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UNIVERSITY OF OTTAWA
HEART INSTITUTE
INSTITUT DE CARDIOLOGIE
DE L'UNIVERSITÉ D'OTTAWA

THE BEAT™

A COMPENDIUM OF INFORMATION ABOUT THE UNIVERSITY OF OTTAWA HEART INSTITUTE

HIGHLIGHTS

The Beat has brought you landmark research findings, innovative strategies for the delivery of medical care, and all the latest about cardiovascular medicine at the Heart Institute.

(from Catching Up on Past Stories from The Beat, page 4)

As a budding cardiologist, I was excited at the prospect of working at one of the world's most advanced cardiovascular institutes, but concerned about how much hands-on experience I would obtain. My concern was short-lived.

(from Medical Training: A View from Abroad, page 6)

This year's event, entitled "Decisions, Decisions, Decisions: Launching Your Career," included practical information on clinical and research careers, networking opportunities and viewpoints on where cardiovascular practice and research are headed.

(from Heart Institute Experts at Trainee Day, page 3)

The University of Ottawa Heart Institute once again played a major role. With nearly 100 program items, Heart Institute staff were particularly well represented in the areas of imaging, surgery, nursing, and the presentation of clinical practice guidelines.

(from UOHI at the Canadian Cardiovascular Congress, pages 1–3)

IN THIS ISSUE

The Beat is published by the University of Ottawa Heart Institute (UOHI). Comments or questions about *The Beat* should be directed to Jacques Guérette, Vice President, Communications, at 613-761-4850 or jguerette@ottawaheart.ca. For more information about UOHI, please visit www.ottawaheart.ca.

The University of Ottawa Heart Institute is proud to celebrate the 20th issue of The Beat! To commemorate the event, we are experimenting with a new edible edition adorned with the cover from the very first issue. Let's hope it's heart healthy! See our update on stories from past years on p.4 and find out what has happened since they were first published.

UOHI at the Canadian Cardiovascular Congress

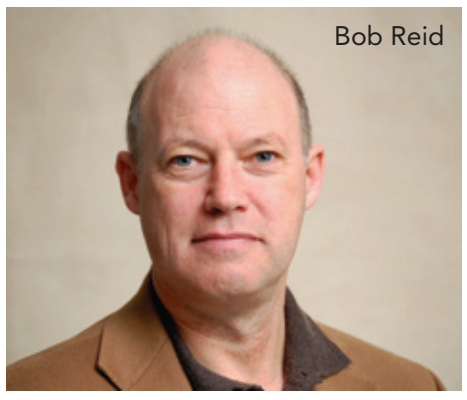
The 2009 Canadian Cardiovascular Congress (CCC) was held this year from October 24–28. The Edmonton event was well-attended and offered an excellent program full of scientific advances and discussions on topics relevant to cardiovascular research and care. The University of Ottawa Heart Institute once again played a major role. With nearly 100 program items, Heart Institute staff were particularly well represented in the areas of imaging, surgery, nursing, and the presentation of clinical practice guidelines.

Behavioral Science and Cardiac Rehabilitation

On the first full day of the Congress, the Canadian Association of Cardiac Rehabilitation's annual Terry Kavanagh Lecture was delivered by Bob Reid, Associate Director of the Heart Institute's Minto Prevention and Rehabilitation Centre. Reid used the lecture, named for one of the pioneers of cardiac rehab, to survey what he saw as the top five advances in behavioural science that have impacted the field. His well-received talk looked at the neurobiology of addiction, social ecology, the psychology of motivation, the science of happiness, and the endocrinology of social relationships.

Nicotine is an incredibly strong addictive substance and tobacco use is the single greatest modifiable risk factor for heart disease. We now understand the mechanisms of nicotine addiction and that the brains of smokers are shaped by tobacco use. Nineteen per cent of the populace, or 5 million Canadians, are smokers, making cessation a high-priority target for cardiovascular prevention.

We have also learned that circumstances and environment affect how people act as much as do personal will and initiative. The obesity epidemic is a good example of how social ecology impacts people. Cultural shifts in convenience, cheap high-calorie food, and sedentary work and home environments all conspire to promote weight gain. Cardiac rehab, Reid explained, needs to build supportive environments, give patients tools to achieve their goals and help them successfully transition back to their daily lives.


Bob Reid

Additionally, patients report being happiest at the point of initial treatment, become less so six months out, and then gradually gain ground. Men start happier, but do not recover fully, while women are less happy at hospitalization, but tend to match or exceed initial happiness. Rehab tends to attract happier people. Rehab programs need to be better at getting to the rest of the patient population and psychosocial interventions need to foster happiness as well as deal with negative emotions.

(continued on page 2)

(UOHI at the Canadian Cardiovascular Congress, continued)

Finally, Reid addressed social relationships. People who are married or have strong social connections do better following a cardiac event. Oxytocin is a hormone released from the pituitary gland. Research has shown that, among other things, it reduces anxiety and promotes social behavior and bonding. There is a possibility that oxytocin could be used to facilitate increased socialization in patients lacking such social support.

