# Message from the Director

Vision, Mission, Core Values

## 2012 Highlights

- Insight: Stream
- Impact: Featured Publications
- Innovation: Introducing New Faculty
- Inspiration: The Next Generation of Health Researchers

## The Year in Review

- Thought Leadership
  - Faculty
  - Peer Reviewed Publications
  - Beyond 2000
  - The Canadian Cardiac Chronicle
- Services and Activities
- Clinical Trials
  - Site Network and Profile
  - Active Clinical Trials
- ECG Core Laboratory
- Biostatistical Analysis
- Population and Health Economic Outcomes
- Clinical Trial Portfolio

## CVC Operations

- Sources of Revenues
  - Clinical Trials
  - Grand Funded Projects
- Management Team
- Worldwide Collaborators

## Acknowledgements
There is genuine value in the production of an annual report. This is a good thing to remember, given the substantial time and effort required to produce it. Surveying a year of work on behalf of my band of brotherly and sisterly colleagues, this annual report gives me pause to reflect on what a great team of people we have that are committed to our common cause of enhancing cardiovascular health for current and future generations.

The theme of this year’s report “Charting a Course for the Future” is well aligned with our recent faculty and leadership advance. This annual strategic planning session helps us focus on future research and operational priorities. This year we employed the compass as a model to assist in setting our direction. Notice this compass shown opposite page 4 has an outer ring framed by four phrases we believe capture the context of our work:

1. Leading hearts and minds which echoes CVC’s tag line
2. Continuously innovating or exploring new paths to enhance the care of our patients but also finding new and better way of doing things
3. Ensuring our work has impact on cardiovascular health and on health policy and
4. Career development of our most valuable resource, our people.

Central to the compass and our entire organization is our purpose, to enhance cardiovascular health for current and future generations. Within the compass are four essential quadrants, the CVC vision and core values which were the product of a prior advance, and the two new quadrants are occupied by our promise which is how we propose others would see us and what commitments we aim to keep in fulfilling our purpose, and finally, what operational priorities we propose to live by to stay on course as we move forward.

Consistent with these strategic research priorities, the 2012 annual report reflects several key highlights of the past year:

- The culmination of over five years of collaborative work with many global partners was the unveiling of the STREAM trial. It has generated worldwide attention and widespread uptake by demonstrating the tremendous advantage of early pre-hospital treatment of heart attack patients. The results, which spill over into the first quarter of 2013, demonstrate a remarkably low mortality of these high-risk patients and highlight that there are two legitimate options for best care thereby providing excellent options to such patients worldwide and irrespective of where they live.
- Our work continues to be well reviewed in the peer-reviewed literature. Amongst the several publications of our faculty listed herein, seven have been chosen that are particularly noteworthy. They signify our commitment to the cycle of quality by exemplifying the compelling linkages between discovery science, novel clinical investigation and clinical trials. By taking creative approaches to enhancing cardiovascular care to the Alberta community, we have made a genuinely positive impact on mortality and hospital readmission rates in heart failure. We found an innovative statistical method to better understand the results of our research and that of others; this not only makes the work more efficient but also provides better insight into what it really means. We have identified a new approach to improve understanding of our patients symptoms and analytical models that enhances our ability to to predict the likelihood our patients will experience future events.
- I am delighted to formally announce the addition of Shaun Goodman, Professor of Medicine at the University of Toronto and Adjunct Professor of Medicine at the University of Alberta to our faculty. Shaun brings a wealth of expertise and experience and provides vital east-west collaborative link to our future. Readers of this report will appreciate excerpts from a recent interview that describes his philosophy and desire to participate in CVC’s future academic and research initiatives.
- Mentorship continues to be a fundamental part of our mission, and this year we highlight an interview with Heda Dinanata Maleki, a physician-trainee, who worked with us for a year on the STREAM project. Her insights and experiences are shared within this report. We continue to learn from our trainees and welcome others from within our own ranks and around the world to join us in pursuing our mission.

As we mark year 15 of CVC’s existence as a centre within the Faculty of Medicine and Dentistry, we are pleased to have a continuing and vigorous pipeline of ongoing cardiovascular projects. We are grateful for funding provided by our industrial partners as well as the Canadian Institutes of Health Research, the Heart and Stroke Foundation, Alberta Innovate-Health Solutions, the University of Alberta, and the Mazankowski Alberta Heart Institute and University Hospital Foundation.

The quality and quantity of our work is a tribute to an outstanding faculty, whose unique synergies catalyze our efforts and attract an energetic group of trainees that together comprise our promise for tomorrow. Operationalizing all of these ideas into reality takes a great team whose talents, commitment and personalities decorate this report.

To be a good sailor and know where you are going, you need both a chart and a compass. To read a compass you need to understand where you are and to what extent the magnetic forces of the earth deflect your compass away from a true north direction. So here in Edmonton our co-ordinates are 53°31'20" N & 113°31'14" W: however if you were to arrange to point your compass due north you need to know that it is actually pointing 15°1’ east of true north because of the magnetism of the earth’s core. From this metaphor emerged the theme “Recalibrating Our Compass” that we share here in this annual report, as it reflects our steadfast commitment and determined direction to lead novel cardiovascular research.

I heartily commend this year’s report to you so you may better understand who we are and what we do. In so doing I trust that the CVC spirit of crafting innovative solutions, inspiring the next generation of health professionals, seeking insight into the unmet needs of our patients and generating outcomes that have impact on health policy is clearly evident.

With kind regards,

Paul W. Armstrong, MD
**Vision**
Generate, translate and disseminate knowledge on novel diagnostic and therapeutic strategies in cardiovascular medicine acquired through collaborative research to enhance the health of the citizens of Alberta, Canada, and the world.

**Mission**
Aligned with the University of Alberta and the Mazankowski Alberta Heart Institute (MAHI), our mission is to:

- Design, conduct, analyze and disseminate findings arising from novel clinical research
- Interrogate clinical trial, registry and population health data to evaluate outcomes, identify unmet needs and inform future basic and clinical research directions
- Identify, inspire and nurture the next generation of health researchers and professionals.

**Quality**
Aspire to the highest standard of work while respecting a balanced life perspective. Attract, mentor and retain high-quality colleagues and collaborators with similar core values.

**Collaboration**
Promote and support an outstanding team that integrates a diversity of knowledge, experience, ideas, and skills supportive of our mission/vision.

**Intergrity**
Perform our roles in an ethical framework which enhances our reputation as honest, trustworthy and responsible.

**Respect**
Create an innovative, engaging and inclusive work environment appreciative of individual differences and contributions. Our workplace will be conducive to personal growth and development that is aligned with our overall mission.

**Operational Priorities**
- Collaborator and site retention through engagement
- Efficient project management
- Early on the ground
- Maximizing return on investment
- Linking trials/registries/populations

**Core Values**
- Quality
- Collaboration
- Integrity
- Respect
“We shall not cease from exploration, and at the end of all our exploring will be to arrive where we started and know the place for the first time.”

— T. S. Eliot
Paul Armstrong (left) is joined by Robert Harrison, who had a major heart attack two years ago and took part in the study.
STREAM (Strategic Reperfusion Early after Myocardial Infarction) represents the recent culmination of over five years of collaborative work relating to the recent successful late breaking trial ACC presentation by Frans Van der Werf (March 10, 2013) and publication of the STREAM Trial, N Engl J Med 2013; 368:1379-1387 DOI: 10.1056/NEJMoai1301092.

