Peter Munk Cardiac Centre

CLINICAL AND RESEARCH REPORT

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Gift inspired by world-class team

$18 MILLION GIFT LAUNCHES NEW HEART CAMPAIGN

The Peter Munk Cardiac Centre's mission to deliver the best patient outcomes in the world has been significantly strengthened through a new generous donation of $18 million by Peter and Melanie Munk. The new gift will fund four Centres of Excellence, five chair positions for the Centre and innovations in care.

"Given the outstanding success achieved and compassionate care delivered, it didn't take much more than a heart beat for Melanie and me to support the Cardiac Centre again," said Peter Munk. "This facility – and more importantly the

continued on page 3…

Peter and Melanie Munk (centre and far right) accept a "heartfelt" thank you gift from staff and patients of the Peter Munk Cardiac Centre

ABOUT THE PETER MUNK CARDIAC CENTRE

The Peter Munk Cardiac Centre is the premier cardiac centre in Canada. Each year, approximately 37,000 patients receive innovative and compassionate care from the Centre's world-renowned multidisciplinary cardiac team. The Peter Munk Cardiac Centre is based at Toronto General Hospital and Toronto Western Hospital. Both hospitals, along with Princess Margaret Hospital and the Toronto Rehabilitation Institute, are part of University Health Network. All four are research hospitals affiliated with the University of Toronto.

RESEARCH

Seeking clues to contraction

DR. PETER BACKX DELVES DEEP INTO THE HEART

In dealing with heart failure, it is necessary to understand that the heart is a pump whose ability to propel blood to the body is impaired. Therefore, maintaining effective pumping function of the heart is critical for preventing arrhythmias and related heart conditions. Work currently being conducted in the laboratories of Dr. Peter Backx, Senior Scientist, at the Peter Munk Cardiac Centre and Toronto General Research Institute, is helping to shed exciting new light on potential ways of strengthening the heart's pumping abilities.

Dr. Backx's work centres on the mechanisms involved in regulating the heart's contraction strength, which relates directly to its ability to pump blood throughout the body. Specifically, it focuses on the unique role of a single member of a large family of enzymes called phosphodiesterases – or PDEs.

"This project really took off when we were looking at signal pathways linked to heart failure – for example, how hypertension progresses to heart failure," says Dr. Backx. "We looked at PDEs, which we already knew played a key role in the heart's contractions. They impact how heart contractions respond to demand, such as exercise and excitement."

Previous research had shown that PDEs regulate cellular levels of calcium and contractile strength by controlling levels of a chemical called cAMP.

"While the role of PDEs and their potential impact have long been intriguing, previous studies designed to alter PDE function have essentially failed," Dr. Backx notes. In fact, drugs developed to target PDEs in the treatment of heart failure did manage to increase heart contraction strength, but were associated with increased mortality rates.

A targeted approach

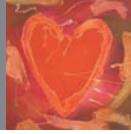
The problem, according to Dr. Backx, is that these approaches were too general. There are 17 different PDE genes in the human body, and these therapies targeted many different PDEs. "It's kind of like trying to combat crime in a big city," he explains. "If you eliminate everyone in the city, there would be no more crime but this is obviously not a solution. The real solution is to selectively eliminate only the criminals, while not harming the good folk. In the case of PDEs, we argued that a more targeted approach is the way to go."

"Our work was more focused," Dr. Backx continues. "We looked at specific molecular targets of PDEs that are critical in regulating the heart's contraction and identified a subgroup – actually a subgroup of a subgroup - of PDEs responsible for this regulation. In this way we identified the specific PDE gene linked to a single aspect of heart contraction."

This specific gene is a member of the PDE4 family called PDE4D. Dr. Backx and his colleagues, from the National Institutes of Health in Washington and researchers at the University of Calgary and Queen's University in Kingston, Ontario, studied mice lacking the PDE4D gene and found that their hearts beat more strongly than those of normal mice. Similarly, normal mice treated with a drug that inhibited all PDE4 family enzymes exhibited elevated calcium and greater contractile strength.

