



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

“We have been on the leading edge of this from the beginning.”

– Dr. Michel Le May, cardiologist, who leads the STEMI program at UOHI
(from *Fresh Approach Leads to Dramatic Mortality Reduction in High-Risk Patients*, pages 1-3)

“Reducing dietary salt is a lot tougher than removing the salt shaker from the supper table.”

– Dr. Frans Leenen, Director of the Hypertension Unit at UOHI
(from *Hypertension Leader Explores Blood Pressure Influences*, pages 5-6)

“What the Society now is doing is establishing benchmarks across the country.”

– Dr. Lyall Higginson, President of the Canadian Cardiovascular Society
(from *Widen Focus on Wait Times: CCS President Talks about Access*, page 7)

“This model teaches people how to ask the right questions, how to look for local solutions and to keep a group solving the right problems.”

– Heather Sherrard, UOHI Vice-President of Clinical Services
(from *Heart Institute Coaching Aims for Best Practice Care*, page 8)



(Source: Musée du Louvre, www.louvre.fr)

The Heart Institute's STEMI program is founded on principles established by Dominique Larrey, Napoleon's Chief Surgeon. The innovative program has fuelled a 75% reduction in mortality of high-risk patients arriving by ambulance.

Fresh Approach Leads to Dramatic Mortality Reduction in High-Risk Patients

It takes a very large team to save a heart attack patient. The Heart Institute has assembled a remarkable corps of leaders who successfully championed a novel Canadian team protocol to cut the death rate among high-risk heart attack patients.

When an Ottawa patient calls 911 complaining of chest pain, a crew of advanced care paramedics is immediately dispatched. Their skills far exceed their ability to negotiate snarled traffic. These squads are trained to interpret the results of an electrocardiogram (ECG) and recognize a heart attack known as an ST-Elevation Myocardial Infarction – STEMI. If a STEMI is confirmed, the patient is urgently delivered to a STEMI cardiology team standing at the ready at the Heart Institute when a ‘Code STEMI’ is signalled. On receiving the patient, the cardiology team is primed to perform an emergency angioplasty, quickly opening blocked arteries with a balloon and stent designed to improve blood flow and oxygen to the heart.

The STEMI protocol developed by the Heart Institute represents an extraordinary collaboration within Ontario's complex web of front-line health care workers. The team is so closely allied that

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Credit Napoleon's Surgeon for Saving Lives Today



The Heart Institute's STEMI protocol was in part adapted from the emergency services system in France known as SAMU – *service d'aide médicale urgente*. France's national health care system differs substantially from Canada's medicare model. Still, SAMU is distinct from other emergency services because it relies on the use of hospital physicians who are sent into the field to treat patients and accompany them during transport to the appropriate hospital.

The modern SAMU system began evolving in the 1960s. But SAMU physicians credit Dominique Larrey, the chief surgeon of Napoleon's Grande Armée, as the original practitioner in France's distinctive emergency medical services. In 1792, he would venture out even under enemy fire to treat the wounded where they fell. His principle of emergency care was to treat wounds without delay with prompt but full medical attention. It is said that he conducted as many as 200 amputations a day on the open battlefields. 🦋

(Source: SAMU de France; available online at www.samu-de-france.fr/en/news/front/afficher/rescue_services_in_europe_france-ref/?id_actu=170)

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Advanced care paramedics are specially trained to identify a STEMI heart attack. "Code STEMI" patients are routed directly to the Heart Institute.

"We have always been aware of the importance of time in getting to heart attack patients."

– Dr. Michel Le May, Director of UOHI's STEMI Program

(Fresh Approach Leads to Dramatic Mortality Reduction in High-Risk Patients, continued)

cardiologists, base hospital physicians and support staff all know each other by name. A collaborative alliance established among Ottawa's health care leaders enables advanced care paramedics to bypass conventional emergency room procedures and route heart attack patients directly to the Heart Institute's STEMI lab. The alliance includes the four local Ottawa hospitals along with an immense base of emergency physicians, cardiologists and GPs, whose co-operation is essential. Because a suspected heart attack patient will also appear in the Emergency Department of an Ottawa hospital, the STEMI team relies on ER staff to identify a STEMI and transfer the patient quickly to the Heart Institute.

A total of 344 STEMI patients were transported to the Heart Institute between May 2005 and May 2006 – the first full year of operation. The figure includes 209 patients transferred from city hospitals and 135 patients transported by advanced care paramedics. Of that number, 28 percent were women and 18 percent were diabetics.

The protocol took several years to develop. It proceeded in tandem with a series of Ottawa research studies beginning with an early evaluation of the most effective means of saving a heart attack patient. "We have always been aware of the importance of time in getting to heart attack patients," says cardiologist Dr. Michel Le May, Director of UOHI's Coronary Care Unit and Director of UOHI's STEMI Program.

