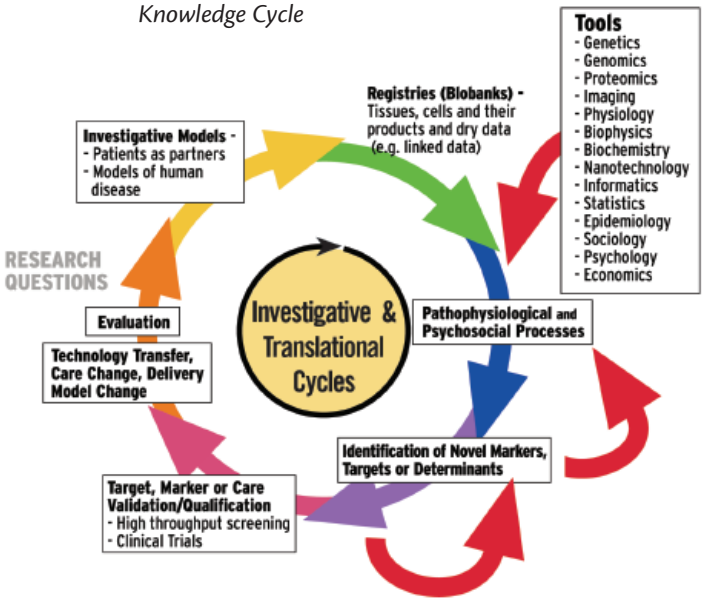
Multi-Disciplinary Teams – Everything Is Connected

Over the course of the Summit, one of the key themes that emerged was interconnectivity: hearts and lungs; clinicians and researchers; charities and hospitals; national and provincial bodies; the environment and our health. BC research advances have most often come from institutions that educate doctors and other health professionals, conduct biomedical and health systems research, and care for patients.

This multi-disciplinary setting gives rise to synergies between researchers and clinicians and expands the capacity of the system to enable health care providers to evaluate, innovate, and learn (*Figure 5*).

Figure 5:

A Role for All Discoverers and Knowledge Translators in the Dynamics of the Knowledge Cycle



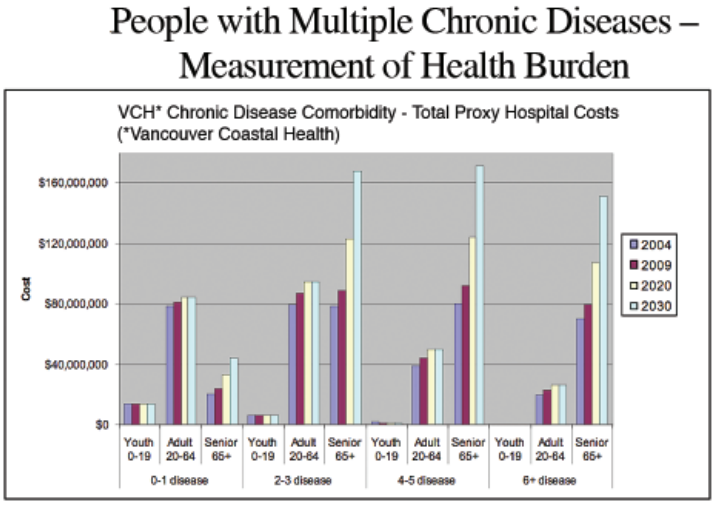
There has historically been a disconnect between knowledge generation and knowledge translation – and, globally, there is a large gap between basic and applied cardiovascular and pulmonary research-generated data, information and knowledge, and its clinical applications. Despite the pervasive burden of cardiopulmonary diseases, the identification of many potential biological markers or targets, technologies and tools for betterment of health, there are few new markers or therapies currently in clinical trials specifically directed at either one or the other of these disease categories.

One of the great opportunities based on our strengths in the heart and lung arena relates to understanding the dynamic relationship between genetic and environmental determinants. With our ability to phenotype and develop molecular signatures that are embedded, we are perfectly poised as a community of heart and lung researchers to become genuine world leaders in this domain of activity. We have a sizeable contribution to make in providing leadership for Canada.