Dr. Peter Backx's research is helping to demystify some of the key functions of the heart, opening up new avenues for the development of innovative therapies.

Their work showed that PDE4D exerted its effect on cAMP and calcium levels by interacting with a complex called SR-Ca2+ATPase, which controls calcium in cardiac muscle cells. It is this fact that links this seemingly abstract science to the very real problem of treating patients with heart failure.



…and conduction

The electrical conduction system essentially controls heart rate, the number and regularity of the heart beat within a set time. This system generates and 'conducts' electrical impulses throughout the heart muscle, stimulating the heart to contract, thus pumping blood through the body. These impulses travel along a dedicated network of cardiac cells. When these impulses are slowed, interrupted or disrupted, a condition known as heart block occurs. As a result, the heartbeats can fall out of sync, in some cases leading to potentially fatal arrhythmias or other forms of heart disease.

Understanding of how this conduction system functions or is controlled has been limited. However, in recent ground breaking research, Dr. Backx, working with Dr. Chi-Chung Hui at Toronto's Hospital for Sick Children and researchers at the Gladstone Institute in San Francisco have identified a key component that regulates the development and function in this conduction system.

In a paper recently published in the prestigious *Proceedings of the National Academy of Science*, the researchers have shown that a genetic regulator called Irx3 (Iroquois homeobox gene 3) plays a crucial role in coordinating the rapid and regular conduction of the vital electrical impulses. When the researchers 'switched off' Irx3 in mice models, the impulses slowly diffused and had difficulties reaching their destinations. As a result, the mice's heartbeats fell out of sync and they developed arrhythmias.

An important contribution

This is the first published research that clearly defines the role of Irx3 in the electrical conduction system, and is being acknowledged as a breakthrough, prompting an editorial in the American Heart Association's journal *Circulation Research*, where it is acknowledged as an "important contribution".

The work of Dr. Backx and his colleagues have potential implications for the treatment and prevention of arrhythmias and other heart disease in humans.

"We need to understand more about factors that regulate the cardiac conduction system," notes Dr. Backx. "Our observations give us some important clues into how heart block occurs and its relationship to heart disease as well as arrhythmias leading to sudden cardiac death. For example, doctors are aware of heart block, but many might not realize its potential impact or why it occurs. Moreover, there are no effective medical treatments for heart block other than pacemakers. If we can better understand the impact of heart block and its origins, we can devise new approaches for treating this rather common condition."

Gift inspired by world-class team *…continued from page 1*

excellence and innovation of its caring professionals – has put Canada's cardiac care on the world map."

The announcement was made at a celebration to thank the staff of the Peter Munk Cardiac Centre for their contribution to compassionate, and innovative care. The evening's event was hosted by the CBC's Rex Murphy who gave a heartfelt account of his own experience as a cardiac patient at the Centre. He noted that had he not been fortunate enough to receive treatment at the Peter Munk Cardiac Centre, he might not be alive today.

Patients are the inspiration

Dr. Barry Rubin, Program Medical Director of the Peter Munk Cardiac Centre, also spoke at the celebration and shared some dramatic and touching accounts of patients who had been saved by innovative treatments that were developed at the Centre. In many cases, the technology and equipment that was involved was made possible through donor support.

Peter and Melanie Munk's latest gift also serves to launch a $100-million fundraising campaign at the Peter Munk Cardiac Centre called *Building the Future – from the heart.*

A primary focus of the campaign is building and sustaining the Centre's greatest strength – the exceptional team of specialists and medical staff who are responsible for the emergence of extraordinary medical discoveries and the development of innovative treatments for heart diseases and disorders.

More information is available at **www.inaheartbeat.ca**

Future of Cardiac Care Recognized in Cath Lab

Image-guided, minimally-invasive procedures are the future of heart disease treatment and the Cardiac Catheterization Laboratory (Cath Lab) in the Peter Munk Cardiac Centre is the ideal facility for cardiologists to perform and develop new heart therapies, improving the lives of thousands of patients.