In this regard, we all owe a debt to our French colleagues who developed the SAMU system of emergency care and contributed the majority of patients to STREAM.

After exploring this first-hand early in 2000, Dr. Armstrong and his colleague and CVC faculty member Robert Welsh, MD undertook to lead the Edmonton Initiative within the local health community. Together, they adopted the approach first used in the ASSENT 3+ trial and then in another transforming Canadian trial of 300 patients called WEST, which provided a key stepping stone to STREAM.

In STREAM we achieved unprecedented short times to reperfusion namely 100 minutes from first medical contact to initiation of fibrinolysis in the field and 178 minutes to first coronary intervention in one half of the patients randomized to primary PCI. The results demonstrated remarkable similarity in efficacy with a trend towards less shock and heart failure in the early lytic treated group (approximately 1/3 of whom underwent rescue PCI; the remainder undergoing catheterization and as appropriate, coronary intervention within the first 24 hours). When we observed excess intracranial hemorrhage in the over 75 year group after approximately 21% of the enrolment, we reduced the dose of TNK by half with greatly improved safety and sustained efficacy.

STREAM is a milestone on a much longer journey in the care of patients with ST elevation myocardial infarction. Few individuals will have worked during the pre-reperfusion era, when in-hospital mortality from STEMI was 30% and cardiogenic shock, heart failure were common place. The remarkable 30 day mortality rate of 4.5% achieved in STREAM, is a tribute, not only to better understanding of MI pathophysiology, the development of novel molecular therapies and advances in PCI, but also the effectiveness of a cadre of multidisciplinary healthcare professionals working in teams, essential to ensuring maximal efficacy of our greatly advanced but time dependent therapies.

We salute our patients who willingly volunteered to participate in helping us define a most meaningful result.

We have much more to learn from STREAM, but, we must await the one year results of mortality to further establish the relative efficacy of both therapies. STREAM however was unquestionably a successful trial. It demonstrates that we have two viable therapeutic options for reperfusion in STEMI. Since one size does not fit all in the real world of STEMI care, reasoned clinical judgment is required to assess which strategy is most appropriate in each circumstance.

We are grateful to our many colleagues globally, our sponsor Boehringer-Ingelheim, and the leadership team in Leuven Belgium who supported this important trial. Finally, and most importantly we salute our patients who willingly volunteered to participate in helping us define a most meaningful result.
This trial (which began in 2008 and enrolled the last patient in July 2012), compared pre-hospital fibrinolysis followed by coronary angiography within 6-24 hours to primary percutaneous coronary intervention (PCI) in patients presenting with an acute ST-segment elevation myocardial infarction (STEMI) within 3 hours of symptom onset and who had at least 2mm ST-elevation in 2 contiguous leads. To be eligible these patients could not have accessibility to PCI within 1 hour. The primary end point of this trial was a 30 day composite of death, cardiogenic shock, congestive heart failure or reinfarction.

**STUDY PROTOCOL**

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<th>Strategy B: primary PCI</th>
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<td>&lt;75y: full dose</td>
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<td>≥75y: 1/2 dose TK</td>
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<td>Antiplatelet and antithrombin treatment according to local standards</td>
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**Ambulance (4h)**

- Aspirin
- Clopidogrel: LD 300mg + 75mg OD
- Enoxaparin: 30mg IV + 1mg/kg SC Q12h

**PCI Hospital**

- ECG at 80 min: ST resolution ≥50%
- angle >61 to 24 hours PCI/CABG if indicated
- immediate angio = rescue PCI if indicated
- Standard primary PCI

Primary endpoint: composite of all cause death or shock or CHF or reinfarction up to day 30

Armstrong PW et al NEJM 2013

**STREAM IN THE NEWS**

Fibrinolysis or Primary PCI in ST-Segment Elevation Myocardial Infarction

Paul W. Armstrong, M.D., Anthony H. Garsthick, M.D., Patrick Goldstein, M.D., Robert Wilcox, M.D., Thierry Danays, M.D., Yves Lambert, M.D., Vitaly Bulimov, M.D., Ph.D., Fernando Rosell Ortiz, M.D., Ph.D., Milorad Ostojic, M.D., Ph.D., Robert C. Welsh, M.D., Antonio C. Carvalho, M.D., Ph.D., John Nanas, M.D., Ph.D., Hans-Richard Arntz, M.D., Ph.D., Bignun Halvorsen, M.D., Ph.D., Kurt Huber, M.D., Stefan Grajek, M.D., Ph.D., Claudio Fresco, M.D., Erich Bluhmki, M.D., Ph.D., Anne Regelin, Ph.D., Karsten Vandenbergh, Ph.D., Kris Bogaerts, Ph.D., and Frans Van de Werf, M.D., Ph.D. for the STREAM Investigative Team


Edmonton study could set world standard for treating heart attack patients

http://www.edmontonjournal.com/search Edmonton+study+could+set+world+standard+for+treating+heart+attack+patients/8076145/story.html

Research suggest drugs may be as effective as angioplasty

http://edmtonon.ch/news.ca/video?playId=1116270

New hope for heart attack victims

http://www.torontonstar.com/2013/03/10/new-hope-for-heart-attack-victims

New study could change how heart attack patients are treated worldwide


Research excellence results in better care for heart patients

http://news.ualberta.ca/newsarticles/2013/march/research-excellence-results-in-better-care-for-heart-patients

Acute coronary syndromes. STREAMlining care for patients with STEMI

Bai A and Granger CB. Nat Rev Cardiol 2013 Jun;10(6):304-8

The following are selected highlights from a more extensive list of peer-reviewed publications that appear elsewhere in this annual report. They were selected because of their novelty, diversity and interest. In several instances they have been accompanied by editorials, an important signal by the journal in which they are published that they deserve special recognition and expert opinion drawing attention to the significance of the findings.

**FEATURED PUBLICATIONS**

The Core ECG Laboratory at CVC provides useful insight into our conduct of clinical trials and care of patients. In this study arising from the PLATO (A Platelet Inhibition and Patient Outcomes) trial, a study of over 6000 patients, we demonstrated that the extent of deviation of the ST-segment on the baseline ECG was independently associated with one year vascular death and recurrent myocardial infarction. Because no difference was evident in the resolution of baseline ST-segments after percutaneous coronary intervention, these data suggest that the active treatment i.e. ticagrelor, as compared with clopidogrel, probably prevented recurrent vascular events rather than their affecting reperfusion. In addition because ticagrelor seem to provide the greatest benefit amongst those who had the greatest resolution of their abnormal ST segments, this highlights a category of patient that may derive particular benefit from more powerful platelet inhibition.
For a long time our approach to assessing outcomes in clinical trials has involved measuring different outcomes such as mortality, heart attack, heart failure and shock and then adding them up and reporting the total event rate without reference to the relative importance. In this study by Bakal and coworkers which involved a collaboration of our newest faculty member Shaun Goodman, the importance of considering the relative severity of different endpoints and how this in turn led to a new perspective on the outcome of a clinical trial. This research adds genuine value to the way future trials should be analysed and thereby provides more meaningful and cost efficient results.

