Retrospective Review

Notable Cardiovascular Specialists in Canada:

Standing on the Shoulders of Giants—
Past, Present, and Future

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Introduction

One summer day in the year 1926, four heart specialists met for a luncheon in Montreal to discuss the creation of an organization analogous to the American Heart Association. Of the four men, three were recent graduates returning to the city from their cardiology training: Dr. Ray Brow and Dr. Harold Segall from McGill University, and Dr. Albert de Guise from the University of Montreal. The fourth, Dr. Cecil Birchard, was a graduate of the University of Toronto and director of the Department of Clinical Electrocardiography at Montreal General Hospital. The seed was sown for the eventual rise of the Canadian Heart Association, but no significant progress would be made until 20 years later.

The decisive moment of action came over coffee and brandy in February 1946. Dr. Ignacio Chavez, a distinguished cardiologist from Mexico, was in Montreal while visiting family. During the dinner organized by Drs. Birchard, Brow, Segall, and Hoff, Dr. Chavez advocated for a Canadian delegate to attend the inter-American Congress of Cardiology scheduled for October 1946. To attend, Canada needed its own “Heart Society.” With a fast-approaching deadline, the dinner party of four swung into action. By September 1946, the Montreal Cardiac Society was formed to facilitate creation of the Canadian Heart Association, and Dr. Segall represented Canada as a semi-official delegate at the 1946 Inter-American Congress of Cardiology. The proposal for the Canadian organization was formally brought to the Royal College in November 1946 by a dozen cardiologists across the country, and the Canadian Heart Association was officially established on June 24, 1947.

It has been 75 years since the formation of the Canadian Cardiovascular Society (CCS), which was renamed from the Canadian Heart Association in 1962. The initially club-sized group of heart specialists has flourished into a diverse national organization that contributed to a 75% decline in cardiovascular deaths in Canada. The CCS now plays a key role in cardiovascular care with its resounding innovations and guidelines that influence patients and healthcare providers worldwide. As we celebrate the 75th anniversary of the CCS, let us revisit just some of the influential doctors in Canadian history who built the foundation for our progress, and introduce some of the rising stars that light our path to an even more successful future. The list of individuals below is by no means exhaustive. We hope to highlight other notable cardiovascular specialists in future editions of the journal.

Dr. Maude Abbott
The first female cardiovascular specialist in Canada

The *Atlas of Congenital Heart Disease*, published in 1936, laid a foundation that supported the decades of flourishing developments in both the diagnostic and surgical fields of heart defects. The *Atlas* has since become the standard reference guide in the subject of congenital heart disease and includes many anatomical specimens that are becoming ever more uncommonly witnessed in the era of high-tech imaging. Its author, Dr. Maude Elizabeth Seymour Abbott (March 18, 1868 – September 2, 1940), was one of the first female Canadian physicians and the first woman to receive an honorary medical degree from McGill University - eight years prior to the university opening its doors to female medical students. Dr. Abbott found her passion in medicine during her undergraduate years in McGill, but was unfortunately barred from entering the medicine program due to her being a woman. She instead pursued her medical
degree at Bishop Medical College and excelled in her studies, earning the Senior Anatomy Prize and Chancellor’s Prize as she graduated in 1894.6

After three years of post-graduate studies in Europe, Dr. Abbott returned to Montreal to set up her own clinic for women and children, which often received young patients with congenital heart defects. In 1898, she accepted the position of Assistant Curator of the McGill Medical Museum.5 During her appointment as Curator starting in 1901, Dr. Abbott enlightened multiple generations of medical students with her informal teaching demonstrations at the museum, and transformed the building into an integral part of medical learning.5 Her efforts and contributions led to McGill University incorporating the museum as a mandatory part of its medical curriculum in 1904.5 In 1905, Dr. Abbott was invited to author a chapter on congenital heart disease by Sir William Osler, who was in the process of creating his book *Systems of Modern Medicine* at the time. Her submission greatly impressed Dr. Osler, who praised her work to be “by far and away the very best thing ever written in the subject in English - possibly in any language”.7 It was clear by then Dr. Abbott’s extensive experience in pathology and congenital heart disease promised thrilling changes in the future of medicine. Her wealth of knowledge and inspiration would later culminate in the now world-renowned *Atlas of Congenital Heart Disease*. She also described the Eisenmenger complex 25 years after Victor Eisenmenger reported the case of a cyanotic adult with a large ventricular septal defect.52