One early study directed by Dr. Le May in the late 1990s showed that primary percutaneous coronary intervention (PCI) – essentially an emergency angioplasty – was superior to using a clot busting drug to save a heart attack patient. Further research showed that inserting a stent by angioplasty to improve blood flow was also much less costly than using a clot busting drug. Hospitalization costs were lower. So too was length of stay in hospital.

Additional research found that patients transported by ambulance were older, sicker and faced a higher risk of mortality. The findings underscored an apparent

Primary PCI: Fitting into the Canadian Landscape

Diverse elements of the Heart Institute's STEMI protocol have been combined to fit different areas in Canada. Already, Kingston, ON, and Montreal have adapted components of the STEMI program to suit the community environment, says UOHI's Dr. Michel Le May.

A larger, more complex system in Toronto, for example, would face logistical challenges involving patient transport to selected hospitals where primary PCI could be quickly performed. Such programs, says Dr. LeMay, would similarly call upon health care leaders in the community to mobilize catheterization facilities, emergency rooms and ambulance transportation to ensure speedy treatment of heart attack patients.

"The science is there – it's just a matter of logistics now on how you transform," says Dr. Le May. Some institutions might prefer electronic transfer of electrocardiogram data directly into the hands of an emergency room physician or cardiologist. "It is a matter of taking pieces of our system, which works very well for us, to fit within Toronto."

Smaller centres could apply other components, whether by improving the diagnosis of patients in an ambulance or by establishing a Code STEMI protocol that could be set up to quickly administer clot-buster medication to rapidly increase blood flow in a heart attack patient.

Other areas, such as Montreal, have implemented key parts of the Heart Institute's STEMI protocol, such as quickly transferring patients to institutions where they will be immediately prepared on arrival for primary PCI. 🌀

“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.”

– Dr. Michel Le May, Director of UOHI’s STEMI Program

need to transfer these patients directly to the Heart Institute for rapid PCI. Still further research led by Dr. Le May assessed whether advanced care could accurately identify a STEMI patient employing an ECG, and if a pre-hospital diagnosis could shorten the length of time prior to the life-saving surgical procedure.

“We’ve been leaders in this field,” says Dr. Le May. “We have been on the leading edge of this from the beginning.” The STEMI system was in part adapted from the emergency services system in France known as SAMU – *service d’aide médicale urgente*. SAMU distinguishes emergency transport from emergency treatment. A company of SAMU-affiliated physicians is available for dispatch.

“In Ottawa, since we don’t have the doctors, we decided to provide additional training for these advanced care paramedics to make a preliminary diagnosis for a heart attack,” says Dr. Le May. “Over the last few years in Ottawa, we’ve been fortunate to have a group in advanced care who study a little longer and not just about the heart but about trauma, for example.”

From a pilot phase of the program, Dr. Le May and colleagues Drs. Justin Maloney and Richard Dionne saw the results of advanced care paramedics who could read pre-hospital ECGs. Dr. Maloney is associate professor in the Department of Emergency Medicine at the University of Ottawa and the Medical Director of the Ottawa Base Hospital Paramedic Program. Dr. Dionne, assistant professor at the University’s Department of Emergency Medicine, is Assistant Medical Director of the paramedic program.

A new UOHI study published in the *American Journal of Cardiology* in

November 2006 showed a dramatically reduced mortality rate among patients sent to the Heart Institute. Advanced care paramedics referred 108 consecutive patients to UOHI for emergency angioplasty between July 2004 and June 2005. Mortality figures of patients delivered to the Heart Institute were 1.9 percent, compared to 8.9 percent in 225 STEMI patients transported by ambulance to emergency departments of the local university hospitals between July 2001 and January 2004.

“And now, the entire metropolitan area has gone primary PCI – very different from the way it worked before,” Dr. Le May adds. “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.”

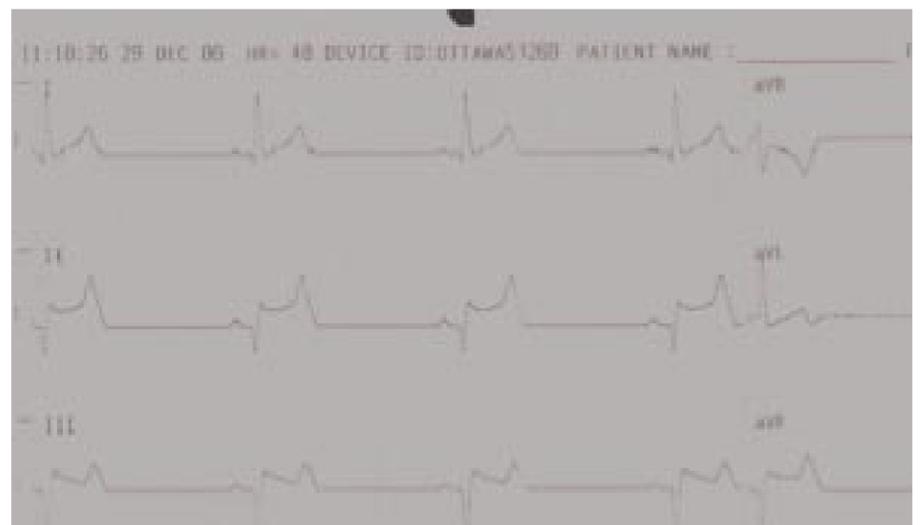
“An estimated 300 paramedics in Ottawa ride in about 50 emergency service trucks,” says Dr. Le May. “We couldn’t have done this without them. Many people have been involved here with this. There were many key players we had to bring to the table. This was very new.”