A New Imaging Network

The Canadian Atherosclerosis Imaging Network (CAIN) is an ambitious national initiative to advance the imaging of coronary artery disease. While the network links an expanding number of clinical sites, now at 45, funding was obtained by a small group of leading centres including the University of Ottawa Heart Institute. Total current funding is $38 million. In a workshop session, features of the network were outlined.

Likely the only initiative of its kind in the world, CAIN will support team-based clinical trials and has established a series of core laboratories for arterial and organ imaging. Member organizations will have access through these facilities to any necessary imaging technology. In addition, the network will support data coordination, establish biomarker, genetic and pharmacogenetic banks, and conduct proteomic and metabolomic analyses. Three initial CAIN projects were summarized. Dr. Rob Beanlands, head of the Heart Institute's National Cardiac PET Centre, discussed a large-scale collaboration that will develop and assess vascular imaging using PET, CT, MRI and 3-D ultrasound.

Awards

The Heart Institute swept the runner-up category this year for the Canadian Cardiovascular Society Young Investigator Awards. Dr. Lisa Mielniczuk was chosen in Clinical Science for her work in right ventricular heart failure. As medical director of the Pulmonary Hypertension Clinic, Dr. Mielniczuk is well aware that patients seen there often die from right ventricular heart failure rather than pulmonary hypertension. She was recognized for her work exploring the relationship between right ventricular function and metabolism.


Dr. Darryl Davis

In Basic Science, Dr. Darryl Davis was selected based on his research into cardiac stem cells, conducted under renowned expert Dr. Eduardo Marban at the Cedars-Sinai Heart Institute in Los Angeles. Dr. Davis received his cardiology training at the Heart Institute before leaving to conduct his post-doctoral research. He has recently returned to the Heart Institute as a full staff member and is in the process of establishing his lab.

At the other end of her Heart Institute career, retiring Nursing Manager Marlene Adam received the Honorary Lifetime Member Award from the Canadian Council of Cardiovascular Nurses. Adam, who has worked at the Heart Institute for 28 years, received the award at the organization's Annual General Meeting. Her dedication and energy will be missed.

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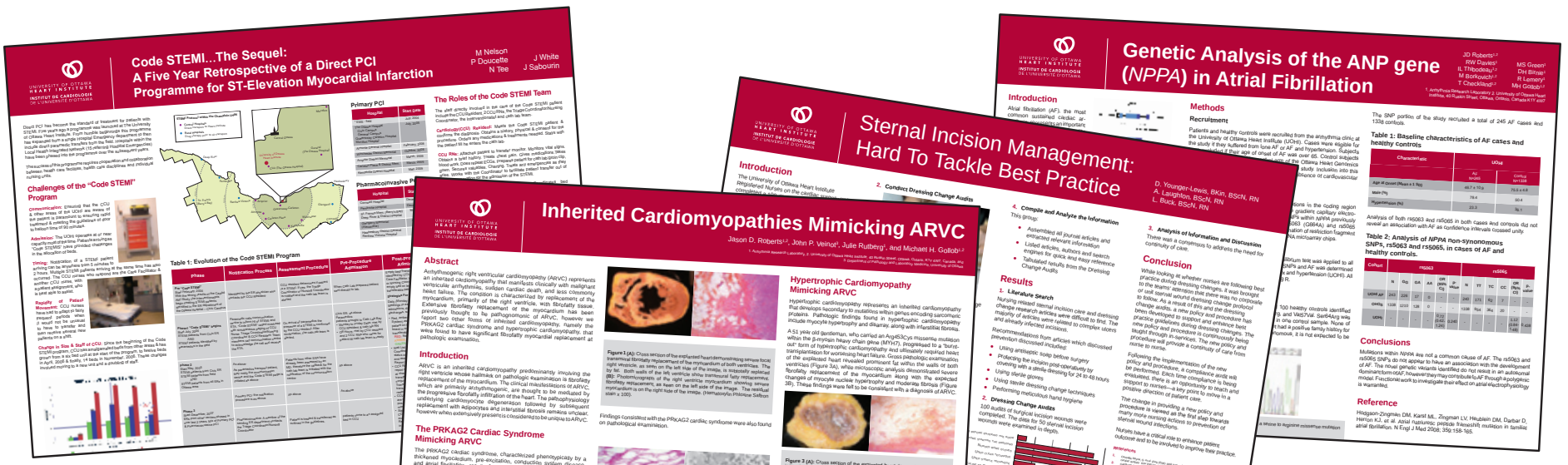


A wealth of Heart Institute posters covered many different research topics.

Guidelines, Guidelines, Guidelines

A remarkable number of guidelines and position statements were issued or presented at the Congress this year—10 in all. Several were presented by Heart Institute staff.


Dr. Ruth McPherson

Cholesterol

As part of a panel of experts involved in their development, Dr. Ruth McPherson, Director of the Lipid Clinic and Atherogenomics Laboratory, was given the task of presenting the 2009 CCS Canadian Cholesterol Guidelines. The new guidelines have simplified primary target levels and made them LDL-centric. Framingham risk scores have been modified because they previously underestimated risk in women and young individuals. Additionally, APO-B, a component of LDL cholesterol, has been introduced as an alternate primary indicator. Interestingly, the data supporting the inclusion of APO-B came heavily from Canadian research.