Dr. Arthur Martin Vineberg
A pioneer of the precursor procedure to coronary artery bypass grafting (CABG)

The internal mammary artery (IMA), favored for its accessibility, resistance to atherosclerosis, and high rates of long-term patency, is considered the first-choice conduit for coronary artery bypass grafting (CABG) in the modern era. However, few are aware that its value in the treatment of coronary artery disease was not initially recognized for CABG, but rather a procedure now obsolete in cardiac surgery. The Vineberg procedure was the first technique to use the IMA as a source of extracardiac blood in perfusing chronically ischemic myocardium.8 This procedure involves implantation of the left IMA directly into the myocardium of the left ventricle without a direct vascular anastomosis.

**Dr. Arthur Vineberg** (May 24, 1903 – March 26, 1988), a Canadian cardiac surgeon, developed the technique in the 1940s...
among a surge of interest in the surgical community to improve coronary circulation for treatment of angina pectoris. Atypical from the general stream of thought at the time, which revolved mostly around increasing intercoronary collaterals, Dr. Vineberg believed rather than attempting to surgically stimulate collateral formation, which is already being done by Nature itself, it will be more effective to directly introduce “a powerful new source of blood ... brought to the ischemic myocardium in such a manner as to bypass the occluded proximal portions of the major coronary vessels”. His first human patient received the operation in 1950 and early clinical results reported encouraging outcomes of symptomatic relief. However, waiting around the corner in 1958 was the first double-blind trial in open surgery that disproved the efficacy of IMA ligation, another technique proposed to treat angina during that period of time. The results of this trial cast doubt upon the relative success Dr. Vineberg had described with his procedure, and contributed to a rising criticism of the placebo effect in surgery. These criticisms, coupled with the fact that the medical community at the time lacked the means to objectively prove the efficacy of IMA implantation in humans, plunged the Vineberg procedure into a whirlpool of intense debate for more than a decade. It was not until 1962, after the invention of coronary angiography, that the procedure finally began to gain traction. However, the Vineberg procedure was soon abandoned by the medical community in favor of CABG, which took inspiration from Vineberg and was developed amidst the Vineberg debate in the late 1950s and early 1960s. By the 1970s, the Vineberg procedure had become obsolete in the field of cardiac surgery and what remains is the appreciation for the IMA as an invaluable extracardiac blood source.

Dr. Wilfred Gordon Bigelow

The surgeon who created the world’s first pacemaker

The cardiac pacemaker is a common device seen in the treatment of bradyarrhythmias. Over the seven decades since its first prototype was built in Canada, this device has evolved from a heavy table top radio to the newest leadless models that are the size of a nickel. The spark of inspiration that initiated this process came from a simple act of curiosity during a hypothermia experiment by Dr. Bigelow and Dr. Callaghan. Dr. Wilfred Gordon Bigelow (June 18, 1913 – March 27, 2005) was a Canadian cardiac surgeon, scientist, and educator. He is best known for his research in hypothermia, cardiac pacing, and heparin. He also created Canada’s first Cardiovascular Investigation Unit, commonly referred to as “Bigelow’s Bungalow”.

During his service as an army surgeon in World War II, Dr. Bigelow witnessed the physiological effects of hypothermia on the battlefields and started studying hypothermia upon returning from war. His discovery of decreasing oxygen demands during low body temperature pioneered the eventual invention of extracorporeal cooling that drastically decreased the dangers of open-heart surgery and is still in use today. One of the
major obstacles in his research was the asystole that often accompanied low core temperatures. One day in 1949, a dog’s heart suddenly stopped during an experimental operation under hypothermia. Out of curiosity, and perhaps frustration, Dr. Bigelow gave the heart “a good poke”. To his surprise, the poke from his probe caused the heart to contract, and subsequent pokes allowed the heart to beat to the rhythm of the stimulus. After discussion with his colleague, Dr. John C. Callaghan, they hypothesized that electrical impulses will be able to maintain cardiac contractions during open heart surgery. This triggered the collaboration with John Hopps, now known as the father of biomedical engineering in Canada, to develop the world’s first human cardiac pacemaker for continuous use in 1951.