The next phase of the STEMI program will involve expansion into neighbouring Ontario communities such as Pembroke, about 100 kilometres west of Ottawa. These STEMI patients, once identified by advanced care paramedics, would be treated with clot busters before being transported for the emergency procedure at the Heart Institute.

The Heart Institute’s STEMI program has attracted interest from across Canada and in different parts of the world – from Vancouver to the Czech Republic. 🇨🇪



Patients are brought to a special room equipped expressly for STEMI cases. The STEMI program is led by Dr. Michel Le May.



The STEMI waveform of a heart attack patient



Paramedics rely on a dedicated hotline to call the Heart Institute and trigger a “Code STEMI”.

Tracking STEMI's Growing Success Helps Determine Way Forward

The University of Ottawa Heart Institute assessed the effectiveness of each phase of its STEMI protocol. The following studies are a published record of the research and trials undertaken that led to the successful development of the STEMI initiative:

1: Le May MR, Labinaz M, Davies RF, Marquis JF, Laramée LA, O'Brien ER, Williams WL, Beanlands RS, Nichol G, Higginson LA. *Stenting versus thrombolysis in acute myocardial infarction trial (STAT)*. *J Am Coll Cardiol*. 2001 Mar 15;37(4):985-91. PMID: 11263625 [PubMed – indexed for MEDLINE]

This study was designed to evaluate the effectiveness of primary PCI with stents vs thrombolysis. The results showed that primary PCI is superior to thrombolysis in STEMI.

2: Le May MR, Davies RF, Labinaz M, Sherrard H, Marquis JF, Laramée LA, O'Brien ER, Williams WL, Beanlands RS, Nichol G, Higginson LA. *Hospitalization costs of primary stenting versus thrombolysis in acute myocardial infarction: cost analysis of the Canadian STAT Study*. *Circulation*. 2003 Nov 25;108(21):2624-30. Epub 2003 Nov 3. PMID: 14597591 [PubMed – indexed for MEDLINE]

The study showed that primary stenting was cost saving compared to thrombolysis in acute myocardial infarction. Hospitalization costs associated with primary stenting averaged \$3,500 less per patient at six months. Length of stay was also found to be shorter (eight days versus 12 days in hospital).

3: So DY, Ha AC, Turek MA, Maloney JP, Higginson LA, Davies RF, Ryan SC, Le May MR. *Comparison of mortality patterns in patients with ST-elevation myocardial infarction arriving by emergency medical services versus self-transport (from the prospective Ottawa Hospital STEMI Registry)*. *Am J Cardiol*. 2006 Feb 15;97(4):458-61. Epub 2005 Dec 13. PMID: 16461036 [PubMed – indexed for MEDLINE]

This STEMI registry looked at patients with STEMI who presented by self-transport versus those who called for an ambulance – Emergency Medical Services (EMS). This study has served as the control group for subsequent STEMI studies. We learned from this registry that patients who arrived by ambulance were older and sicker, and had a higher in-hospital mortality. This paper highlighted the need for a new strategy for these high-risk patients. This included transport of these patients to the UOHI directly for rapid

The "Code STEMI" Protocol

The STEMI protocol, developed by the Heart Institute in a remarkable collaboration among health care leaders, mobilizes a large team that is available 24 hours a day, seven days a week. Here is how a Code STEMI works.

- Patient with chest pain calls 911.
- Dispatch sends a special ambulance crew of advanced care paramedics. Crew arrives in roughly eight minutes.
- Advanced care paramedics obtain targeted history of patient.
- A 12-lead electrocardiogram (ECG) is obtained in the patient's home or in the ambulance.
- If STEMI is confirmed, paramedics call the Heart Institute using a dedicated STEMI hotline.
- A 'Code STEMI' is immediately triggered at the Heart Institute.
- A Heart Institute cardiology team assembles in the STEMI room adjacent to the Catheterization Laboratory to await the patient's arrival.
- The patient is wheeled to an adjacent Catheterization Laboratory, where a primary PCI (percutaneous coronary intervention) is performed. This is essentially an emergency angioplasty, where the blocked arteries are opened to improve the flow of blood and oxygen to the heart.