The ability to identify those most at risk would greatly increase our ability to not only help them – earlier and more efficiently – but would drastically reduce spending and costs, from treatments, medications, hospitalizations, and continuing care. Our research efforts must support our goal of optimizing health outcomes and ultimately reducing expenditures in a world of rising costs and increasing competition for health dollars.

Figure 6:

People with Multiple Chronic Diseases – Measurement of Health Burden



In the midst of all of this discussion, it is essential that the focus remains on the patient, not the disease or the institution, and to remember the role of the primary care physician and primary care team in patient health. The "patient as partner" model is the key to successfully changing our outcomes; the patient as partner approach will be further highlighted as the provincial government rolls out its patient-centred funding model over the coming months. It is also important to remember that a majority of patients present with more than one condition (*Figure 6*). An integrated, multi-disciplinary approach to caring for these people is imperative.

A National Perspective

Canada is fortunate to have collaborative networks at both the provincial and country wide levels. Canada's scientists and clinicians, known worldwide as leaders in the arena of heart and lung research and treatment, are supported by a strong federal commitment to science, technology and innovation that underpins Canada's stated federal science policy directive to enhance the creation of health and wealth for all Canadians. The most recent federal budget, introduced February 26th, 2008, allocated $28 million over two years for a new Canada Graduate Scholarship and stipend program, and another $21 million over two years to establish additional science research chairs, recognizing the important contributions of research to the national economy. Other major allocations to health research and the life sciences were also announced, including important funding to Genome Canada and the Tri-Councils. Thanks to funding allocations to organizations like the Canada Foundation for Innovation, hundreds of millions of dollars continue to be invested in health research infrastructure.

The government's commitment to the Canadian Heart Health Strategy aims to develop a stakeholder-driven, upstream and downstream process to identify risk factors by emphasizing coordination and collaboration in delivery of evidence-based care. It also recognizes the need for multi-disciplinary teams to deliver acute and chronic care, and for seamless knowledge generation from inception to implementation to improve quality of cardiovascular care. The Summit participants acknowledge the historic tension that has existed between knowledge generation and knowledge translation, and suggest that we together could be important forces to bridge this divide.

The nascent National Lung Health Framework, supported and steered by the Public Health Agency of Canada in cooperation with charitable organizations like the Canadian Lung Association, is aimed at advancing lung health and delivery of care while providing advanced policy leadership in the areas of prevention and awareness, chronic disease management and in reinforcement of the awareness of infrastructure needs.

The government recently announced the creation of 11 new Centres of Excellence for Commercialization and Research that will receive funding in the current fiscal year of a combined total of $163 million through the federal government's Networks of Centres of Excellence (CECR) program. British Columbia will be host for four of these CECRs, including the Prevention of Epidemic Organ Failure (PROOF) CECR, led by Dr. McManus, which will lead the way in identifying and developing biomarkers of risk, early presence, and progression of heart, lung and kidney failure, and in altering the impact of vital organ failure on Canadians and our health care system. Through in-kind donations and funding, the PROOF CECR has leveraged an additional $24 million in funding. The PROOF CECR will focus on moving away from drug-only strategies towards biomarker-guided prevention and effective early detection of primary diseases that cause organ failure. Rapid advances in the "personalization" of care – giving the appropriate treatment or preventative program to the right person, only when needed – will continue to decrease the cost and the potential adverse effects of treating common, burdensome diseases. PROOF will also build on existing strong relationships with bodies such