In the case study discussions that followed, it was emphasized that, for low and moderate risk patients, the decision to go on treatment is one that should not be taken lightly as it will have a significant impact on their lives. In these cases, the audience felt that patient preferences should be taken into account. It became clear that in borderline cases, even with guidelines in hand, medicine is as much art as science and comes down to the judgment of individual physicians.

Genetic Testing

Recommendations for the use of genetic testing in the evaluation of inherited cardiac arrhythmias associated with sudden cardiac death were presented by Dr. Michael Gollob. Dr. Gollob is Director of the Inherited Arrhythmia Clinic and Research Laboratory. This first-ever document provides a series of disease-specific guidelines for the use of genetic testing, as determined jointly by Canadian Cardiovascular Society and the Canadian Heart Rhythm Society.

Diagnoses of inherited arrhythmia disorders can be difficult. While the diseases are potentially deadly, genetic tests are expensive. A basic principle for the development of the guidelines was whether the use of genetic testing for a particular condition would enhance patient care. It was emphasized that genetic counselling should be provided prior to testing to address factors such as familial and psychosocial issues.

Cardiac CT

The Consensus Training Standards for Cardiac CT, prepared jointly by the Canadian Association of Radiologists and the Canadian Cardiovascular Society, represent a unique collaboration between cardiologists and radiologists. The standards were presented by Drs. Benjamin Chow and Carole Dennie, Co-directors of Cardiac Radiology.

The standards establish three levels of progressively advanced training. Satisfaction of these standards does not confer certification to practice. But because the reading of cardiac CT scans can be challenging, the authors wanted to ensure that the proliferation of the technology is accompanied by appropriate expertise.

Risk Factor Management

C-CHANGE, which stands for Canadian Cardiovascular Harmonized National Guidelines Endeavour, is an initiative led by the Canadian Institutes of Health Research and the Public Health Agency of Canada. The effort arose from the Canadian Heart Health Strategy. It seeks to harmonize and integrate existing guidelines for risk factor management for the prevention of cardiovascular disease. Panelists spoke on specific aspects of C-CHANGE, including Dr. Andrew Pipe, Chief of the Division of Prevention and Rehabilitation, on smoking cessation guidelines.

The integrated guidelines will be both patient-centred and practical for caregivers. To achieve this goal, the initiative will develop innovative tools to assess risk, define goals and ensure treatment to them, and track adherence and follow-up. These may include care maps, decision algorithms, smart phone applications, and decision sharing tools for patients and families. The intention is to proactively provide appropriate information to healthcare professionals, patients and patient organizations.

(UOHI at the Canadian Cardiovascular Congress, continued)

Cardiac Nursing

The Heart Institute's cardiac nursing corps are leaders in implementing successful nurse-driven programs designed to smooth the delivery of care, increase operating efficiency and free more time for other nursing responsibilities. This point was driven home in sessions throughout CCC. Heart Institute nurses are front and centre in this area because of applied technologies in novel programs such as cardiac telehome care to monitor discharged cardiac patients from home and anticoagulation management for patients who receive blood thinners to prevent stroke.

Lorraine Clark discussed these services which employ interactive voice response (IVR) technology that automatically contacts patients by telephone at regular intervals, delivering a pre-set list of questions. These question trees are designed to ensure that patients follow the all-important to-do list for medication, monitor for side effects and proper dosage, and provide reminders for follow-up appointments. The IVR technology also enables nurses to establish and update a patient database with information on medical history, medications, co-illnesses and other details.

Other sessions focused on successful nurse-managed programs. Carolyn Pugliese presented on the Pulmonary Hypertension Clinic and Joanne Morin presented on the Adult Congenital Heart Disease Clinic. Clinic activity is carefully organized in terms of appointments, tests, medication, follow-up, and scheduling coming procedures. With the advance work done, patients have more time with the cardiologist during a regularly scheduled appointment and gaps in care are closely monitored.

Screening Athletes

The Canadian Heart Rhythm Society brought together a panel of experts to discuss the necessity of screening of athletes for risk of arrhythmia and sudden cardiac death. The subject has received a great deal of attention in the last few years given the publicity surrounding high-profile sports figures who succumb during training and competition. Moderated by Dr. Martin Green and including Dr. Kwan-Leung Chan, the panel addressed several aspects of the topic.

First, delegates learned of the risks of sudden cardiac death in young, competitive athletes engaged in high aerobic activities such as football, hockey and soccer. The risk of death for athletes is significantly lower than for the general population, and considerable ethical and logistical questions would have to be dealt with if broad-based screening were to be implemented. How would athletes be policed if they were deemed to be unfit based on abnormal echocardiogram results? Is enforced testing of athletes cost effective, and who would pay for or sponsor the testing? Athletes in Italy are routinely screened and Italian sports authorities are rigorous in managing these test programs. The only major North American sports organization that has any routine procedure in place is the National Hockey League, which screens all potential draftees.