For a long time, the assessment of heart failure in clinical trials has been challenging. This has been especially true as it relates to objectively evaluating the cardinal symptom of heart failure, namely shortness of breath or dyspnea. In this study, Ezekowitz was able to capitalize on a clinical trial of acute heart failure by undertaking a careful substudy in over 400 patients from 37 participating institutions in Canada and the United States. By carefully monitoring and characterizing changes in shortness of breath with spirometry (an established measurement of lung and airway function used in patients with respiratory diseases), he was able to establish the clinical utility of this method thereby setting an important new platform for future studies of acute heart failure.
Kaul and colleagues have provided interesting new insights into the differences between men and women presenting with heart attack. It appears that the baseline electrocardiogram gives a better indication of the evolving nature of heart attack in women than men. Given that symptoms of heart attack in women tend to be less straightforward than those of men, this new data provides physicians with a new marker to better predict clinical outcomes of death, shock, and heart failure which may assist in the choice and timeliness of lifesaving reperfusion therapy.

Finlay McAlister led this key strategic effort examining the impact of the Alberta Cardiac Access (ACA) initiative which was implemented in early 2008. The program, aimed at enhancing access to specialized heart failure clinics after a heart failure event, has been associated with improvements in 30-day post-discharge mortality and readmission rates that has been climbing during the decade prior to the initiation of the program. Finally and especially germane in the health care resource constrained environment where we function, they identified that the benefits accruing to the patients had no negative impact on health care resource use.

Changes in Heart Failure Outcomes After a Province-Wide Change in Health Care Resource Use

Finlay A. McAlister, MB, BS, Geoffrey A. Bakal, MD, Paula Kaul, MS, Mehi Quan, MD, Robby Blackadar, MBBS, David Johnson, MD, Victor Fitchett, MB, BS, MA

Background. — The Alberta Cardiac Access (ACA) initiative was implemented during the period 2008 to 2010 to enhance access to specialized heart failure (HF) clinics after hospital discharge.

Methods. — We identified all adults hospitalized with a primary diagnosis of HF between April 2006 and December 2009. We used a validated algorithm of care processes and evaluated outcomes using interrupted time-series design. The period of rapid change was from 2008 to 2010, with an expected immediate increase in access, followed by a slower increase as the program settled into a new stable state in 2010. Outcomes include 30-day HF mortality, overall mortality, and hospital readmissions.

Results. — We found that the 30-day HF mortality, overall mortality, and total readmissions rates were reduced in all provinces after the ACA initiative. In Alberta, the reduction in 30-day HF mortality (2.2%, 95% confidence interval [CI] 0.7% to 3.7%, p = 0.004), overall mortality (2.4%, 95% CI 0.7% to 4.1%, p = 0.008), and readmission rates (1.8%, 95% CI 0.4% to 3.3%, p = 0.01) were greatest.

Conclusions. — A province-wide HF care intervention associated with improved outcomes after hospital discharge benefitted to a greater extent in a health care resource constrained environment where limited resources were available.

Online First 2013;16:53-58
Welsh reported on this study he led, in collaboration with colleagues from the Duke Clinical Research Institute and elsewhere, examining a novel platelet inhibitor called elinogrel. Whereas these P2Y12 agents have been available in oral form, few have been formulated for intravenous use and clinically evaluated. Given the limitations of current oral agents, this study demonstrated that elinogrel had an acceptable safety and tolerability profile as compared with conventional clopidogrel in patients undergoing percutaneous coronary intervention. This new work supports further development of this agent for the treatment of patients with ischemic heart disease.

Working with data acquired in over 5000 patients in the APEX-AMI trial, Westerhout and colleagues crafted a new approach to assessing risk and estimating mortality in 5 elevation myocardial infarction patients undergoing primary percutaneous coronary intervention.

Aims: Dynamic risk models quantify the risk profile of 5 elevation myocardial infarction (STEMI) patients over the acute period following the onset and heart rate clinical. Clinical practice and research.

Methods and Results: Multicenter medical records were developed in 7,619 STEMI patients undergoing primary percutaneous coronary intervention (PCI) while adhering to current guidelines. Risk factors included (i) baseline, (ii) 24 hours, (iii) 48 hours, and (iv) 96 hours. Co-varying Cox proportional hazards regression model, used to identify clinical factors contributing to risk. The 96-day mortality was 4.7%: The proportion of patients with 5, 10, and 50% 5-year survival rates were (47.2, 30.5, and 10.3%, respectively). A novel risk score categorized patients at low (0-10%), intermediate (11-20%) and high (≥21%) risk. The area under the receiver operating characteristic curve for the risk score is 0.87 and 0.89 for the patients with low and intermediate risk. Conclusion: This tool is useful for predicting the risk of future adverse events in 15,000 patients undergoing primary PCI in the acute setting and 5- to 5-year follow-up.
INTRODUCING NEW FACULTY
The Canadian VIGOUR Centre is proud to introduce to its faculty Shaun Goodman, MD. Based out of St. Michael's Hospital in Toronto, Ontario, Dr. Goodman has been a key partner and operational leader on several clinical trials managed by the CVC. In joining our faculty in 2012, he is the key to developing and implementing a brand new cross-Canada program for mentoring cardiovascular researchers. Dr. Goodman is committed to the knowledge transfer derived from clinical trials that lead to enhancements in quality of life and improved standards of care in cardiovascular disease. He has a pivotal role in fostering and inspiring the next generation of health researchers in Canada. Below, Dr. Goodman shares some responses to a recent interview, describing his interest, association and ongoing plans with the Canadian VIGOUR Centre.

Would you describe how you became involved with CVC or its faculty? I feel very privileged. I remember vividly the moment I met Dr. Armstrong. I was a first year cardiology resident on my very first day, and the small group of cardiology residents arrived at 0800 on Canada Day, July 1st many years ago! Now Dr. Armstrong wasn’t even on-call, and pretty much everyone else in the country was taking the holiday off! However, as the great role model he is, he made it clear that he intended to invest his full time and expertise in us—the “next generation”—and we, in turn, had an obligation to learn and work hard to provide the best care possible to our patients. I worked extremely hard that year, but everywhere I turned, I saw Dr. Armstrong working even harder (and longer hours) than me (talk about leading by example!). I also started one of my first research projects with him that year and 23 years later I know I wouldn’t be doing what I am today without having observed and experienced his exemplary “fire in the belly” interest and commitment in both the clinical and research arenas.

Dr. Paul Armstrong has been an outstanding mentor, colleague, and friend to me and I’ve had the good fortune to continue to collaborate with him on a number of research projects since he moved from my university-affiliated hospital in Toronto to the University of Alberta and established the CVC. We’ve worked together on a number of ECG Core Laboratory-based studies led by the CVC, and in addition, Dr. Armstrong connected me with Dr. Rob Walsh, Padma Kaul, and Cynthia Westerhout many years ago and we’ve enjoyed working together on a variety of national and international collaborations. So when Dr. Armstrong offered the chance to become more formally and extensively involved in the CVC’s many activities, I welcomed the opportunity to work even more closely with the CVC team.