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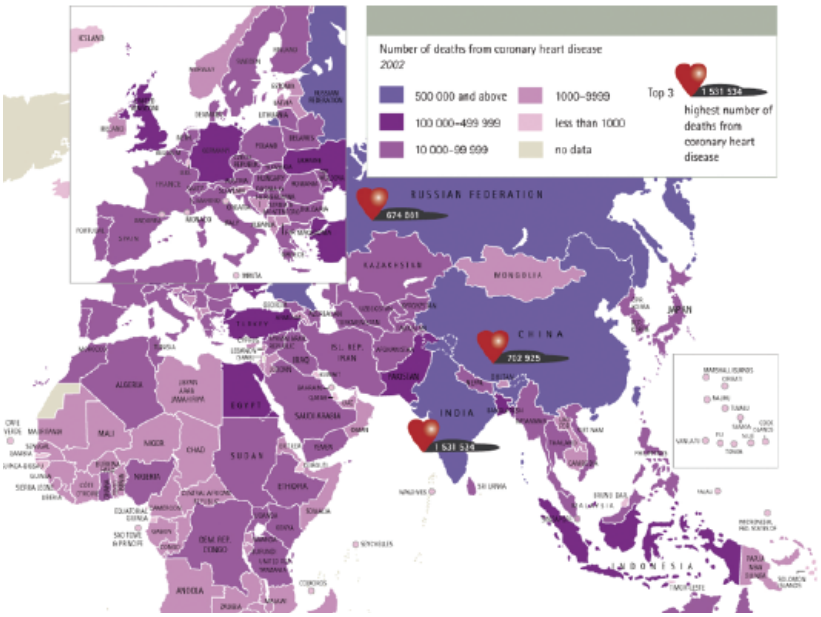
as the Heart & Stroke Foundation, the Canadian Heart Failure Network, and the Canadian Cardiac Transplant Network. PROOF is one vehicle of activities that can bring our mutual goals and diverse talents and resources into alignment with a major positive impact.

Figure 7:

The Massive Global Burden of Ischemic Heart Disease (WHO 2004)



The Global Community & Environment

The sharp rise in chronic non-communicable diseases (CNCDs) in developing nations – particularly noted in China and India, home to fully one-third of the world's population (2 billion people) – has prompted a group of leading scientists and policy makers from around the world to designate this struggle as a Grand Challenge in a similar fashion as the Grand Challenges funded by the Bill and Melinda Gates Foundation. Without concerted and rather urgent action, this leadership group predicts that some 388 million people will die of CNDCs in the next decade (*Figure 7*).

BC has a large role to play in reversing this devastating trend. The province's ability, despite challenges and a competitive environment, to attract and retain world-class researchers is evidenced in the high calibre of the research being generated by our scientists. With the focus shifting from treatment to prevention, BC's ability to phenotype and develop embedded molecular signatures that effectively predict how each individual will respond to this changing environment puts us at the forefront of reversing this trend, and poises us perfectly to help lead the way to finding solutions to this heart and lung disease global epidemic.

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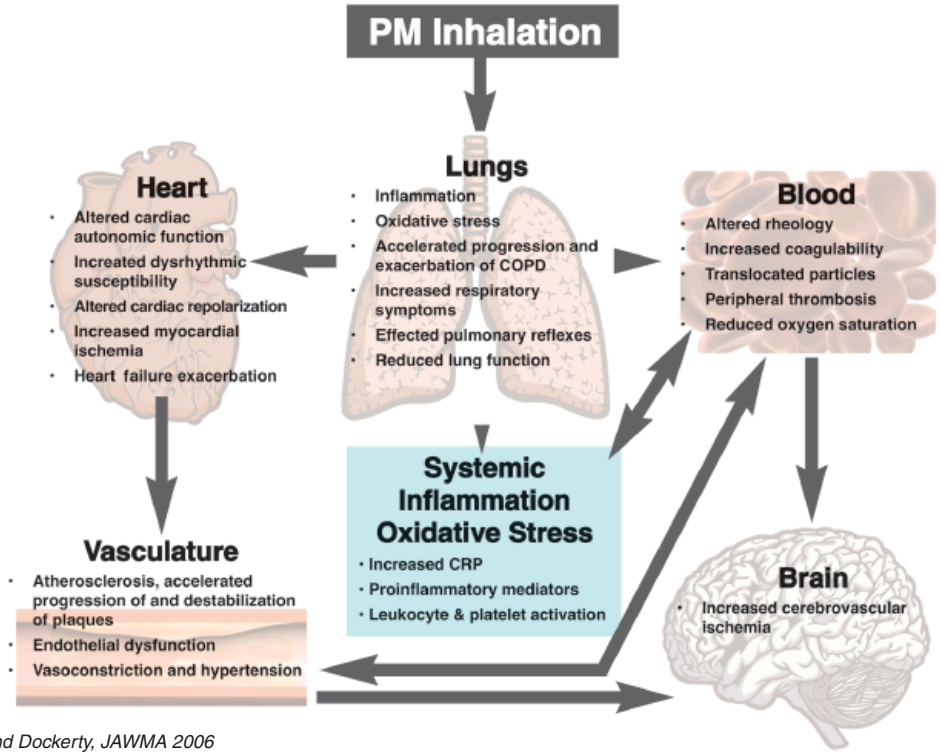
The sobering international, national and local statistics are also a reminder that we are all connected – we all share the same genome, the same human body, and the same planet. With the now-acknowledged phenomenon of global warming dictating a worldwide negative effect on the planet's atmosphere and ecologies, we will all be impacted. And, as researchers learn more about the indivisible connection between heart and lung health, questions related to tobacco use, air pollution, toxins and microbial infections become even more glaringly obvious.