Research and assessment during the first year of operation show a median 'door-to-balloon' time of 63 minutes. This represents the interval between when a patient is brought through the emergency doors of the Heart Institute by the paramedic crew to the inflation of the inserted balloon and stent by the cardiology team during the angioplasty procedure to improve blood flow to the heart. The Canadian Cardiovascular Society STEMI Working Group shares the same treatment guidelines as the American College of Cardiology/American Heart Association. These guidelines call for 'door-to-balloon' times of under 90 minutes. 🏥

reperfusion of the infarct-related artery by primary PCI.

4: Le May MR, Wells GA, Labinaz M, Davies RF, Turek M, Leddy D, Maloney J, McKibbin T, Quinn B, Beanlands RS, Glover C, Marquis JF, O'Brien ER, Williams WL, Higginson LA. *Combined angioplasty and pharmacological intervention versus thrombolysis alone in acute myocardial infarction (CAPITAL AMI study)*. *J Am Coll Cardiol*. 2005 Aug 2; 46(3):417-24. PMID: 16053952 [PubMed – indexed for MEDLINE]

Under the direction of Dr. Le May and the interventional group, a study is designed to evaluate t-thrombolytic-facilitated primary PCI vs thrombolytic therapy alone in acute myocardial infarction. Patients are randomized in the emergency rooms at the local hospitals, and transferred for thrombolytic-facilitated primary PCI.

5: Le May MR, Dionne R, Maloney J, Trickett J, Watpool I, Ruest M, Stiell I, Ryan S, Davies RF. *Diagnostic*

performance and potential clinical impact of advanced care paramedic interpretation of ST-segment elevation myocardial infarction in the field. *CJEM*. 2006 Nov;8(6):4011-7. PMID: 17209489 [PubMed – indexed for MEDLINE]

Development of a screening tool to assess the ability of advanced care paramedics (ACP) to independently identify ST-elevation myocardial infarction and evaluate eligibility for thrombolytics. Base Hospital and Emergency Medical Services develop a training program and train advanced care paramedics on ECG interpretation. Results indicated that ACPs accurately identify STEMI and determine eligibility for thrombolytics.

6: Le May MR, Davies RF, Dionne R, Maloney J, Trickett J, So D, Ha A, Sherrard H, Glover C, Marquis JF, O'Brien ER, Stiell IG, Poirier P, Labinaz M. *Comparison of early mortality of paramedic-diagnosed ST-segment elevation myocardial infarction with immediate transport to a designated primary percutaneous coronary*

intervention center to that of similar patients transported to the nearest hospital. *Am J Cardiol*. 2006 Nov 15;98(10):1329-33. Epub 2006 Sep 28. PMID: 17134623 [PubMed – indexed for MEDLINE]

Following an intensive training and development period, paramedics began independently triaging STEMI for primary PCI. Between July 2004 and June 2005, advanced care paramedics referred 108 consecutive patients to the UOHI for primary PCI, by-passing the 4 local emergency departments. During this time, in-hospital mortality was dramatically reduced from 8.9% to 1.9%. The lower mortality is attributed to the very rapid triage by paramedics coupled with the most effective reperfusion therapy: primary PCI. This study confirms that an integrated multi-disciplinary approach is effective and safe. 🏥

Hypertension Leader Explores Blood Pressure Influences

As a young cardiologist with a PhD in pharmacology and an interest in clinical research, Dr. Frans Leenen ended up in a laboratory investigating high blood pressure almost by accident. In those early years, the deadly effects of high blood pressure were much less known.

“Hypertension was barely recognized at the time as a serious medical problem,” says Dr. Leenen, Director of the Hypertension Unit at the Heart Institute and a leading authority on high blood pressure.

“Treating high blood pressure was more of an art,” he says. “At that time, it was very difficult to try to reduce high blood pressure and the medication available caused many side effects. It still is an art to treat hypertension but at least now we have effective medication with generally minimal side effects.”

Dr. Leenen’s areas of research have included a close look at salt intake and how it is reflected in higher blood pressure. Today, the link between salt use and changes in blood pressure is well documented. High salt consumption also plays a role in the increase of blood pressure, which tends to rise with age in western society. In North America, 40 to 60 percent of people older than 60 years have high blood pressure, which is a major risk for stroke and heart attack.

A Swedish study published in the March issue of the *Journal of Hypertension* notes that reduced salt consumption results in a significant drop in blood pressure.¹ “Reducing dietary salt is a lot tougher than removing the salt shaker from the supper table,” says Dr. Leenen, “because salt is so ubiquitous, particularly in processed foods.” He cites a new British survey on bread that shows how much salt is found in what one would expect is the most innocent of all vital foods.²

For example, a single slice of packaged whole grain Canadian-brand bread contains 140 milligrams of sodium (salt). A single piece of whole wheat pita from a packaged product purchased from an Ottawa supermarket contains 130 mg of sodium. That means four plain slices of whole grain bread from this particular loaf would contain more than half a gram of salt or about one quarter the daily amount recommended by the Canadian Hypertension Society. Add all the other extras from meals throughout the day and salt consumption can easily get out of hand.