The Heart and the Brain

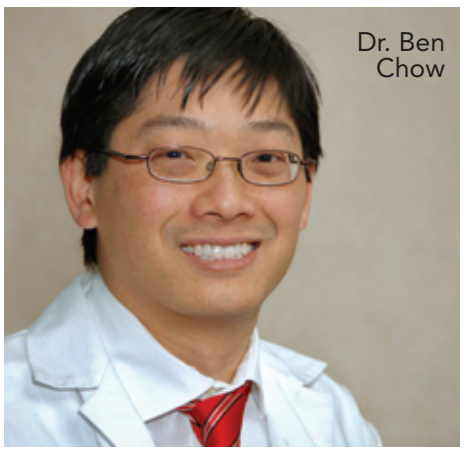
Among interesting sessions presented by other cardiovascular professionals was a joint Canada-U.S. symposium dealing with the mind-body connection as it relates to stress and heart disease. Two prominent U.S. researchers in particular discussed the effects of personal tragedy, catastrophic events and other triggers that appear to lead to cardiovascular disorders—notably heart attack.

Psychiatrist Dr. Joel Dimsdale of University of California, San Diego, looked at physical, psycho-social and behavioural reactions to a range of events from care of severely ill partners and earthquakes to problems at work and traffic jams. Research has shown stress is a serious enough factor to affect heart function in a number of as yet unexplained circumstances. Additionally, the effects of stress interventions such as meditation practices and fitness levels play an important role in reducing the severity of those effects on the heart. One definitive result of research to date, Dr. Dimsdale said, is that the heart serves as a sentient organ that can sniff out and sense stress in every corner of a person's life.

Cardiologist Dr. Robert Kloner of the University of Southern California is also Director of Research at the Heart Institute of Good Samaritan Hospital in Los Angeles. From a mechanical perspective, Dr. Kloner's research interests involve cardiac function. But as part of his interest in preventive cardiology, Dr. Kloner has studied triggers of acute risk factors that lead to the onset of coronary artery disease. A long list of trends and patterns, he showed, appear to leave a trail of severe heart attacks. These include weather changes such as heavy snow, holiday events such as Christmas and Thanksgiving (over eating, increased salt consumption, sedentary behaviours, boosted alcohol levels), lack of sleep, anxiety, major sporting events, high pollution rates and emotional upheaval. Anger, Dr. Kloner noticed, can trigger a heart attack within one to two hours making the notion of counting to 10 for a cool-down a very sensible response to a potentially deadly situation.

All in all, CCC 2009 was another successful venue for Heart Institute research and expertise. Special thanks go once again to Dr. Rob Beanlands for his work as Chair of the Scientific Program Committee. Next year we will have a shorter trip when we head to Montreal.

Heart Institute Experts at Trainee Day


Dr. Ben Chow


Erik Suuronen

Cardiovascular Trainee Day is a regular part of the Canadian Cardiovascular Congress. It offers a range of career development sessions for trainees across all levels and disciplines. This year's event, entitled "Decisions, Decisions, Decisions: Launching Your Career," included practical information on clinical and research careers, networking opportunities and viewpoints on where cardiovascular practice and research are headed. Several Heart Institute staff members shared their experience and expertise in sessions throughout the day.

Dr. Benjamin Chow spoke in "Imaging and Clinical Cardiology," a session that surveyed the roles of various imaging modalities in diagnosis. Dr. Chow discussed positron emission tomography (PET) and computed tomography (CT) while other speakers addressed echocardiography and magnetic resonance imaging (MRI).

In weighing relative advantages, the speakers indicated that echo is best for functional imaging and overall flexibility, CT is best for anatomical imaging, and PET is strongest for metabolic imaging and strong in functional imaging. MRI is very strong across all imaging applications, but comes with significant disadvantages in complexity, cost and availability. Looking ahead, imaging will move to combining modalities in single images in order to provide more comprehensive data for improved diagnostic accuracy.

From a career perspective, the panel encouraged trainees who are good with visual information to consider a specialization in imaging. All speakers agreed that imaging trainees should master two modalities. This approach will give trainees more flexibility and career options without spreading their knowledge too thinly. The panel also recommended looking for institutions that encourage strong cross-communication and training between radiology and cardiology.

In "The Role of Imaging in Research," Rob de Kemp, Head Imaging Physicist, told trainees that the value of imaging in research is to aid the development and evaluation of new therapies. Small animal imaging provides a bridge between basic science and human trials and is highly translatable to clinical practice. Non-invasive imaging also allows researchers to follow disease progression in individual subjects that can act as their own controls.

De Kemp and his co-presenter then detailed the technical capabilities of cardiac PET, CT and high-resolution ultrasound along with research examples. In another session, Dr. Darryl Davis, recently recruited to the Heart Institute, discussed the use of models of ischemia (loss of blood flow) in translational research.

Surgeon Marc Ruel spoke on the Canadian job market from the perspective of an academic clinician, in "What Are Your Career Options after Completing Training?" The session offered participants practical advice for both the institutional setting and private practice. Other career-focused sessions looked at obtaining grant funding, publishing in high impact journals and conferences, and designing and launching multi-centre research trials.

Trainee Day closed with two presentations by Erik Suuronen, a scientist well recognized for his accomplishments as a young researcher. He spoke first on "State-of-the-Art Tissue Engineering Research." As he explained, the heart has the ability, albeit limited, to repair damaged tissue by stimulating the release of stem cells. The goal of Suuronen and many others is to augment this response so as to regrow or revascularize damaged tissue. Researchers are exploring a variety of cell types and methods to boost the effectiveness of regenerative processes. These include the development of bio- and synthetic materials to encourage cell attachment and growth and the use of various factors to increase stem cell release and longevity.