The day's discussions were enriched by Dr. Arden Pope, an economist and air pollution epidemiologist. Dr. Pope has conducted research dealing with a wide range of natural resource and environmental issues, but most of his research has focused on studies evaluating the health effects of air pollution. He has conducted or collaborated on many of the key, pioneering studies of short-term and long-term effects of air pollution and, as one of the world's most widely cited and recognized air pollution experts, has played a prominent role in reviewing and interpreting this literature.



Pope and Dockerty, JAWMA 2006

Figure 8:

The Heart, Blood Vessels, Blood and Lungs – Targets of Polluted Air

Dr. Pope presented compelling evidence of the strong linkage between not only heart and lung disease in general, but also between air pollution, and heart and lung disease specifically (*Figure 8*). Thanks in part to Dr. Pope's research, it is now clear that there are direct linkages between heart and lung health, and between heart-lung health and air quality. It has also become evident that there is a real need for interdisciplinary efforts that expand and integrate different disciplines (cardiology, pulmonology, toxicology, pathology, immunology, cellular biology, epidemiology, economics, etc.) into focused teams in order to answer questions of importance.

Dr. Arden Pope presented compelling evidence of the strong linkage between not only heart and lung disease in general, but also between air pollution, and heart and lung disease specifically.

OPPORTUNITIES AND RECOMMENDATIONS

The Providence Heart + Lung Institute-hosted Summit brought together leaders in British Columbia from across the patient, health care, health research, policy and private sector spectrum, and their interactions and discussions resulted in a number of preliminary recommendations. It became evident that short-term solutions must include people coming together to create the critical mass to address these challenges, and for the making the "business case". Such will allow us to capitalize on the social and economic opportunities presented, driven by the imperative of creating realistic, yet bold, sustainable plans that will reduce the oppressive burden of heart and lung disease.

1. **Improve access to databases.** The lack of discussion among those responsible for developing and maintaining informational databases of all types is limiting the harvest of valuable information by various research teams. The wealth of information that is being collected by researchers across the province should, with reasonable administrative oversight, be accessible to all researchers, both those

contributing to and those making knowledge advances. The need for a more open and accurate database network requires the engagement of each of the health authorities, particularly with regard to the implementation and dissemination of guidelines to govern the necessary access to enable research and educational use. On another note, it is also important to ensure that the information being collected is the "right" information.

2. **Provide clinicians real-time access to information about health outcomes and hospitalizations.** While integration is not necessarily achieved by having everyone in the same building, access to information would allow clinicians to more effectively assess the consequences of their management and treatments in a tangible way. Being mindful of the physical layout and development of Institute will help to facilitate interaction between the various component and diverse groups of clinicians, scientists and educators.

Evidence and common sense dictate that it is far more cost-effective to prevent rather than treat illness.