What areas of clinical research interest you most? I have, and continue to be, extremely interested in the diagnosis, risk stratification, treatment, and prognosis of acute coronary syndromes. Beyond the acute, in-hospital management, I’ve also explored a number of strategies aimed at the secondary prevention of cardiovascular disease. In the last few years, in part because of my interest in antithrombotic drugs, I’ve also been engaged in research related to stroke prevention in atrial fibrillation. In the past few years, I’ve helped lead some studies in Canada that have looked at combinations and
permutations of “clot busting” and “anti-clotting” types of treatments.

I’m hoping that I can bring some experience in facilitating clinical trial-based research across Canada and internationally, including the provision of some leadership in important projects led by the CVC and in collaboration with Duke Clinical Research Institute colleagues. One example is the ongoing EXCEL trial of a novel, once-weekly therapy for patients with type 2 diabetes mellitus. I’m also excited about the recently initiated ODYSSEY Outcomes trial of a new twice-monthly cholesterol-lowering drug for patients recovering from a recent acute coronary syndrome that may provide additional benefit beyond the gold-standard statin treatment we currently employ. In addition to representing the CVC and serving as the National Leader, Dr. Armstrong enabled my joining the global Executive Steering Committee of the ODYSSEY trial.

Beyond our involvement in clinical research studies, we have a responsibility to translate evidence-based strategies into routine clinical practice.

I’ve recently taken on a more formal mentoring role at the University of Toronto as the Heart & Stroke Foundation of Ontario “Polo” Chair and I’m hopeful we can expand further upon the “V” for virtual in the acronym for VIGOUR (Virtual Coordinating Centre for Global Collaborative Cardiovascular Research) and capitalize on the enthusiasm and skill sets these fine young researchers possess. Indeed, I hope we can strengthen the cross-country relationships the CVC has fostered for many years and develop some new ones by engaging the “next generation”.

What do you consider to be your most important contributions to improving patient care? Beyond our involvement in clinical research studies, we have a responsibility to translate evidence-based strategies into routine clinical practice. I’ve learned it isn’t “enough” to perform a trial and then present and publish the results—we need to get whatever new information is important out to our peers in a manner that “fits” with their reality. This is especially critical if the research results involve a change from what we were taught in medical school or learned during our post-graduate training. In addition, there are often differences between patients and how they are cared for as part of a research project when compared to the “real” world. We therefore need to work with our peers across the country (and the rest of the world) to integrate whatever we’ve learned in an unbiased manner and in a way that is applicable and generalizable to the front-line health care providers. So some of my most important contributions to improving patient care have included some of the knowledge-translation programs I’ve been involved with the past few years where we get health care providers to measure and take stock of what they are doing, offer up some practical tips as to how implement new knowledge, and provide constructive feedback. We can do fantastic research but unless it gets translated into clinical practice, we’re not much further ahead in improving patient care.

Beyond our involvement in clinical research studies, we have a responsibility to translate evidence-based strategies into routine clinical practice.

“An ARO (Academic Research Organization) in my view possesses scholarly values of inquiry and truth, shares knowledge in an ethical framework, is dedicated to enhancing public health, and values discovery, novel approaches and methodologies over profit. It strives to achieve the operational efficiency of a contract research organization and is directly linked to patient care and the bedside. It is almost always embedded in a University, functions on a not-for-profit basis, is committed to the education of the next generation of professionals and fulfills its contract with society by emphasizing the public good.”

— Paul W. Armstrong, MD
The Next Generation of Health Researchers

Neda Dianati Maleki joined the CVC in March 2012 on a part time basis, as she continues her medical studies as a graduate student at the University of Alberta, and has worked with the CVC primarily in the capacity of the ECG Core Laboratory on the STREAM clinical trial and the PROACT projects. We are delighted that the manuscript (of which she is lead author) has recently been accepted by the AHA for the STREAM trial. Neda has taken a lead role in the interpretation of ECG’s on these projects, and in collaboration with the ECG Core Laboratory team, under the guidance of Dr. Armstrong, has made significant findings that have been recognized throughout the international research community. Neda shares her experiences and insights as a mentee with the CVC.

Why did you choose to work at CVC? As a medical graduate and a graduate student in clinical epidemiology, I was seeking an opportunity to develop my research skills through hands-on experience and to contribute in clinical research in the field of Cardiology under the guidance of experienced academics. I was also trying to build a strong resume to pursue my clinical career goals. I found CVC the best match to my needs.

CVC has a dynamic and vibrant academic environment. At CVC, experts from different disciplines are brought together to combine their unique perspectives and generate new research ideas. From my perspective, as a graduate student, this creates an ideal environment that facilitates interactions between trainees and world-class physician-scientists. As a student, you will gain experience in conducting clinical research at different levels. There is a strong spirit of cooperation at CVC and help and guidance is always provided to you. I personally have had one of the most valuable learning opportunities in CVC.

What did you learn during your time with CVC? Do you have any experiences based on your collaboration with CVC you would like to share? At CVC I was exposed to the excitement and enthusiasm of a research career. I had the chance to expand my knowledge and research skills into a range of fields including pathophysiology of cardiovascular diseases, the latest treatment strategies for STEMI, designing and conducting clinical trials, etc. Moreover, I was able to improve my understanding of the principles of biostatistics and to apply my theoretical knowledge, gained through graduate courses at U of A, in various projects. The experience provided me with excellent preparation for my application to residency programs in internal medicine.

What was most satisfying about your CVC mentorship experience? I enjoyed multidisciplinary research training at CVC under the supervision of dedicated mentors. Above all I had the pleasure and the honor to meet and work with Professor Paul W. Armstrong, an outstanding mentor to whom I owe a profound debt of gratitude for the guidance and insights he offered to me, and an inspiring speaker who influenced my thinking, he helped me to develop my critical thinking skills. I am, and will always be, deeply grateful for this invaluable experience at CVC.

Would you tell us about some significant advances that have resulted from your time at CVC? As a result of all the support, encouragement and advice I received from Dr. Armstrong, I was able to submit a successful application to a graduate medical training program in internal medicine and I will start my residency program in July 2013. Once again I am very thankful to him and I wish to continue my collaboration with CVC in future. I would like to acknowledge all the great people at CVC from whom I have worked and thank them for the opportunity to learn together as we work collaboratively in advancing cardiovascular research to better the quality of life, and outcomes for those suffering from cardiovascular disease.
“We can chart our future clearly and wisely only when we know the path which has led to the present.”

— Adlai E. Stevenson
Our CVC Faculty are internationally recognized as Thought Leaders in their respective areas of interest. They represent a unique and dynamic integration of clinical research. The approach begins by addressing unmet clinical needs through conducting rigorous clinical investigation and clinical trials of novel diagnostic and therapeutic interventions in selected areas of cardiovascular medicine. It extends from that pivot to knowledge gained through detailed registries of all patients in areas of particular interest and relevance to public health, namely Acute Coronary Syndromes and Heart Failure. Our group has been especially keen to explore better ways of analyzing the responses of patients to interventions by modeling their outcomes over time, taking account of the relative value patients put on differing outcomes and their implications for quality of life and health care costs. Finally we are well positioned to study health care outcomes at a population level for all Albertans to assess how well new advances are being applied and whether they are making a meaningful difference.