The new Canada Food Guide, released earlier in 2007, notes the ‘important step’ of limiting foods and beverages that are high in salt. Dr. Leenen and his colleague Dr. George Fodor of the Heart Institute see salt consumption in a typical diet as excessive. They estimate daily salt



Dr. Frans Leenen’s work on hypertension includes searching for a genetic cause of salt-sensitivity. Salt has profound influence on high blood pressure, which in turn can lead to stroke and heart attack.

consumption in Canada averages about 10 to 12 grams. And reducing that figure by half, to six grams per day, would lower blood pressure in people who have high blood pressure and, to a lesser extent, lower the figures in people with normal blood pressure.

The American Heart Association guidelines call for an ideal daily total salt consumption of 1.5 grams, although they say 2.3 grams – about one teaspoon per day in total – is more realistic.³ The Canadian Hypertension Society also recommends roughly the same total daily intake.⁴ Dr. Leenen is a past president of the Canadian Hypertension Society. Dr. Fodor was its founding chairman and the founding president of the Canadian Coalition for High Blood Pressure and Control.

The picture involving salt and high blood pressure appears to be growing more complicated because scientists are learning that some people seem to have a higher sensitivity to salt. This was evident in a recent Swedish study, which noted that salt reduction and the magnitude of its effect on lowering blood pressure varies substantially between people. Dr. Leenen has been investigating this further in terms of effects of salt on brain function. Previous research on the impact of salt on the body has focused largely on the kidneys.

(continued on page 6)

Hypersalinated Hypertensives?

Hypertension is defined as a systolic reading of 140 mm Hg (millimetres of mercury) or higher or a diastolic reading of 90 mm Hg or higher.

In general, decreasing salt intake by half, from the current average of 12 grams per day to six grams, would lower the systolic blood pressure in people with high blood pressure by an estimated six to seven mm Hg and in people with normal blood pressure by two to three mm Hg.

In people with high blood pressure, it is estimated that this decrease would lower the risk for strokes by 25 to 30 percent and by 20 to 25 percent for Coronary Heart Disease.

Dietary sodium (salt) consumption of one teaspoon a day or less is among the 2007 recommendations from the Canadian Hypertension Society for a healthy lifestyle in the prevention and treatment of high blood pressure.

The Canadian Hypertension Society recommends 100 mmol or less per day, which is about 2400 milligrams, 2.4 grams or about one teaspoon. (See www.hypertension.ca)

1 Mellander, O et al. Moderate salt restriction effectively lowers blood pressure and degree of salt sensitivity is related to baseline concentration of renin and N-terminal atrial natriuretic peptide in plasma. *J Hypertension*. 2007 Mar;25(3):619-627
2 Survey Shows Significant Variations in Salt Content of Bread, Consensus Action of Salt and Health, Feb. 28, available online at www.actiononsalt.org.uk
3 Appel LJ et al. American Heart Association, Dietary Approaches to prevent and treat hypertension: a scientific statement from the American Heart Association. *Hypertension*. 2006;47:296-308
4 2007 Canadian Hypertension Education Program Recommendations, Annual Update, available online at www.hypertension.ca/chep/docs/2007RecommendationsSummary.pdf

(Hypertension Leader Explores Blood Pressure Influences, continued)

The Hypertension Unit at the Heart Institute, under the direction of Dr. Leenen, is also embarking on a major new study to determine if there is a 'salt gene' – a gene or set of genes that makes some people more sensitive to salt and therefore increases their blood pressure.

"For a long time you could only see if someone was responsive to salt by putting them on a low-salt diet," says Dr. Leenen. "But you had no idea whether that person was going to respond. Slowly, a picture is beginning to emerge – and it is still very slow going – that taking a single blood sample from a person could someday predict their salt sensitivity. This in turn would enable us to say that a person's blood pressure is salt-sensitive."

Awareness and interest in curtailing excessive salt use has only recently surfaced, largely because of other issues in the spotlight. "If you look at the public's priorities," says Dr. Leenen, "well, salt wasn't there as a priority. For a long time the attention has been focused on smoking. Now the next step is obesity and diabetes. We know that salt is a major component of obesity. If you have a high salt content in your food, you will also drink more high-calorie drinks, for example. Lowering salt can make a big difference just in those terms."

Increasingly, researchers are looking at the long-term effects of salt reduction or conversely, the cumulative effect of high salt usage. "Salt intake depends on your portion," says Dr. Leenen. "And if you go out for food, there is a chance it will be very high in salt. Salt is unquestionably part of the obesity epidemic. It is very difficult for people to get fresh food on a daily basis or even every second day. It requires a different kind of mindset."

The different mindset is perhaps best illustrated by a 2005 statement by the American Heart Association. The AHA looked at a study on the eating habits of American children and found that French fries were the most commonly consumed

"vegetable" for children 19 to 24 months of age.⁵ It is not certain whether these habits are as closely tracked in Canada.