3. **Encourage program-management structures that align all members of the team with the mission while finding a balance between research and practical applications.** In order for all team members to be invested in a particular project, it is imperative that they are aware of the overall goals underlying the project and of their role in achieving those stated goals. As achieving such a common mindset takes time, one suggestion is to work within the context of common modules and common structures to begin, gradually blurring the margins driven by projects that naturally bring people together. BC is challenged by competing dynamics: for researchers, the greatest successes come from unstructured creativity, but for clinicians who need to provide effective clinical care there is a concurrent need for structure and traditional responsibilities.

4. **Break down barriers to attracting strategic recruits to BC.** A significant amount of money has been allocated to attract top-class researchers and scientists to BC, yet there are still barriers. The cost of housing in BC is prohibitive; we lack a robust structure to recognize and advance excellence in research within the clinical domains. There is a need to build an incentive structure within the province to continue attracting top talent with the approach being to provide a mosaic of rewards for both research and clinical experience. The role of mentors in this process cannot be over-estimated.

5. **Shift the focus from downstream treatment to earlier intervention and prevention.** Evidence and common sense dictate that it is far more cost-effective to prevent rather than treat illness; this approach could lead to huge health cost savings that can then be translated into significant health care investments in other arenas of pressing need. Health care providers can become more effective advocates by joining forces – there is no need for territorial 'ownership' in advocating and implementing programs of prevention. In order to unify the broad

cross-section of stakeholders in this process, there is a need for definition of return on investment, vis-à-vis health outcomes, economic outcomes, environmental benefits and societal benefits.

6. **Involve relevant governing bodies in the goal-setting process.** Identifying landmarks and goals while establishing a model for chronic disease care and research is paramount. The involvement of the province's health authorities, with engagement of the PHSA, will ensure new plans accommodate existing structures and a distributive, networked model for treating chronic disease, and also integrate within and build on the existing medical system. Educating and empowering our patients is paramount. "Patients as partners" is the new reality, and it fits nicely with the vision of our leaders that a much more personalized version of health care is in our near-term future.

7. **Capitalize on BC's reputation as a world leader.** The creation of the necessary "critical mass" to ensure this enterprise's success is linked to the creation of a framework from which this reputation will emanate – the new framework including the Providence Heart + Lung Institute should span the spectrum from basic to research to clinical care, to policy making, and beyond. Again, it is important that we are not limited by our 'physical' layout (finite) vis-à-vis the infinite virtual reach/impact to be exploited. Science and health are both global, and available technology should be exploited to maximize e-health opportunities, research and care networks, and targeted national and international opportunities.

8. **Position the vision of heart and lungs together at the forefront.** The importance of translational research is key: the combination of social-behavioural expertise, an amalgam of a broad mix of patients and families, life-time seekers and learners, clinicians and researchers will make the difference. It is imperative to reach out to other institutions and the broader community to ensure that our vision engages as many talents as possible, while benefitting as many people as possible.

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About the Providence Heart + Lung Institute at St. Paul's Hospital

The Providence Heart + Lung Institute (HLI) at St. Paul's Hospital, launched in June 2007, unites all of Providence's heart and lung research, education and care programs under one umbrella. The only such institute of its kind in Canada, the HLI's mandate is to transform cardiovascular and pulmonary research and care – accelerating the transfer of new care solutions from discovery to clinics and communities to improve the lives of British Columbians.

Armed with a vision to be world leaders in sustaining and restoring heart and lung health, the HLI leverages and builds on the pivotal research and training in heart and lung diseases now active for 30 years at the renowned James Hogg iCAPTURE Centre for Cardiovascular and Pulmonary Research and capitalizes on the excellent, innovative and long-standing

cardio-pulmonary care and education programs of the Heart Centre and the Pacific Lung Health Centre at St. Paul's Hospital. The Institute also capitalizes on the strength in health economics and clinical trials design inherent to the Centre for Health Evaluation and Outcomes Sciences.