Suuronen then joined the keynote panel to discuss technological advances that are impacting the future of cardiovascular medicine. While Suuronen extended his discussion of stem cell research, other speakers addressed potential futures in the operating room.

Heart surgery has progressed from the heart pump to beating heart procedures to small incisions to endoscopic procedures. A group from London, Ontario is using robotics to increase precision and reduce invasiveness. They have developed hybridized interventions that bring together the surgical theatre and catheterization lab, reducing the exposure of patients to multiple invasive procedures. The group has found that the combination of robotics and hybridization can reduce scarring, shorten hospital stays and recovery times, and decrease the incidence of infection and neural complications.

In a move to merge diagnosis and treatment, a brain surgery team from Calgary has brought MRI into the operating room. With a robotic system designed specifically to work with MRI, they are applying failsafe software and "no-go zones" to increase safety for highly sensitive procedures. They are also looking at targeted staining techniques that could let robots completely excise all desired tissue, such as cancer cells or rupturing arterial plaques, without fear of leaving some of it behind.

Catching Up on Past Stories from The Beat

To mark both the 20th issue of The Beat and the beginning of its fifth year of publication, we have decided to take a look back at some of the major stories of the past four years. Over that time, The Beat has brought you landmark research findings, innovative strategies for the delivery of medical care, and all the latest about cardiovascular medicine at the Heart Institute. Read on to see how some of our major advances of recent years have continued to evolve and have an impact.

Boldly going where no surgeon has gone before

In 2006, The Beat ran an article featuring Dr. Marc Ruel's efforts to help patients with advanced heart disease and who have no options left. These were patients with extremely diseased arteries—so much so that bypass was not an option—or who had already had several bypass operations. Dr. Ruel proposed to use their own cells to repair the damaged blood vessels. He called it Star Trek medicine and he said that one day it is sure to happen.

"The real Star Trek medicine will be a patient who will have some of their cells isolated, hopefully from the blood and not the bone marrow, and we will expand them in the lab, re-inject them and those cells will go where they are needed," he said.

One of the challenges Dr. Ruel was facing was the fact that 99 per cent of the cells, when injected, die. He was investigating a biopolymer gel that could protect the cells within the first days after transplantation, making it more likely that they would survive.

Another possibility Dr. Ruel mentioned was that there wouldn't be a need to inject stem cells. Instead, the solution might involve injecting a special molecule, such as L-selectin, a molecule that helps capture cells in tissue and blood as part of the immune system's line of defence. The molecule would be injected into the damaged area of the heart and would attract stem cells to that area. Dr. Ruel just wasn't sure where the ultimate solution might come from. Either way, though, regeneration of the heart was a certainty.

While he focussed on regeneration of blood vessels, the story noted, other researchers elsewhere were investigating regeneration of the heart muscle itself. But Dr. Ruel was placing his bets on the blood vessel route—and he was confident of eventual success.

"It could be five years, or it could be 15 years. But there is tremendous potential for regeneration of the heart," he said.

UPDATE: Since then, Dr. Ruel and his colleague, Erik Suuronen, have made a number of advances in the regeneration of blood vessels in damaged muscle tissue. This year, their work on a "smart" biomaterial that helps attract and maintain progenitor cells at the site of damage gained a good deal of attention following publication in the FASEB Journal. The news announcement drew international attention and interest in this work.

Exceptional quit-smoking program offers new hope

More than 44 per cent of participants in a Heart Institute smoking cessation program were still smoke-free six months and more after the program ended, according to a story published in The Beat in 2007. The Ottawa Model, developed at the Heart Institute, was being hailed as a new national model for use across the country, the story said.

"The Ottawa Model leads to a significant increase in long-term cessation rates," said Dr. Andrew Pipe, Director of Prevention & Rehabilitation.

The Ottawa Model is a hospital-based program involving a unique combination of consultation and intervention, information, follow-up and feedback. All new medical residents and nurses are provided with training on how to manage tobacco dependency, while smokers admitted to hospital are identified and treated with support from a designated nurse counsellor and stop-smoking aids. Patients receive assistance to develop a quit plan and, at discharge, are provided with guidance on a smoking withdrawal program and assorted materials, including nicotine replacement therapy, if needed. Patients are then contacted at home three times a month for six months after discharge by a unique call system that tracks the patient's progress using a detailed series of questions. At any indication of trouble, a nurse counsellor calls to help get the patient back on track, including referrals to the Heart Institute's outpatient smoking cessation clinic.

Two health districts, one in New Brunswick and one in British Columbia, had adopted the Ottawa Model to incorporate smoking cessation into their standard of care, the story reported. Over time, the Ottawa Model was expected to provide a means of establishing comparable standards and practices across the country, encouraging medical units to collaborate more closely to further reduce smoking among Canadians.

"We're willing to contribute our experience and share our knowledge with anyone, anywhere, especially when addressing this important preventive health practice," said Dr. Pipe.