Dr. Ezekowitz’ research interests include:
- Testing the impact of drugs and processes of care for acute heart failure patients;
- Novel interventions for patients with chronic systolic and diastolic heart failure;
- The impact of comorbidities such as atrial fibrillation, anemia and hip fractures;
- Knowledge gaps for drugs and devices in heart failure.

Dr. Goodman’s research interests include:
- Facilitating clinical trial, observational, and knowledge translation research in cardiovascular disease in Canada with a focus on:
  - Diagnosis, management, and prognosis of acute coronary syndromes;
  - Optimal stroke prevention risk stratification and management in atrial fibrillation; and,
  - Primary and secondary prevention of cardiovascular disease.

Dr. Welsh’s research interests include:
- Acute Coronary Syndromes and Interventional Cardiology
- Cardiovascular disease and diabetes
- Exercise physiology and cardiac physiology
- Pre-hospital management of STEMI and the interaction of pharmacological (antithrombotic and fibrinolytic) and mechanical interventions (primary and rescue angioplasty)

Dr. Kaul’s research interests include:
- International differences in practice patterns and outcomes;
- Sex differences in treatment and outcomes of cardiovascular disease;
- Issues related to access and delivery of care at a population level; and
- Health economics.

Dr. McAlister’s research interests include:
- Outcomes research in hypertension, heart failure, perioperative care, and coronary artery disease
- Clinical epidemiology methodology with a focus on evidence-based medicine and implementation of evidence at the bedside
- Methodology of trials and systematic reviews
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Beyond 2000

In October 2012, CVC hosted our 18th annual ground breaking symposium New Concepts in Acute Coronary Syndromes: Beyond 2000 held in conjunction with the Canadian Cardiovascular Society and Congress and supported by unrestricted educational grants from Astra Zeneca and Eli Lilly. As has been our tradition with this symposium, we were pleased to have partnered with the Mazankowski Alberta Heart Institute, and University of Alberta in undertaking this venture which probes new avenues in acute coronary syndromes and also address the role of novel technologies amidst the brave new information age in which we work. Since all of us who practice cardiovascular medicine in Canada are tasked with ensuring that we make sensible choices and take into account the best allocation of limited resources while at the same time delivering high quality cardiovascular care, the symposium addressed all of these matters head on.

Our International Symposium concluded with a future look at the opportunities in clinical research elaborated by Eric Peterson, the newly appointed Chief Executive Officer of the Duke Clinical Research Institute (DCRI). The DCRI remains an important continuing collaborative partner in our education and research initiatives. To ensure the high quality presentations and video dialogues with key speakers is preserved from this legacy event; we have established a web site: www.Beyond2000.org that is now available for your viewing under the “Continuing Conversation” banner. Assuredly, this was a memorable educational experience.

Sunday, October 28, 2012, 8:00 a.m. - 12:00 p.m.

Program Description

This program will be comprehensive and explore broad and novel concepts relating to the large cross section of patients with ACS. Specifically, it will evaluate how to incorporate new technologies and a dynamic approach to risk modeling in order to better stratify the spectrum of these disorders. Novel pathways involved in antithrombotic therapy of ACS will be addressed. The complex navigation through the antiplatelet therapy maze will be discussed. An emphasis on quality of care and its application to cardiovascular medicine, as well as the dilemma involving best allocation of resources in an economically constrained healthcare environment will be presented. Finally, the impact of recent and evolving clinical trials as it relates to the ever changing face of ACS will be undertaken.

Learning Objectives

After attending this symposium participants will be able to:
1. Identify new technologies, including a dynamic approach to risk modeling for better stratification of ACS.
2. Evaluate novel pathways involved in coronary thrombosis and current antithrombotic therapies.
3. Describe a logical strategy for the use of anti-platelet therapy.
5. Evaluate the best cost-effective management in ACS therapy.
6. Describe how to incorporate recent ACS clinical trials into their practice.

This accredited symposium was co-developed and planned to ensure the evidence presented is valid, objective and balanced.
The Canadian VIGOUR Centre is recognized as a thought leader and valuable partner in cardiovascular research across all regions of Canada and amongst key centres around the world. Its track record of conducting, delivering and publishing insightful and unbiased research and health outcomes is strongly influenced by clinical practice and health care.

**THOUGHT LEADERSHIP**
- Provide expert advice and promotion of cardiovascular research characterized by quality, scholarship and integrity
- Define unmet needs for patients with and those at risk of cardiovascular diseases
- Align new cardiovascular research with these unmet needs
- Seek cost-effective solutions and enhance return on investment in research
- Trial architecture, development, data acquisition, integration, analysis, presentation and peer-review publication
- Creation of novel substudies aimed at mechanistically informing primary clinical trial results
- Monitoring junior faculty, medical trainees, students and allied health professionals

**POPULATION AND ECONOMIC HEALTH OUTCOMES RESEARCH**
- Collection of resource utilization and cost data
- Development of economic models
- Cost-effectiveness analyses
- Clinical Registry development

**BIOSTATISTICAL ANALYSIS**
- Design of research protocols and studies
- Development of statistical analysis plans and database specifications
- Data management
- Programming expertise in SAS and R
- Generation of statistical tables, figures and listings and interpretation of findings
- Consultation and execution of advanced statistical methods
- Development and application of novel statistical methods

**EGC CORE LAB**
- Informing trial design
- Monitoring protocol adherence
- Guiding mechanistic insights
- Prognosis and outcomes assessment

**SERVICES AND ACTIVITIES**
The Canadian VIGOUR Centre is recognized as a thought leader and valuable partner in cardiovascular research across all regions of Canada and amongst key centres around the world. Its track record of conducting, delivering and publishing insightful and unbiased research and health outcomes is strongly influenced by clinical practice and health care.

**CLINICAL TRIALS**
- Investigator selection, qualification and recruitment
- Investigative site start-up and training
- Ensuring site regulatory compliance
- Project, Site and Data management
- In-house and onsite clinical monitoring (including bilingual services)
To date, the CVC has participated in 49 cardiovascular clinical trials (Phase II and Phase III) and studies, with enrollment of over 284,830 patients globally, of which over 19,018 patients were from Canada. These patient enrollment figures consistently meet or exceed anticipated and representational enrollment relative to national populations of other countries around the world. CVC’s success in consistently meeting enrollment targets stems in large part from the strength of our relationships with our site network (more than 229 sites across Canada), comprised of over 425 Principal Investigators (PIs).

A barometer of our operational success and our ability to deliver on our promise of quality to each of our stakeholders is our ability to recruit sites to participate in multiple, non-competing trials. Increasingly, our site network is reflective of our involvement in cardiovascular trials involving diabetes, as the metrics on the following page indicate. In profiling our site network, we note the range in specialty of our PIs, their geographic distribution across Canada, as well as their repeated involvement and collaboration in trials managed by the CVC.

Dedicated to quality assurance, the CVC Clinical Trial team, works closely with our sites across Canada to ensure timely and accurate data collection, collaborative problem solving, patient safety, and audit preparedness. This requires up to date Standard Operating Procedures (SOPs) and CVC utilizes a web application platform as a collaborative tool to share key metrics with our myriad stakeholders, and to reflect our achievement of trial milestones.