Inside the Cath Lab, a multi-disciplinary team of cardiologists, cardiac fellows, registered nurses and anesthesiologists cares for patients with life-threatening heart disease. The latest medical imaging equipment provides greater visualization of the heart and surrounding structures, allowing for a more targeted therapy. Streamlined communications tools enhance staff-to-staff and staff-to-patient dialogue, improving the patient experience.

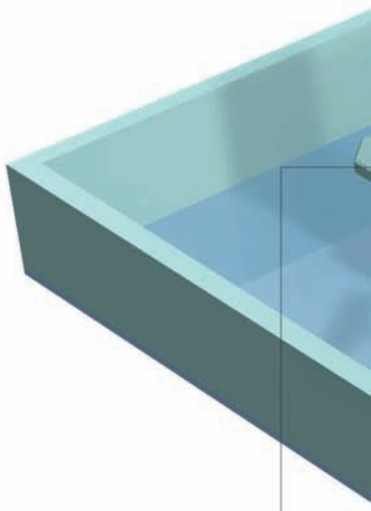
Improved technology and communication are crucial for the Peter Munk Cardiac Centre's Cath Lab—one of the busiest labs in Canada—that treats patients with blocked arteries, heart rhythm disorders and structural heart defects, including those present at birth and heart valve disease, conditions that affect over 1.3 million Canadians.

Versatile procedure rooms, which are also equipped to operating room sterility and air flow standards, allow cardiologists to move seamlessly from minimally-invasive interventions to complex surgical procedures. Most heart procedures can be done at any time, saving precious time in emergencies when patient needs can change quickly. Patients experiencing a heart attack can be treated quickly, efficiently and safely, minimizing the amount of damage to the heart and preserving as much function as possible.

"The new lab allows healthcare practitioners to perform and develop minimally-invasive heart procedures in the safest possible environment," says Dr. Peter Seidelin, Medical Director of the Cardiac Cath Lab at the Peter Munk Cardiac Centre. "Improved patient safety and staff communication translate into better patient care, allowing the centre to reach its vision of becoming a world-leading cardiac centre by providing the highest quality of treatment and care for the most complex cardiac conditions."

For more information, please visit **www.petermunkcardiaccentre.ca**

Control Room Nurse
Monitors the patient's vital sign
comfort. The decentralized con
room improves patient-centre
because the nurses have a bett
visual of the patient's head and
helping gage patient reactions
and tailor care appropriately.



Ultra Sound
Provides real time imaging with no radiation.

C-Arm Angiogram
A more agile C-Arm was install
various body scanning position
a more ergonomic stance for t
while still providing state of the
time X-ray imaging.

CLINICAL CARDIOLOGY

Celebrating Dr. Susan Lenkei

COLLEAGUES MARK RETIREMENT OF A CARDIOLOGY "LEGEND"

After a remarkable career spanning five decades, Dr. Susan Lenkei has retired from clinical practice, marking the end of an era at the Peter Munk Cardiac Centre and beyond.

Dr. Lenkei was a pioneer of clinical cardiology and she remains one of the most recognizable names in cardiology in Canada, having trained generations of cardiovascular clinicians.

At a time when women in her native Hungary did not have the right to vote, Dr. Lenkei graduated with an MD from the University of Zurich in 1951. She interned at Women's College Hospital in Toronto and then joined the Toronto Western Hospital (TWH) as attending staff in 1959. Dr. Lenkei served as Director of the Cardiac Investigation Unit from 1967-1988 and Division Chief of Cardiology at TWH from 1974 through 1983.

"If you were part of the hospital family – from cleaner to CEO – an appointment was available to you," says Denise Perks who provided administrative support for Dr. Lenkei from the late 1960s. "Her office door was always open. If you had a problem, she always made time to listen and advise."

Dr. Lenkei started her practice at a time when sophisticated diagnostic testing, such as angiography and echocardiograms, didn't exist. She relied on patient history, physical exam and, primarily, her stethoscopes to make patient care decisions.

"She helped me screen patients, deciding who were best suited for surgery and who were not," says Dr. Chris Feindel, a cardiac surgeon and colleague of Dr. Lenkei's who, early in his career, found her strong personality intimidating at times. "It wasn't an ego thing. No matter how tough or critical of me, she always focused on the patient. She had a sixth sense for knowing what was right."