The HLI has great potential and desire to work cooperatively and in depth with other health research, educational and care organizations and units – including the breadth of programs and activities in UBC's Faculty of Medicine and Faculty of Science including all relevant departments, Vancouver Coastal Health, the Provincial Health Services Authority, the Heart and Stroke Foundation of British Columbia, the British Columbia Lung Association, private sector enterprises, and the Government of British Columbia – to maximize the likelihood of a comprehensive provincial approach to heart and lung health. The Institute will link to teams and programs across British Columbia, Canada and internationally.

How can we further align researchers, educators and mentors, and care providers from the basic laboratories, to the wards and clinics, and into the communities?

APPENDIX A – BREAKOUT GROUP QUESTIONS

1. How best can we enable integrated expertise and synergistic actions among clinical and laboratory researchers, care providers and educators? How can this integration and synergy improve the quality of heart and lung care and prevention?

2. How can we further align researchers, educators and mentors, and care providers from the basic laboratories, to the wards and clinics, and into the communities?

3. What are the steps necessary to harness our understanding of common causes, common mechanisms, common care strategies and related costs that pertain to heart and lung diseases?

4. What are the strategies that must be implemented to attract, nurture and retain the most innovative and committed heart and lung faculty, trainees and staff – stars for health?

5. How can we create and use the best heart and lung knowledge earlier and more effectively?

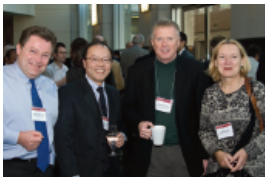
6. What are the steps to elevate impact and visibility of heart and lung health sciences in British Columbia, nationwide and around the world?

7. How can we, with leadership and many crucial partners, assure progressive and bold advances and sustainability of our heart and lung discovery and health care, and our people and programs?

8. Going forward, what is the best way to foster an atmosphere and actions that enable the most collegial, inspired and high impact research, educational, and clinical endeavours possible?

APPENDIX B – LIST OF PARTICIPANTS

Title Name	First Name	Last	Position	Affiliation
Dr.	Raja	Abboud	Respirologist	Vancouver Coastal Health
Dr.	Mike	Allard	Principal Investigator	University of British Columbia, Providence Health Care
Mr.	David	Babiuk	Provincial Executive Director-Cardiac Services	Provincial Health Services Authority
Professor	Tony	Bai	Associate Director, Heart + Lung Institute	University of British Columbia, Providence Health Care
Ms.	Sandra	Barr	Operations Leader	Providence Health Care
Dr.	Pascal	Bernatchez	Principal Investigator	University of British Columbia, Providence Health Care
Ms.	Jenny	Boon	Projects & Administration	Providence Health Care
Dr.	Christoph	Borchers	Director, Proteomics Centre	University of Victoria
Dr.	Don	Brooks	Associate Vice President, Research	University of British Columbia
Dr.	Alison	Buchan	Senior Associate Dean Research, Faculty of Medicine	University of British Columbia
Dr.	Chris	Buller	UBC Division Head, Cardiology	University of British Columbia, Vancouver Coastal Health Authority
Mr.	Martin	Butler	Principal Consultant	The Butlers & Associates
Ms.	Jennifer	Butler	Project Coordinator/Lead Writer	The Butlers & Associates
Dr.	John	Cairns	Cardiologist	University of British Columbia, Vancouver Coastal Health Authority
Dr.	Ron	Carere	Associate Director, Heart + Lung Institute	University of British Columbia, Providence Health Care
Ms.	Sarah	Chiu	Fundraising Manager	St. Paul's Hospital Foundation
Dr.	Arun	Chockalingham	Professor	Simon Fraser University
Dr.	Harvey	Coxson	Principal Investigator	University of British Columbia, Providence Health Care
Ms.	Dianne	Doyle	President & CEO	Providence Health Care
Professor	Mark	Fitzgerald	UBC Division Head, Respiratory Medicine	University of British Columbia, Vancouver Coastal Health Authority
Dr.	Gordon	Francis	Principal Investigator	University of British Columbia, Providence Health Care
Dr.	Jiri	Frohlich	Principal Investigator	University of British Columbia, Providence Health Care
Dr.	David	Granville	Canada Research Chair	University of British Columbia, Providence Health Care
Ms.	Bettina	Hamelin	Director, Research & Development	Pfizer Canada Inc
Ms.	Wendy	Hansson	Vice President, Clinical Programs	Providence Health Care
Mr.	David	Hardwick	Special Advisor on Planning, Faculty of Medicine	University of British Columbia
Professor	Jim	Hogg	Principal Investigator	University of British Columbia, Providence Health Care
Dr.	Andy	Ignaszewski	Division of Cardiology	University of British Columbia, Providence Health Care
Dr.	Gabe	Kalmar	Executive Director of Operations	Genome BC
Dr.	Marla	Kiess	Cardiologist	University of British Columbia, Providence Health Care