In 2012, the CVC provided project management, site management and monitoring for six clinical trials, and other associated ancillary studies, and some of which are local initiatives such as PRDACT, which were developed by our faculty. These trials and projects are summarized in the following pages, and reflect the purpose, scale, and timelines for each. The Clinical Trial group, led by Tracy Temple, is comprised of experienced Project Leads, administrative staff, Halina Nawrocki, our Lead CRA, along with monitoring report reviewers and six contracted monitors based regionally throughout the country.

Our Project Leads are responsible for liaising with sites in Canada, reporting internally to the Assistant Director of Clinical Trials and reporting externally to sponsors and academic partners. They answer questions related to the protocol, patient eligibility, data queries, and study drug. In their roles, they are responsible for monitoring trends and identifying issues associated with the trial, ensuring patient recruitment targets are met, ensuring data quality is maintained, and reporting trial status to key project stakeholders on a timely and consistent basis. The Clinical Trial team also works to ensure regulatory is reviewed, logged and filed appropriately, monitoring plans are adhered to, databases with both demographic and trial related documentation are maintained and are up to date.

Our work in clinical trials is both informed and enriched by connectivity to regional, provincial and national registries and population outcomes databases.
**TECOS**

**Trial Evaluating Cardiovascular Outcomes with Sitagliptin**

**DESCRIPTION:** Randomized, placebo controlled clinical trial to evaluate cardiovascular outcomes after treatment with sitagliptin in patients with Type 2 diabetes mellitus and inadequately glycemic control

**CLINICALTRIALS.GOV:** NCT00790205

**SPONSOR:** Merck & Co. Inc

**DRUG:** Sitagliptin

**ANTICIPATED TIMELINE:** August 2008 – June 2015

**STATUS:** Target enrollment reached now in patient retention and event accrual stage.

**481/14,000**

**PATIENT ENROLLMENT TARGET (CANADA / GLOBAL)**

**589/14,745**

**PATIENT ENROLLMENT ACHIEVED (CANADA / GLOBAL)**

**28/681**

**NUMBER OF SITES PARTICIPATING (CANADA / GLOBAL)**

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**STREAM**

**Strategic Reperfusion Early After Myocardial Infarction**

**DESCRIPTION:** Open label, prospective, randomized, parallel and comparative international multi-centre trial comparing the efficacy and safety of a strategy of early fibrinolytic treatment with tenecteplase and additional antplatelet and antithrombin therapy followed by catheterisation within 6-24 hours or rescue coronary intervention versus a strategy of standard primary PCI in patients with acute myocardial infarction within 3 hours of onset of symptoms.

**CLINICALTRIALS.GOV:** NCT00623623

**SPONSOR:** Boehringer Ingelheim, Hoffman LaRoche & Sanofi-aventis Canada Inc.

**DRUG:** Tenecteplase

**ANTICIPATED TIMELINE:** August 2007 - September 2013

**STATUS:** Database Locked, 1 year follow up and closing out sites

**300/2,000**

**PATIENT ENROLLMENT TARGET (CANADA / GLOBAL)**

**92/1,915**

**PATIENT ENROLLMENT ACHIEVED (CANADA / GLOBAL)**

**4/134**

**NUMBER OF SITES PARTICIPATING (CANADA / GLOBAL)**

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**IMPROVE IT**

**IMProved Reduction of Outcomes: Vytorin Efficacy International Trial**

**DESCRIPTION:** A multicenter, double-blind, randomized study to establish the clinical benefit and safety of Vytorin (ezetimibe/simvastatin Tablets) vs. simvastatin monotherapy in high-risk patients presenting with acute coronary syndrome

**CLINICALTRIALS.GOV:** NCT00202878

**SPONSOR:** Merck & Co. Inc

**DRUG:** Vytorin

**ANTICIPATED TIMELINE:** March 2005 - December 2014

**STATUS:** Target enrollment reached now in patient retention and event accrual stage.

**500/18,000**

**PATIENT ENROLLMENT TARGET (CANADA / GLOBAL)**

**602/18,142**

**PATIENT ENROLLMENT ACHIEVED (CANADA / GLOBAL)**

**36/1,519**

**NUMBER OF SITES PARTICIPATING (CANADA / GLOBAL)**

---

**EXSCEL**

**Exenatide Study of Cardiovascular Event Lowering**

**DESCRIPTION:** A randomized, placebo controlled clinical trial to evaluate cardiovascular outcomes after treatment with exenatide once weekly in patients with type 2 diabetes mellitus.

**CLINICALTRIALS.GOV:** NCT01144338

**SPONSOR:** Amylin Pharmaceuticals, LLC & Eli Lilly and Company

**DRUG:** Exenatide

**ANTICIPATED TIMELINE:** May 2009 - December 2017

**STATUS:** Actively enrolling

**248/9500**

**PATIENT ENROLLMENT TARGET (CANADA / GLOBAL)**

**120/5,565**

**PATIENT ENROLLMENT ACHIEVED TO DATE (CANADA / GLOBAL)**

**18/436**

**NUMBER OF SITES PARTICIPATING (CANADA / GLOBAL)**
Proact

2012 sees the continuation of a long standing transformative clinical research project known as PRoACT (Providing Rapid Out of Hospital Acute Cardiovascular Treatment), which CVC initiated within the Edmonton region. This project builds on the success of our initial research in pre-hospital care for patients with ST-elevation myocardial infarction (STEMI) and the VHR (Vital Heart Response Registry) program that coordinated STEMI care in a seamless and collaborative fashion. We embarked on this faculty initiated project to extend the lessons learned to high risk non-ST elevation acute coronary syndromes which actually are more common than STEMI and possess a greater disease burden, and secondly, to acute heart failure, for which new therapy is desperately needed. In both these syndromes, like STEMI, delay from symptom onset to hospital evaluation is significant and novel diagnostic biomarkers are now available to help at an earlier point in care to help decide on more accurate diagnosis, and to contribute to better risk stratification and ultimately best appropriate triage and early care.

With the leadership of Drs Justin Ezekowitz and Robert Welsh, we continue to collaborate in this city-wide program involving the leaders from all hospitals as well as their emergency departments. One of the innovative features of this program is the installation of specialized biomarker meters that allow for measurement of cardiac troponin (a sensitive marker of myocardial injury) and brain natriuretic peptide (a sensitive marker of heart failure). Two hundred and fifty paramedics have been trained and 25 meters installed in the ambulances that facilitate the above-mentioned measurements.

CVC gratefully acknowledges seed research funding from the University Hospital Foundation and the Mazankowski Alberta Heart Institute, as well as in-kind support from Alere Inc., in the form of meters and related materials. We remain committed to ongoing collaborations with these partners within our community to advance acute cardiac care.

Stability

The STabilisation of Atherosclerotic plaque By Inhibition of darapLadib Therapy

DESCRIPTION: Randomized, placebo-controlled, double-blind, parallel group, multicenter, event driven trial. A Clinical outcomes study of darapladib vs placebo in subjects with chronic coronary heart disease to compare the incidence of major adverse cardiovascular events

ClinicalTrials.gov: NCT00799903

Sponsor: GlaxoSmithKline Pharmaceuticals

Drug: Darapladib

Anticipated Timeline: September 2008 - December 2013

Status: Start up and actively enrolling.