In the fall of 1978, due to poor outcomes, Dr. Lenkei dramatically shut down the cardiac surgery unit at TWH. Soon after, Dr. Tirone David, former head of the Peter Munk Cardiac Centre's Division of Cardiovascular Surgery, who was just beginning his career as a new cardiac surgeon met Dr. Lenkei and asked to reinstate TWH's cardiac surgery division.

"I asked if she'd stop me from doing surgery. She told me, 'not if you're good' and within six months, she was my biggest ally," Dr. David recalls.

In 1988, Toronto General Hospital (TGH) and TWH cardiac divisions merged into The Toronto Hospital, with Dr. Lenkei playing a major clinical leadership role at TGH ever since. As a Senior Staff Cardiologist at TGH since 1989, Dr. Lenkei has cared for more cardiac surgery patients than any other cardiologist in Toronto.

Dr. Susan Lenkei has been a role model for more than one generation of cardiologists at the Peter Munk Cardiac Centre. Her legacy lives on through the innovative new *Dr. Susan Lenkei-Kerwin Cardiac Catherization Laboratories* (see page 4).

Setting the standard

"Dr. Lenkei is a leader, pioneer, role model and patient advocate," says Dr. John Ross, a Peter Munk Cardiac Centre Cardiologist who interned with Dr. Lenkei at TWH in 1972 and then reignited their professional relationship as colleagues at TGH in 1990. "She really loved being a cardiologist."

Documenting patient outcomes decades before it was mandated by the Ministry of Health, Dr. Lenkei set the standard for clinical practice. In addition to her wealth of clinical expertise and experience, she steadfastly put the patient first and demanded as much of her colleagues. Dr. Lenkei is the role model for more than one generation of clinicians.

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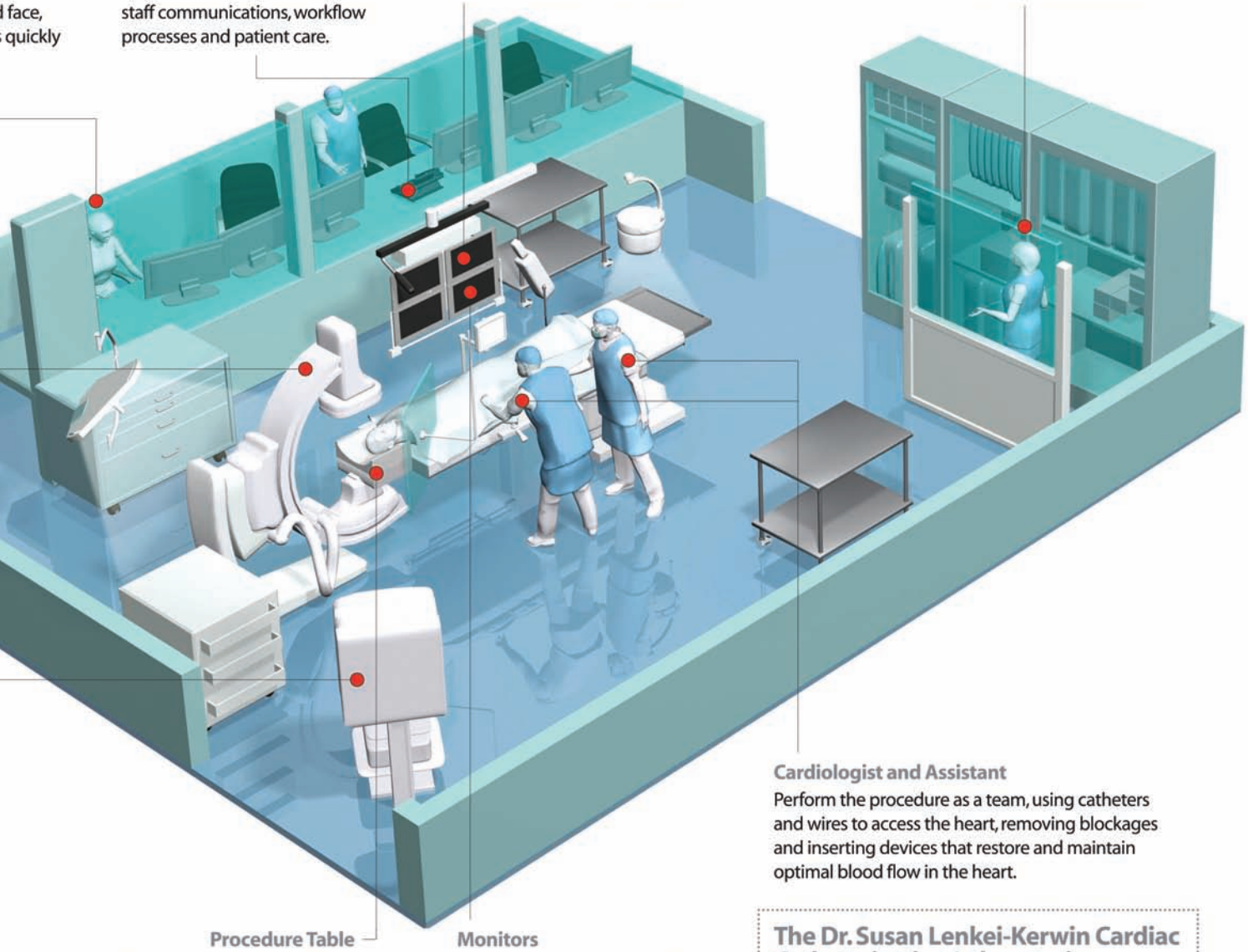
Communications System
Newly installed telecommunications system include staff wireless phones, nurse call systems and an electronic whiteboard, all designed to improve staff communications, workflow processes and patient care.