High blood pressure is getting a very thorough examination. The Heart Institute is a leading site for research on hypertension. A team of UOHI researchers, led by Drs. Leenen and Fodor, is wrapping up analysis of an Ontario-wide survey on the prevalence of high blood pressure and effective treatment. The survey got underway in August 2005 with interviews and blood pressure measurements of nearly 7,000 randomly selected adults between the ages of 20 and 79. A total of 16 sites, from Sudbury in the north to Windsor at the southern tip, took part in this survey. The Heart Institute was conducting the survey on behalf of the Heart and Stroke Foundation.

Dr. Leenen was also the principal Canadian investigator for one of the largest trials and surveys ever conducted on high blood pressure and cholesterol. More than 42,000 participants in 623 specialty clinics across Canada and the United States were studied over a five-year period. The findings, released in late 2002, suggested that less expensive diuretics or 'water pills' could be an effective starting point in the early treatment of high blood pressure in many patients.

Dr. Leenen's findings showed that the Canadian region led by the Heart Institute was the best site for improving blood pressure results among the study participants. When first enrolled in the study, only 20 percent of participants at the Heart Institute had a controlled blood pressure. "By the end of the study, 70 to 75 percent of the recruited population had their blood pressure controlled. That was a very big improvement."

In his early days in the laboratory, Dr. Leenen was exploring for the sake of scientific discovery. "Whether it is always important for society is impossible to say at the beginning because you don't know what will happen down the road."

Searching for the Salt Gene

The Heart Institute will recruit 3,400 people for a major clinical trial aimed at identifying genes associated with salt-sensitive high blood pressure.

Patients with high blood pressure have a tendency to respond more often to salt in the diet, fuelling the expectation of a genetic component. The Hypertension Unit of the Heart Institute is beginning Phase One of the study, which will recruit 400 patients with a family history of high blood pressure. The patients will be taught to lower their salt intake to a total of less than one teaspoon of salt each day for seven weeks. During three of the seven weeks, salt tablets will be added to bring their salt use closer to that of a typical consumer.

"We expect that in half those people, blood pressure should respond to salt and in the other half, there will likely be no change," says Research Manager Elizabeth Coletta RN, of UOHI's Hypertension Unit. Phase Two of the study will look at two groups of 1,500 people aged 20 to 60 years old. One group will be composed of people who have high blood pressure and a family history of hypertension. The other group will be in the normal blood pressure range.

The study is led by Drs. Leenen and Frédérique Tesson, a PhD in molecular biology who is Director of UOHI's Laboratory of Genetics of Cardiac Diseases. The research is part of a broadening investigation into the genetic causes of heart disease. This type of study will be crucial to carefully assess possible genetic variants, which will be performed at the Ruddy Canadian Cardiovascular Centre. It is essential to measure the blood pressure effects of salt, says Dr. Leenen. This will be done by 24-hour urine collection to measure the level of salt intake and by 24-hour blood pressure monitoring.

The Ruddy Centre is the only one of its kind in Canada, and one of only a handful around the world, dedicated to coronary artery disease. The Heart Institute recently received \$4.7 million in Canada Foundation for Innovation funds to support significant research that employs advanced gene sequencing, DNA analysis and microchip technology to hunt for various genes related to heart disease. ❀

The journey to discovery is continuing. His work in hypertension is leading to a wider path and into the area of heart failure. "A lot of the mechanisms that play a role in heart failure also play a role in high blood pressure, in hypertension. When we began to study the role of salt and hypertension on the brain, we saw that most of the same mechanisms also played a role in heart failure." More new research will likely follow as Dr. Leenan continues to pursue laboratory work.

A tall, very lean and active man, Dr. Leenen practises what he preaches as a clinical cardiologist. He works out at least four times a week or makes the effort outdoors by walking or skiing. "The time is long gone when a doctor would advise someone to stop smoking while they were having a cigarette themselves," he says. "Or that you can be overweight and tell your patients to lose weight. If you want to provide advice about lifestyle, then you have to provide an example." ❀

⁵ Recommendations for Children and Adolescents, Consensus Statement from the American Heart Association, September 27, 2005, available online at <http://www.americanheart.org/presenter.jhtml?identifier=3034808>

"By the end of the study, 70 to 75 percent of the recruited population had their blood pressure controlled. That was a very big improvement."

Dr. Leenen, Director of the Hypertension Unit at the Heart Institute



Widen Focus on Wait Times: CCS President Talks about Access

As the leading killer in North America, heart disease remains a formidable foe for all physicians. Dr. Lyall Higginson, President of the Canadian Cardiovascular Society (CCS), sees access to care as a key battle plan in the fight against coronary artery disease.

The former chief of cardiology for the Heart Institute, Dr. Higginson laid new tracks at UOHI, building on the twin foundations of access to care and education. Under his tenure, the Heart Institute's Division of Cardiology embarked on a range of pioneering activities that have advanced UOHI's reputation for providing the most successful clinical care, educational and training programs in the country.