Dr.	Darryl	Knight	Associate Director, iCAPTURE Centre for Cardiovascular and Pulmonary Research	University of British Columbia, Providence Health Care
Mr.	Patrick	Lauzon	Manager of Corporate Affairs BC	Merck Frosst Canada Ltd
Dr.	Scott	Lear	Associate Professor	Simon Fraser University
Ms.	Yvonne	Lefebvre	Vice President, Research & Academic Affairs	Providence Health Care
Dr.	Robert	Levy	Medical Director	Lung Transplant Program at the BC Transplant Society
Dr.	Sam	Lichtenstein	Division of CV Surgery	University of British Columbia, Providence Health Care
Dr.	Peter	Liu	Director	CIHR Institute of Circulatory and Respiratory Health (ICRH)
Ms.	Leah	Lockhart	Communications Specialist	Providence Health Care
Dr.	Heather	Manson	Vice President, Population Continuums	Vancouver Coastal Health
Ms.	Ivone	Martin	Vice President Development (Leadership Giving)	St. Paul's Hospital Foundation
Mr.	Scott	McDonald	Executive Director	BC Lung Association
Ms.	Anne	McLaughlin	VP, Strategic Communications & Donor Relations	St. Paul's Hospital Foundation
Dr.	Bruce	McManus	Director, Heart + Lung Institute	University of British Columbia, Providence Health Care
Ms.	Marnie	Mitchell	CEO	British Columbia Pharmacy Association
Mr.	Paddy	O'Reilly	CEO	Healthy Heart Society
Professor	Peter	Paré	Principal Investigator	University of British Columbia, Providence Health Care
Professor	Arden	Pope	Professor	Brigham Young University
Dr.	Alan	Rabinowitz	Cardiologist	University of British Columbia, Providence Health Care
Ms.	Linda	Revell	Vice President, Clinical Programs	Providence Health Care
Ms.	Nana	Rezai	Regional Medical & Research Specialist - Cardiovascular	Pfizer Canada Inc
Mr.	Brent	Sauder	Assistant Deputy Minister Ministry of Advanced Education	Research, Technology & Innovation Div., Province of British Columbia
Dr.	Andrew	Sandford	Principal Investigator	University of British Columbia, Providence Health Care
Dr.	Wan C.	Tan	Principal Investigator	University of British Columbia, Providence Health Care
Dr.	Scott	Tebbutt	Principal Investigator	University of British Columbia, Providence Health Care
Dr.	Chris	Thompson	Cardiologist	University of British Columbia, Providence Health Care
Dr.	Stephan	Van Eeden	Principal Investigator	University of British Columbia, Providence Health Care
Dr.	Nancy	Van Laeken	Chair, Department of Surgery at St. Paul's Hospital	University of British Columbia, Providence Health Care
Ms.	Johanna	Ward	Consultant	
Dr.	John	Yee	Thoracic Surgeon	University of British Columbia, Vancouver Coastal Health Authority

APPENDIX C – ORGANIZATIONS REPRESENTED AT THE SUMMIT

PROVIDENCE
HEART + LUNG INSTITUTE
AT ST. PAUL'S HOSPITAL
New solutions for health

www.heartandlung.ca