Hemodynamics Machine
Combines multiple pieces of vital patient information—blood pressure, heart rate, etc—onto one vibrant screen, allowing cardiologists and nurses to check one screen for all vital patient information.

Circulating Nurse
Gives patient required medications, tracks supplies and equipment used throughout the procedure.



Cardiologist and Assistant
Perform the procedure as a team, using catheters and wires to access the heart, removing blockages and inserting devices that restore and maintain optimal blood flow in the heart.

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ns and promote
he cardiologist,
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Procedure Table
Diagnostic radiology, X-rays and interventional procedure performed without the patient having to move.

Monitors
Mobile banks of monitors allow all team members in the room and nurses in the control room, to see X-ray images and vital signs in real time.

The Dr. Susan Lenkei-Kerwin Cardiac Catheterization Laboratories

The Peter Munk Cardiac Centre is equipped with four Cath Lab procedure rooms. One room is dedicated to Electrophysiology procedures—procedures that treat irregular heart rhythms.

A legacy of excellence

"She's the exemplary physician we all aspire to. Some people think of patient-centred care as something new, but Susan has practised it for over 50 years," says Dr. Patricia Murphy, staff anesthesiologist and Peter Munk Cardiac Centre Executive Committee member, who met Dr. Lenkei in the late 1990s at a women's heart health conference.

"We will never match Susan's style and humour, but we will work hard to maintain her legacy of excellence in patient care," says Dr. Gary Newton, Head of the Division of Cardiology at the Peter Munk Cardiac Centre.

In honour of Dr. Lenkei's dedication and career, the *Dr. Susan Lenkei-Kerwin Fellowship in Cardiac Clinical Education* has been established to continue training future cardiologists in her work.

CVICU wins 'Gold' for patient care

The Carlo and Angela Baldassarra and Family Cardiovascular Intensive Care Unit (CVICU) in the Peter Munk Cardiac Centre is the 2011 *Gold* recipient of *The Beacon Award for Excellence*, awarded by the American Association of Critical Care Nurses (AACN), joining an international community of nurses that set the standard for optimal patient care.

Established in 2003, the Beacon Award for Excellence honours exceptional care through improved outcomes and greater overall patient satisfaction. Sixteen units in the U.S. received the award this year, but the Centre's CVICU is one of only three to reach the *Gold* Level, and the only Canadian hospital, achieving the highest designation in five criteria: leadership structures and systems, staff engagement, communication, knowledge management, learning and development, evidence-based practice and patient outcomes.