UPDATE: The Ottawa Model has since been implemented in over 50 Canadian hospitals and is being adopted internationally. More than 6,000 Canadians are smoke-free thanks to the program. In January 2010, the second annual conference devoted to the Ottawa Model will be held, not surprisingly, in downtown Ottawa.

Is there a doctor in the house?

The patient's house, that is. In 2007, The Beat reported on a home monitoring program meant to ensure patients remain healthy after discharge and continue to follow their after-care instructions.

"Patients want to age at home. They don't want to go elsewhere," said Christine Struthers, the Advance Practice Nurse who manages cardiac telehealth at the Heart Institute. "Our program provides a connection to the Heart Institute for an extended period of time after discharge. Patients are able to stay at home. They are able to participate in their own care and this provides them with added control of their own lives to a large extent."

The program—personalized telemedicine—was started in 1998, a response to the dramatically shorter stays in hospital that had become a feature of care for many cardiac patients. A pilot project that ran until 2003 found a significant drop in hospital re-admissions and emergency care among patients receiving the distance care. The pilot project was so successful, it was launched as a full program, with newer and more portable home monitoring equipment.

Participating patients perform the monitoring function—including stepping on the scale and answering a series of questions—at a prearranged time each day; information is transferred to the Central Monitoring Station at the Heart Institute. The equipment is programmed for eight languages, including English and French. It is used, not only by patients at the Heart Institute, but also patients at clinics in other centres in Eastern Ontario.

"This program was targeted at patients with chronic congestive heart failure and chronic angina, but we're now getting away from specific diagnoses," says Struthers. "It's really for any patient who requires daily monitoring of their 'status trends.'"

The story noted that the Heart Institute was in the process of developing a regional cardiac telehome monitoring program, permitting patients to avoid long-distance travel to Ottawa.

Telehome monitoring has been shown to reduce hospital readmission by 54 per cent. This means emergency department visits are avoided, saving up to $20,000 per patient.

UPDATE: Telehome monitoring has since been shown to reduce hospital readmission by a dramatic 54 per cent for heart failure patients in the six months following discharge. This means emergency department visits, readmission and additional hospital stays are avoided, saving up to $20,000 per patient.

Fresh approach leads to dramatic mortality reductions in high-risk patients

A new protocol developed at the UOHI has cut the death rate among high-risk heart patients, according to a 2007 story in The Beat. The protocol trains paramedics to interpret the results of an electrocardiogram, or ECG, to identify a particularly severe kind of heart attack, called an ST-elevation myocardial infarction, or STEMI. If a STEMI is confirmed, the paramedics bypass the local emergency room to deliver the patient directly to the Heart Institute, where a cardiology team will be waiting to perform an emergency angioplasty, quickly opening blocked arteries to improve blood flow and oxygen to the heart. The protocol is also applied to patients arriving directly at hospital emergency rooms.

The STEMI Protocol was the result of close collaboration between a complex web of front-line health-care workers, including paramedics, cardiologists, hospital physicians and support staff, the article reported, and involved four Ottawa areas hospitals.

Between May 2005 and May 2006, the first full year of operations, a total of 344 STEMI patients were transported to the Heart Institute, including 209 patients transferred from city hospitals and 135 patients transported directly by paramedics. A study published in the American Journal of Cardiology in November 2006 showed a dramatically reduced mortality rate among patients sent to the Heart Institute.

"We have always been aware of the importance of time in getting to heart attack patients," said cardiologist Dr. Michel Le May, who developed the protocol based on several studies conducted throughout the 1990s and whose ideas were based, in part, on principles established by Napoleon Bonaparte's chief surgeon. The research showed that angioplasty was more effective and less costly than using a clot-busting drug, the usual response at emergency rooms.

"Now, the entire metropolitan area has gone primary PCI [immediate angioplasty]—very different from the way it worked before," said Dr. Le May. "This is a cost-effective program that has reduced mortality in high-risk patients and with many positive impacts, such as a shorter length of time in hospital. This strategy is also helping to reduce the burden on emergency rooms and critical care units, where beds and resources are in high demand."

UPDATE: Based on the ongoing success of the Heart Institute's STEMI protocol, the program was extended in 2009 to cover all of the Champlain Local Health Integration Network (LHIN). This made it the first district-wide emergency protocol in Ontario.

Finding the first path to a heart attack

Also in 2007, The Beat reported on the discovery by Heart Institute researchers of a genetic risk factor that increases the risk of heart disease by up to 40 per cent, regardless of other risk factors such as cholesterol, blood pressure and diabetes.

The discovery means that people at high risk of heart disease (because they have the genetic variant) can be identified early and take preventive action, including lifestyle changes and medication, to reduce their risks. The discovery could also, one day, lead to new treatments to prevent heart attacks by targeting the wayward gene.

Dr. Ruth McPherson, Director of the Lipid Clinic and Lipid Research Laboratory worked with researchers at the University of Texas Southwestern Medical School to analyze the DNA of 1,300 patients and 1,500 healthy controls. The results showed that the genetic variant accounts for about one-fifth of the incidence of heart attacks in individuals of European descent, and one-third of early-onset cases.

"Science has excellent insight as to how to cope with environmental factors such as obesity, but genetic influence on heart disease is less clear. The Heart Institute is targeting these questions," said Dr. Robert Roberts, Heart Institute President and CEO.