Odyssey Outcomes

Trial to study the Occurrence of Cardiovascular Events in Patients Who Have Recently Experienced an Acute Coronary Syndrome

DESCRIPTION: A randomized, double blind, placebo-controlled, parallel group, multicenter, event driven trial. A Clinical outcomes study of darapladib vs placebo in subjects with chronic coronary heart disease to compare the incidence of major adverse cardiovascular events

ClinicalTrials.gov: NCT01663402

Sponsor: Sanofi-aventis Recherche & Développement

Drug: SAR236553/REGN727

Anticipated Timeline: June 2012 - March 2018

Status: Start up and actively enrolling.
The aim of our ECG Core Laboratory is to translate research results into information useful for clinical applications. Using the ECG parameters to generate an improved understanding of the pathophysiologic processes involved in ACS enables improvements in managing cardiac patients, prediction of outcomes, and further stimulates cardiovascular scientific research.

In 2012, the ECG Core Lab at the CVC continued its tradition of conducting quality analyses using clinical research data. The Core Lab has accumulated a wealth of experience in its readers and continues to mentor and train the next generation of talented researchers. To date, ECGs from over 67,976 patients, enrolled in studies around the world, have been analyzed. This provides a rich database for additional substudies, analyses and research. The main projects for the ECG Core Lab in 2012 were STREAM, J-Point project and PROACT-3.

The ECG Core Laboratory continued with the analysis of ECGs for the STREAM trial. The examination of these ECGs includes the determination of ST deviation (area at risk), ST resolution (as marker of myocardial repair fusion) and QRS Scoring (for infant size) in patients experiencing Acute Myocardial Infarction (AMI). The Core Lab also provides central adjudication for patients with rescue PCI to determine whether they have met the clinical indication for this procedure. The results of this process are then communicated to global investigative sites, providing timely feedback during the ongoing enrollment phase of the study.

The STREAM trial makes use of online technology for both the uploading and submission of ECGs. The investigative site is able to upload the electronic ECG photo file and once the process is complete, it is instantaneously available for download by ECG Core Lab staff at the CVC.

In 2012, the ECG Core Lab was involved in PROACT-3, the third stage of the PROACT project, which is detailed in an earlier section of this report. A key component of this project is the timely recognition of patients’ needs, and how best to direct health resources for better and more efficient patient care. Our ECG Core Lab has continued their important role in analyzing the ECGs derived from this project, which will contribute to a database rich in information about outcomes of local Edmonton patients under current practices, and how we can change practice and redirect health care resources to improve patient outcomes for those suffering from acute coronary syndromes and heart failure.

The core lab has a long history of assuring the accuracy and precision of ECG analysis through inter- and intra-reader variability and reliability testing, double data entry procedures, and hard copy and electronic storage and backup procedures.

The J-Point Project, began in 2011, was designed by CVC ECG Core Lab to establish optimal measurement points on ECGs with respect to feasibility, applicability and inter-observer agreement. In addition, the prognostic relevance of this measurement would be determined by correlating the data with outcomes measures from a large sample of clinical trial data from a previously completed study. This project involved the collaboration with two other experienced, well-respected ECG Core Labs at the Duke Clinical Research Institute and the St. Louis University. The results of the first phase of the J-Point Project seeded the second ongoing phase in which we are testing the inter-reader reliability on the application of the universal definition of myocardial infarction in a broad spectrum of acute coronary syndromes (ACS) patients.

Number of ECGs analyzed by CVC from 67,976 patients:
190,694

The ECG Core Laboratory includes the determination of ST deviation (area at risk), ST resolution (as marker of myocardial repair fusion) and QRS Scoring (for infant size) in patients experiencing Acute Myocardial Infarction (AMI). The Core Lab also provides central adjudication for patients with rescue PCI to determine whether they have met the clinical indication for this procedure. The results of this process are then communicated to global investigative sites, providing timely feedback during the ongoing enrollment phase of the study.

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The ECG Biostatistics Group works with clinician investigators to conduct innovative clinical research in cardiovascular medicine in collaboration with local, national, and international researchers. This research focuses on the assessment of patient, environmental and process-of-care factors and their association with outcomes in patients with acute coronary syndromes, acute and chronic heart failure, cardiac arrest, arrhythmias, and diabetes. Areas of interest include: international and regional differences, time to treatment, use of pharmacologic and mechanical interventions, resource allocation and utilization, and gender/sex and age differences in relation to clinical outcomes. Services provided by CVC’s biostatistical team include data management, development of statistical analysis plans and database specifications, programming expertise in SAS and R, generation of statistical tables, figures and listings and interpretation of findings, and consultation and execution of advanced statistical methods.

There are two main data sources on which academic research projects are based: (i) clinical trials and (ii) population-based databases and registries. The CVC houses databases from 27 clinical trials, which provide a rich cache of patient characteristics, ECGs, treatment and outcomes. The CVC also has access to population-based data for over 500,000 Alberta patients seeking cardiovascular medical care between the fiscal years 1999/2000 and 2009/2010, as well as those participating in the following registries or studies:

- Vital Heart Response Registry (over 25,000 patients)
- ASCEND-HF Registry (over 890 patients)
- PROACT Retrospective Cohorts (over 550 patients)

In 2012, the Biostatistics Group participated in numerous studies based on clinical trial or population based data, utilizing a variety of statistical techniques. These ranged from survival analysis and metaanalysis to a novel analysis of composite endpoints in STEMI trials (i.e., weighted composite endpoint). The latter has garnered increased interest from various stakeholders and remains a key area of research.

In keeping with a key component of the CVC mandate, members of the biostatistics team contribute to monitoring the next generation of cardiovascular researchers. They work closely with medical students, residents and other junior researchers to explain the statistical techniques used and their interpretation.
POPULATION AND ECONOMIC HEALTH OUTCOMES RESEARCH

In the last decade over half a million Albertans have been diagnosed with heart disease, which accounts for the second highest number of deaths in the province annually. Ongoing technological advances in the treatment of acute coronary syndromes and heart failure make it essential to examine whether the use of these expensive drugs and devices is equitable and to assess their impact on current and future costs of cardiac care in Alberta. The CVC Outcomes Group (led by Drs. Kaul, Ezekowitz and McAlister) has been actively involved in using health care administrative data to examine issues related to access, delivery, treatment, and outcomes of heart disease in Alberta and Canada.

Administrative databases have become a cornerstone in the process of assessing performance and providing feedback to improve quality of health care delivery at a population level. Using administrative data received from Alberta Health, the CVC Outcomes group has developed an integrated longitudinal database linking inpatient, outpatient (including emergency department), physician office, pharmaceutical claims, registry, vital statistics and census data for all Alberta residents with heart failure, acute coronary syndromes, nonacute ischemic heart disease, cardiac arrhythmias and congenital heart disease between 1999 and 2009 in Alberta. To compare practice patterns and outcomes in Alberta with those in other Canadian provinces, we have acquired Canadian Institutes of Health Information data on all acute care hospitalizations for these five conditions for the same time period. Our extensive portfolio of research projects based on these data includes examining the following: socioeconomic and urban/rural differences in access to treatment and outcomes; outcomes among vulnerable populations such as women, the elderly, and ethnic minorities; the association of risk factors and use of evidence-based therapies on long-term outcomes; impact of alternative levels of care; resource utilization and costs of care; validity and reliability of disease coding; and novel methods to risk stratify patients.