"CVICU staff are on a constant mission to improve the patient experience and our work environment," says Linda Flockhart, CVICU Manager, who notes that she works with a group of high achievers with a surgical mindset.

Lindsay Warren (left) and Lorna Baptiste led the CVICU's successful Beacon Award application.

Key to this recognition was a number of CVICU initiatives that promote a healthy work environment for patients and staff. CVICU also created several inter-professional resources teams, including acute pain service, nutrition and wound care teams, comprised of physicians, nurses, pharmacists, dieticians and others.

Professional development is another priority in CVICU. Four nurses have completed fellowships, the unit participated in three nutrition research studies and management is providing support for 23 nurses who are writing their critical care certification exam this year.

"Five months ago, we applied for this award and began the Beacon journey," says Linda. "I hope other units are inspired by the competition and will take on this challenge."

PETER MUNK CARDIAC CENTRE - CLINICAL & RESEARCH REPORT

Acknowledgments

Dr. Peter Backx
Dr. Tirone David
Dr. Chris Feindel
Linda Flockhart
Dr. Patricia Murphy
Dr. Gary Newton
Denise Perks
Dr. Viv Rao
Dr. John Ross
Dr. Barry Rubin
Dr. Peter Seidelin

In the news

Dr. Viv Rao is known internationally for his contributions to the surgical treatment of end-stage heart disease.

DR. VIVEK RAO TO LEAD DIVISION OF CARDIOVASCULAR SURGERY

Dr. Vivek Rao has been named the new Head of the Division of Cardiovascular Surgery at the Peter Munk Cardiac Centre, University Health Network.

Dr. Rao received his medical degree from the University of Toronto in 1992, where he subsequently completed his PhD in the Surgical Scientist Program and his cardiac surgical training. He underwent further fellowship training in cardiac transplantation and mechanical circulatory support at Columbia-Presbyterian Hospital in New York.

On returning to Toronto, Dr. Rao was appointed to the faculty in the Division of Cardiovascular Surgery in 2001 and was promoted to the rank of Professor of Surgery at the University of Toronto in 2010. Dr. Rao is currently the Surgical Director of the Heart Transplant and Mechanical Circulatory Assistance Program at the Peter Munk Cardiac Centre and is the Alfredo and Teresa DeGasperis Chair in Heart Failure Surgery at UHN and the University of Toronto.

Dr. Rao's clinical interest is in the surgical treatment of end-stage heart disease. He has been a highly productive surgeon scientist, has won many awards for his achievements and has numerous publications to his name. His research interest is in the area of novel techniques of myocardial protection for cardiac transplantation and in new therapeutic strategies to prevent transplant coronary artery disease. The heart transplant/Ventricular Assist Device research group at the Peter Munk Cardiac Centre is part of the largest heart failure program in the country and is actively involved in several international trials in heart transplantation and mechanical circulatory support.

MUNK CARDIAC CENTRE WELL REPRESENTED AT AHA SESSIONS

Experts from the Peter Munk Cardiac Centre shared their knowledge and experiences with colleagues from around the world at the recent American Heart Association (AHA) *2011 Scientific Sessions* in Orlando, Florida.

Among the staff presenting or moderating sessions were: Dr. Vijay Chauhan, Dr. Mansoor Husain, Dr. Vivek Rao, Dr. Candice Silversides and Dr. Richard Weisel.

In addition, clinicians and researchers from the Centre contributed more than 30 scientific posters.

The AHA *Scientific Sessions* is the leading cardiovascular meeting in the United States and one of the largest in the world, with over 17,000 international cardiology professionals attending.

For more information, please visit **www.petermunkcardiaccentre.ca**
To support the Peter Munk Cardiac Centre visit **www.inaheartbeat.ca**
or call **416-340-4056**

Thank you – our donors – for your continued support of the Peter Munk Cardiac Centre.

Peter Munk Cardiac Centre
There's always an answer. *We'll find it.*