"Lifetime risk for heart disease is one in two for men and one in three for women," added Dr. McPherson. "If we can identify genetic factors that influence heart disease risk over and above known risk factors, we can do a better job of identifying those people who will benefit most from early intervention to reduce their risk." The study is thought to be the first genome-wide scan to search for coronary heart disease genes.

UPDATE: The discovery of this contributor to heart disease, known as 9p21, has been confirmed by other research teams and marks the first major risk factor discovered since cholesterol. The importance of the find has been hailed in the international research community. This year, Dr. McPherson and colleagues published initial findings on the mechanism through which the gene increases risk.

New imaging technology holds diagnostic promise

Later in 2006, The Beat told readers of a new $1.9 million imaging system installed in February 2006 – the first high-volume, state-of-the-art scanner in Canada dedicated to cardiac care. The computerized tomography, or CT scanner, uses a computer and x-rays to create cross-sectional "slices" of the heart, rendered in three dimensions. The system, the article said, had the potential to revolutionize cardiac diagnostic medicine.

Normal, "slower" CT scanning can't be used for cardiac imaging because the heart is in constant motion, always beating. The new imaging system is so fast that it gets its pictures within a heartbeat – capturing "still" images of a beating heart. This scanner can create 64 thin slices – and the thinner the slice, the higher the resolution of the image. Using sophisticated image processing tools, a physician can manipulate the images for closer inspection from different vantage points. The higher resolution also makes it easier to map the vascular system and soft tissue surrounding the heart.

The story highlighted a series of research studies underway at the Heart Institute investigating the potential for using CT imaging as a faster and less invasive alternative to tests such as cardiac catheterization. Cardiac catheterization involves threading a tiny catheter through a blood vessel to the heart. It takes 15 to 40 minutes to perform and requires the patient to stay in hospital for four-to-six hours to recover once it's done. A cardiac CT scan, on the other hand, takes only seven-to-ten seconds and provides images with extremely high accuracy, revealing, for instance, the presence of calcification in the arteries—a sign of atherosclerosis, or hardening of the arteries.

Not only is cardiac catheterization more invasive, the story reported, it has a long waiting list. The Heart Institute conducts some 5,000 cardiac catheterizations each year, the story reported, and replacing some of them with the CT scan could go a long way to reducing waits.

"The whole premise here is serving our patient population with the latest technology and reducing wait lists to the shortest possible times," said cardiologist Dr. Benjamin Chow, co-director of cardiac radiology at the Heart Institute. The story noted that the challenge now facing the Heart Institute was to discover how to translate the vast amount of data produced by the new scanner into improved patient care.

UPDATE: In the years since this article was published, cardiac CT has become an invaluable tool to view the structure of the heart and its arteries and is showing promise as a non-invasive replacement for angiography. With the technology now becoming available at more centres throughout Canada, Dr. Chow and his radiology colleague Dr. Carole Dennie have helped to develop national training guidelines for cardiac CT. (See the "Guidelines, Guidelines, Guidelines" section of the CCC highlights roundup in this issue.)

Canada's first cardiac autopsy guidelines

The sudden death of a young person is always a shock. Families want to know why, but sometimes even an autopsy can't tell them. Not only are they frustrated and mourning, they themselves may be at risk of an unidentified threat to their own health.

In 2008, The Beat reported on the recent approval by the Ontario government of cardiac autopsy guidelines to help diagnose the cause of sudden deaths and to facilitate, when appropriate, genetic screening of family members who may also be at risk.

The guidelines were developed in a collaborative effort initiated at the Heart Institute in partnership with the Office of the Chief Coroner of Ontario and other medical experts in the province. The guidelines are the first standardized protocol in Canada outlining what to do when someone under 40 suffers an unexplained cardiac death.

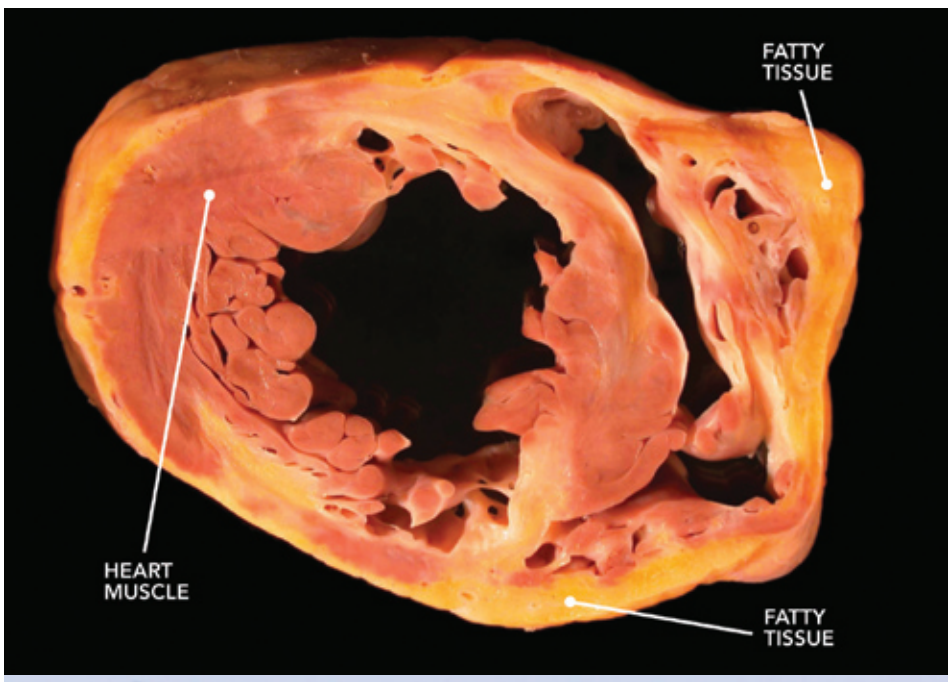
As many as 100 youths 18 and under die in Ontario each year from no apparent cause that can be determined by standard autopsy. Often, these deaths occur in otherwise-healthy individuals who have exhibited no previous symptoms. Many of the deaths are due to cardiac arrhythmias—problems with the electronic circuitry of the heart. The trouble is, once the heart has stopped beating, there is no record in the tissue of the irregular heart beat. So researchers at the Heart Institute developed the idea of a genetic autopsy.