Although administrative data have the strength of being population based and are the best type of data for disease surveillance and health system evaluation, they are limited by their lack of clinical detail. Linking administrative databases to population level clinical registries overcomes this limitation.

A major goal of the CVC Outcomes group is to identify, inspire, and train junior faculty and students in the analysis of linked administrative healthcare databases. Trainees and junior faculty continue to feature prominently in our projects. Health outcomes research has been identified as an area of strong potential by the Faculty of Medicine and Dentistry: the Patient Health Outcomes Research and Clinical Effectiveness (PHORCE) Institute, directed by Dr. Finlay McAlister is a Faculty of Medicine and Dentistry initiative to engage health outcomes researchers in collaborative, interdisciplinary health research projects. As the leading cardiovascular outcomes research group, the CVC continues to interact extensively with other chronic disease groups such as Alliance for Canadian Health Outcomes Research in Diabetes (ACHORD) and the Alberta Kidney Disease Network (AKDN).

One of the major strengths of the CVC Outcomes group is its core of well-trained research personnel. The CVC Outcomes group consists of several biostatisticians and analysts who are extremely well trained in linking clinical and administrative databases, developing and validating algorithms, conducting analyses, and identifying and developing new statistical methods for administrative data.
Sources of Revenue

Revenues from industry sponsored clinical trials
January 1, 2012 - December 31, 2012

Peer Reviewed Grant Funding

<table>
<thead>
<tr>
<th>Project</th>
<th>Sponsor(s)</th>
<th>Grant Holders</th>
<th>Term</th>
<th>Total Granted CAD</th>
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</thead>
<tbody>
<tr>
<td>Providing Rapid Out of Hospital Acute Cardiovascular Treatment (PROACT)</td>
<td>Mazankowski Alberta Heart Institute and University Hospital Foundation</td>
<td>Paul Armstrong (PI), Justin Ezekowitz, Padma Kaul, Finlay A. McAlister, Robert Welsh</td>
<td>2010 - 2013</td>
<td>$325,000</td>
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<td>SODIUM HF</td>
<td>Alberta Health Innovation Solutions</td>
<td>Justin Ezekowitz</td>
<td>2012-2015</td>
<td>$50,000</td>
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<td></td>
<td>University Hospital Foundation</td>
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<td>Acute Heart Failure – Emergency Management</td>
<td>Canadian Institutes of Health Research</td>
<td>Justin Ezekowitz</td>
<td>2009-2012</td>
<td>$129,000</td>
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<td>Team Grant: Diastolic Heart Failure</td>
<td>Alberta Innovates-Health Solutions</td>
<td>Jason Dyck (PI), Todd Anderson, Justin Ezekowitz</td>
<td>2009-2014</td>
<td>$5,000,000</td>
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<td>Cardiac Chemoreceptors in Heart Failure</td>
<td>Heart and Stroke Foundation</td>
<td>Michael Stickland (PI), Justin Ezekowitz</td>
<td>2009-2012</td>
<td>$112,700</td>
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<td>Evaluating the impact of a Province Wide Disease Management Program on Heart Failure Outcomes in Alberta</td>
<td>Canadian Institutes of Health Research</td>
<td>Finlay A. McAlister (PI), Padma Kaul, Justin A. Ezekowitz, H. Quan</td>
<td>2010-2013</td>
<td>$116,765</td>
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<td>Long-term health outcomes of mothers with gestational diabetes mellitus and their children in Alberta</td>
<td>Canadian Institutes of Health Research</td>
<td>Padma Kaul (PI)</td>
<td>2009-2013</td>
<td>$100,000</td>
</tr>
</tbody>
</table>
MANAGEMENT TEAM

DIANNE PAYEUR, MBA, B.Com
Assistant Director
Dianne directs the CVC Business office and manages all aspects of finance, human resource management, strategic planning, IT infrastructure, marketing, and legal matters involving vendors and collaborative partners for CVC managed clinical trials and grants. Her oversight of CVC operations has led to several key process improvements, and has contributed to ensure CVC is an engaged and trusted partner for all service offerings.

CYNTHIA WESTERHOUT, PhD
Assistant Director, Biostatistics
Senior Research Associate
Cynthia’s research interests include novel risk stratification techniques and risk adjustment procedures in acute coronary syndromes and heart failure. In addition to research and publication activities, she provides statistical oversight and consultation to the CVC Biostatistical Group, medical residents and students and serves as the biostatistics representative for CVC Faculty, management team and to the Global VIGOUR Group and other external groups.

TRACY TEMPLE, RN, BSc
Assistant Director, Clinical Trials
Tracy has a SOCRA Certified Clinical Research Professional designation, and oversees the day to day functions of our Clinical Trial team. With extensive experience in managing Phase III industry sponsored clinical trials within CVC, she works to establish and implement standard operating procedures, ongoing training initiatives, and quality controls on all of our projects. Tracy has an excellent rapport with our sites, and works closely with our collaborative partners to ensure needed consistency in Canada on global projects.

HALINA NAWROCKI, RN, CCRA
Lead Clinical Research Associate
Halina is responsible for managing the monitoring activities for all CVC clinical trials. She oversees training of CRAs, and study site personnel to ensure adherence to the protocol and investigational plan, data integrity, accurate source documentation, compliance and adherence to applicable regulatory requirements, and accurate storage and disposition of investigation product and study supplies. She is a valued representative of CVC during site audits, and an excellent ambassador for CVC within our site network.

WORLDWIDE COLLABORATORS

Professeur Philippe Gabriel Steg,
Département de Cardiologie
Hôpital Bichat, Assistance Publique - Hôpitaux de Paris

Brazilian Clinical Research Institute
São Paulo, Brazil

Duke Clinical Research Institute
Durham, USA

Estudios Clinicos Latinoamérica Rosario, Argentina

Green Lane Coordinating Centre
Auckland, New Zealand

Flinders Medical Centre
Adelaide, Australia

Leuven Coordinating Centre
Leuven, Belgium

National Health and Medical Research Council – Clinical Trials Centre
Sydney, Australia

Trials Argentina Group Organization
Buenos Aires, Argentina

Uppsala Clinical Research Centre
Uppsala, Sweden
“Never doubt that a small group of thoughtful, concerned citizens can change the world. Indeed it is the only thing that ever has.”

— Margaret Mead
ACKNOWLEDGEMENTS

CVC gratefully acknowledges and thanks:

- the CVC faculty, external advisors and collaborators for their contributions and for providing ongoing research opportunities, we look forward to providing continued services and to future collaborations;
- the CVC staff and management for their dedication, professionalism, excellent contributions and ingenuity that enhances the quality of our research work;
- our mentees for their commitment and enthusiasm as the next generation of researchers;
- the sponsors, without their financial support these trials and educational activities would not be possible;
- Dianne Payeur and Jennifer Krieger for their time and dedication required to produce this report;
- Kathy Watts and Bryan MacNeill from Watts Communications for the concept and design;
- Photographer Stephen Wreakes for many of the images enclosed in this report;
- McCallum Printing Group Inc. for their service in printing this report and our Chronicle;
- and importantly, the patients, for their willing participation in trials, they are the heroes of clinical research.