"It is probably true that our Institute leads the way regarding access to care and our interest in making sure our patients access appropriate care," says Dr. Higginson, who continues his practice at UOHI and was appointed in October 2006 to the two-year position of CCS President. "The Society has taken an initiative to make this a national goal regarding the establishment of benchmarks – for seeing a cardiologist, for non-invasive testing, for cardiac catheterization, and for cardiac surgery."

CCS is the national organization representing some 1,600 cardiovascular physicians and scientists, and serves to promote cardiovascular health and care. CCS wants to ensure that wait times for patients under any government strategy focus on the entire spectrum of health care – from prevention, consultation and diagnosis, through to treatment and rehabilitation.

Dr. Higginson uses the example of the Heart Institute's innovative STEMI protocol to illustrate swift access to care using a team-based approach that includes advanced care paramedics, emergency department physicians, nurses and cardiologists. The STEMI protocol enables

Benchmark: • noun 1 a standard or point of reference; a criterion, touchstone. 2 a surveyor's mark cut in a wall and used as a reference point in measuring altitudes.

– *Oxford English Dictionary*

emergency diagnosis and immediate treatment of heart attack patients. The average 'door-to-balloon' time is 63 minutes for Ottawa heart attack patients transported or transferred to the Heart Institute for primary PCI (percutaneous coronary intervention). UOHI's STEMI program has been shown to reduce hospital time and ease the burden on emergency rooms where beds are in extremely high demand. (See STEMI special feature on Page 1)

"One of the best arguments for the STEMI program is utilization of resources," says Dr. Higginson. "A patient can be brought into the Heart Institute and can be out within three days, as opposed to having an infarct (heart attack), getting admitted and staying for a week."

The Canadian Cardiovascular Society has the same ideals – using the best proven new programs and employing them across the country to achieve common patient-centred 'benchmarks,' he adds. "What the Society now is doing is establishing benchmarks across the country. The Canadian Cardiovascular Society's perspective is to look at systems within hospitals just as we have done."

The most common public benchmark for the care and treatment of heart disease is

coronary artery bypass grafting. Wait times are most often cited for this single procedure, which traditionally involves open-heart surgery to bypass clogged arteries, opening the flow of blood and oxygen to the heart.

However, advanced diagnostic technology is critical in providing access to care. This includes diagnostic procedures such as Positron Emission Tomography (PET), echocardiography and, at the Heart Institute, the use of ultra-3D imaging by Computerized Tomography (CT).

The Heart Institute, for example, has the first high-volume sophisticated CT scanner in Canada dedicated to cardiac care. Research at UOHI is currently underway to examine how cardiac CT compares with other diagnostic methods. The technology holds the promise of improving patient care and reducing wait times. The Heart Institute is also home to the National Cardiac PET Centre, which fully opened in 2002, and is the country's only such facility dedicated to cardiovascular disease.

Both CT and PET at the Heart Institute have also been involved in the education and training of young cardiologists. Among them was a young award-winning cardiologist from Japan, Dr. Keiichiro

Yoshinaga, who recently returned home to continue research employing PET imaging. His project included a study, accepted for publication in the *Journal of the American College of Cardiology*, showing that PET imaging can be used to predict the prognosis of referred patients for the purpose of defining the extent of heart disease. Another was cardiologist Dr. Ben Chow, who was also part of UOHI's fellowship program. Dr. Chow today is co-director of Cardiac Radiology at UOHI. He is also leading several diagnostic research projects using advanced cardiac CT imaging.

Another advanced program is the new system of personalized telemedicine that uses home monitoring systems for select UOHI heart patients to ensure they remain healthy and continue to follow care instructions after they are discharged from hospital.

"Telemedicine is another way to access our community," says Dr. Higginson. "The Heart Institute is linked to hospitals across our region by people who know exactly who to call. We're reaching into our community with new programs like these."

Beyond the actual 'mechanics' of telemedicine are myriad Heart Institute training programs to provide regional hospitals with expertise in advanced home monitoring and optimal cardiac care. Soon, the net of STEMI will widen to other area hospitals outside the metropolitan area so that heart attack patients can be swiftly transferred to the Heart Institute for advanced care.

"Cardiac disease is the biggest killer," says Dr. Higginson. "It is the continuum of care that counts for our patients – from initial wait to see a cardiologist to appropriate investigation and appropriate therapy. Each step has a wait time that we must monitor and shorten." 🦋



"A patient can be brought into the Heart Institute and can be out within three days, as opposed to having an infarct (heart attack), getting admitted and staying for a week."

– Dr. Lyall Higginson,
President of the Canadian Cardiovascular Society

Dr. Lyall Higginson became the new President of the Canadian Cardiovascular Society in October. The CCS represents some 1,600 cardiovascular physicians and scientists in the country.