"We now can genetically test for a variety of arrhythmia conditions," said Julie Rutberg, a Heart Institute genetic counsellor and a member of the team that developed the guidelines. "We can't identify all causes, but we can diagnose 20 to 30 per cent, and that number grows every year."

The Guidelines for the Investigation of Sudden Cardiac Death do two things. First, they specify a standard protocol for investigation of the heart, more extensive than those employed in a regular autopsy, to exclude conditions that may leave evidence in the organ tissue but would otherwise go unnoticed. Second, the guidelines provide direction to pathologists on tissue collection and storage to enable DNA extraction and subsequent genetic screening.

"As part of our public health mandate, this is an important step in identifying and protecting families at risk," said Andrew McCallum, then coroner for eastern Ontario, now Chief Coroner of the province.

UPDATE: Dr. Michael Gollob, director of the Inherited Arrhythmia Clinic and Research Laboratory, was a leader in the development of the autopsy protocol. At the Canadian Cardiovascular Congress in October of this year, he presented the first-ever Canadian guidelines for the use of genetic testing in evaluating inherited arrhythmias associated with sudden cardiac death. The development of these guidelines grew directly out of the autopsy guidelines initiative. (See the "Guidelines, Guidelines, Guidelines" section of the CCC highlights roundup in this issue.)



Medical Training: A View from Abroad

The University of Ottawa Heart Institute is the leading training centre in Canada for cardiovascular medicine. Aspiring doctors and nurses come from across the country and around the world to advance their professional education.

Natasha Behl came to us from the United Kingdom as a medical student, and her experience here made a strong impression. She wrote the following article for *Student BMA News*, the magazine for medical student members of the British Medical Association. It highlights some of the aspects of learning at the Heart Institute that make it such a highly sought out training ground.

[Note: British spelling in the original article has not been altered.]

Medical training in Canada—what a difference from my UK experiences. I have just returned from a month-long International Federation of Medical Students Associations exchange programme in clinical cardiology at the University of Ottawa Heart Institute, where I had a marvellous time.

As a budding cardiologist, I was excited at the prospect of working at one of the world's most advanced cardiovascular institutes, but concerned about how much hands-on experience I would obtain.

My concern was short-lived. I was welcomed as a member of the "Red Team" and took on the duties equivalent to a junior resident straightaway, despite being a final-year medical student in a different country.

I clerked in new patients, formulated management plans and discussed these with the attending doctor, Lloyd Duchesne, before implementing them myself. I was surprised at how much I was allowed to do on my own (with countersignatures), to the extent of altering medication regimes and ordering complex investigations.

Initially, I was extremely nervous, and I discussed every minor detail with anyone who was willing to listen. But my confidence increased with the encouragement I received at every step from Dr. Duchesne, and I carried out my duties with extra care and commitment because I was determined not to let him down or dent his faith in me.

I was also allowed to run clinics and dictate clinic letters. These are skills that are rudimentary but essential in the NHS [National Health System], but are rarely taught or imparted sufficiently. I learnt how to summarise succinctly when pressed for time.

Not only did my clinical knowledge and skills improve, but—perhaps more importantly—I learnt about the exact roles of the other members of the team, such as pharmacists, occupational therapists, social workers and physiotherapists, and how to tap into their skills and seek their advice appropriately.

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>
> – Natasha Behl

This multidisciplinary approach greatly helped in enhancing patient care. I finally understood the significance of the theoretical knowledge that my medical school has, over the years, given me.

All the staff members were professional, proficient, friendly and forthcoming. In contrast to my experience of many clinical attachments in England, I was never made to feel that I was a mere medical student.

I feel extremely lucky to have experienced such a vibrant, pleasant and cohesive working environment, where patient care was central and where the views of all the members of the team, irrespective of the positions they held, were respected.

I observed theory being put into practice, and experienced encouragement and appreciation from the seniors and gratitude from the patients, who opened themselves up without reservation before a young burgeoning doctor. I wonder why the UK and Canada are oceans apart as far as practical training is concerned.