Heart Institute Coaching Aims for Best Practice Care

The Heart Institute will set up four-member coaching teams composed of physicians, nurses and administrators specializing in coronary artery disease. Recruitment and training of these coaches is supported by \$177,000 in funds from the Government of Ontario. The award, under Ontario's Interprofessional, Mentorship, Preceptorship, Leadership and Coaching Fund, also pays for the cost of sending the teams into 17 peripheral hospitals in Eastern Ontario.

"This coaching model is multidisciplinary and it includes physicians, nurses, experts in quality improvement and in administering health records," says Heather Sherrard, UOHI Vice-President of Clinical Services.

The model employed for this program enables the training of coaches to help teams identify issues and solve problems.

"This coaching model is multidisciplinary and it includes physicians, nurses, experts in quality improvement and in administering health records."

– Heather Sherrard, UOHI Vice-President of Clinical Services

"It teaches people how to ask the right questions, how to look for local solutions and to keep a group solving the right problems," says Sherrard, who is also serving currently as Interim CEO of Ontario's Cardiac Care Network (CCN). CCN is an advisory body to the province's Ministry of Health and Long-Term Care that monitors and guides the delivery of adult cardiac services.

The job of this coaching team will be to assist health care centres in applying best practice guidelines in the care and treatment of patients with acute coronary syndrome. The Heart Institute has already set up new programs to make sure heart attack patients, for example, actually receive the best care and treatment after they are sent home. A new Heart Institute discharge checklist

for each patient on discharge also enables UOHI to incorporate detailed information into a national database. The Discharge Abstract Database (DAD), which is part of the Canadian Institute for Health Information, provides a valuable data collection tool to report on performance. 📊

Counterpoint in Brief

Results of a widely publicized study on heart drugs versus angioplasty called the Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation (COURAGE) seemed to grab quick attention.

Details presented at the American College of Cardiology's annual meeting in New Orleans suggested that patients treated with drugs survive at the same rate as those who receive stents. The study, led by Dr. William Boden of Buffalo General Hospital in New York, was also published online by the *New England Journal of Medicine*.

The research initially looked at 2,287 patients in Canada and the United States.

Dr. Donald Beanlands, who has been honoured on many fronts throughout his career in clinical cardiology, felt the number of participants was too small to show a clear statistical significance. Further, the study examined patients with chronic stable angina. "It is clear and the evidence is overwhelming that angioplasty and stenting is the treatment of choice in acute heart attacks and in unstable patients," he said.

Patients with chronic stable angina have varying degrees of symptoms, Dr. Beanlands said. The COURAGE study, he noted, showed no statistically significant differences between patients who had angioplasty and those who had drug therapy alone in rates of death, heart attack, stroke or hospitalization for acute coronary syndrome or heart attack alone.

Dr. Boden reported that his findings reinforced existing clinical practice guidelines, which state that angioplasty can be safely deferred in patients with stable coronary artery disease provided that intensive medical therapy is initiated and maintained. He also reported that about one third of these patients may need revascularization for symptom control or for development of acute coronary syndrome.

Dr. Beanlands noted that angioplasty immediately improves symptoms. "Medicine makes it better but not as good. Medicine is important for secondary prevention, like the lowering of cholesterol; the Aspirin and the Beta blockers all improve survival."

The study also provided positive news for select patients who are not candidates for either surgery or angioplasty. "This tells us that it's good to treat these patients with medicine, that they will survive a good length of time and that we can help their symptoms." 📊

New in Research

The Heart Institute currently has 180 new and ongoing research projects underway. Understanding the implications, causes and influences of coronary artery disease (CAD) is a fundamental objective of research at the Heart Institute. Bringing the results of science to the bedside in aid of patient care is the ultimate goal. Some facts and figures:

Total staff involved in current research projects:
172

Total number of groups conducting research:
13

Principal Investigators of research grants:
60

Amount of floor space dedicated to research:
62,000 square feet

Percentage increase in research funds since 2004-2005:
155%

Number of clinical trials underway:
108

Groups involved in research include the following:

- Cardiology Clinical Research and Trials
- Behavioural and Risk Modification
- Cellular Dynamics, Lipoproteins and Cardiovascular Disease
- Canadian Cardiovascular Genetics Centre™
- Positron Emission Tomography (PET) Imaging
- Vascular Biology
- Hypertension
- Medical Devices
- Cardiac Surgery
- Cardiovascular Endocrinology
- Cardiac Anesthesiology Research
- Cardiovascular Research Methods Centre
- Taichman Laboratory

Some research projects underway include:

The Women Study: Designed to determine the best test for detecting heart disease in women.

Motivational Counselling for Exercise in Men and Women: To measure the effectiveness of telephone-based counselling for helping heart patients become more active.

Molecular Genetics of Cardiac Arrhythmias: To identify the gene or genes associated with heart rhythm abnormalities, specifically atrial fibrillation, that occur at a younger than expected age and not associated with other heart problems.

Role of Macrophages in Biodegradation of Polyurethanes: To study how white cells interact with materials used in the manufacture of medical devices. 📊