Dr. William Thornton Mustard
The one who created the Mustard procedure to save thousands of children’s lives

The Mustard procedure is an atrial switch technique developed in the 1960s to treat infants born with transposition of the great arteries (TGA). TGA is a cyanotic congenital heart defect where the aorta and pulmonary artery are reversed in position - the aorta exits from the right ventricle and the pulmonary main stem exits from the left ventricle. The mortality rate of this condition was 90% in the first year of life, and no definite treatment existed until the late 1950s. Dr. William Thornton Mustard (August 8, 1914 – December 11, 1987) was a Canadian surgeon who specialized in both orthopedic and cardiac surgery. In 1952, he published the first procedure to bear his name - the Mustard operation, a technique that replaced paralyzed muscles of polio patients and offered them significantly higher quality of life.

After his work on polio, he turned his attention to cardiac surgery and focused on congenital heart defects, especially TGA. He had attempted an arterial switch technique in 1952 but was unsuccessful. The first viable corrective measure was 5 years in the future, when Dr. Ake Senning developed the Senning atrial switch procedure in 1958, where instead of switching the arterial trunks, the atria are reconstructed with an atrial baffle to shunt systemic and pulmonary venous blood to the left and right sides of the heart, respectively. Despite successful outcomes, the Senning procedure was not widely adopted due to the high complexity of the procedure that made it extremely difficult to perform. Dr. Mustard was able to simplify the procedure by using a patch of autogenous pericardium instead of atrial septal tissue to create the baffle, and successfully performed his version of the atrial switch procedure on a 18-month girl in 1963. Moving forward from this point, the Senning procedure became increasingly uncommon in favor of Dr. Mustard’s technique, and this became the second operation to bear the Mustard name. The Mustard repair of TGA was routinely performed until it was superseded by the arterial switch procedure in the 1980s. 
Dr. Lucien Campeau

The one who proposed the CCS angina class that put CCS on the world map in cardiovascular care

The Canadian Cardiovascular Society (CCS) grading of angina pectoris is a widely accepted classification scale for assessing the functional severity of angina. However, not many are aware of the individual who established such a grading scheme. Dr. Lucien Campeau (June 20, 1927 – March 15, 2010) was the Canadian cardiologist who led the ad hoc committee that created the CCS grading of angina pectoris. He published the classification system in a letter to Circulation in 1976 that was rapidly accepted by the medical community. In comparison, his research on radial access in angiography was received with less enthusiasm.

The transradial approach in interventional cardiology is often favored over the transfemoral approach for its advantages in safety and efficiency. It offers patients less discomfort, no limitations in mobility post-procedure, and is widely adopted as a primary access for many centers around the world. However, the first few years of its introduction barely made a splash in the medical field. Dr. Campeau first published his case series of 100 patients on whom he performed radial angiograms in 1989. His work caught the eye of two European colleagues, Drs. Kiemeneij and Laarman, who adapted the transradial approach to coronary artery stenting in 1993. However, the response of the medical community was tepid and Dr. Campeau’s transradial approach did not gather much more attention until 1997, when the ACCESS study showed lower rates of major access site complication in the transradial approach compared to transbrachial and transfemoral approaches.

Dr. Salim Yusuf

The master of clinical trials who developed the concept of “large simple trials”

Dr. Salim Yusuf is a world-renowned Canadian cardiologist, epidemiologist, and one of the most cited researchers in the field of cardiology. He is acclaimed as a “master of clinical trials”, and lives up to this title with numerous groundbreaking trials that have shaped the management guidelines for cardiac patients. Dr. Yusuf first found his interest in cardiology research during his DPhil studies at Oxford in 1976 and finished the degree with his doctoral thesis in “Beta adrenergic blockade in myocardial infarction”. His time in Oxford marked the start of the ISIS trial series that would go on to show the benefits of beta blockers, ACE inhibitors, thrombolytic therapy, and most importantly aspirin in the treatment of acute myocardial infarction. The ISIS trials not only helped shape clinical guidelines, but also revolutionized how clinical trials are conducted.
The “large simple trial”, a concept developed by Dr. Yusuf and his colleagues Drs. Rory Collins and Richard Peto, strips clinical trials of all unnecessary complications and focuses on acquiring a large sample population to answer a simple question, with simple interventions, simple follow up, and simple analyses. Many other impactful clinical trials have since adopted this design, including the HOPE trial in 2000 led by Dr. Yusuf, which demonstrated the benefit of ACE inhibitors in high risk cardiac patients without heart failure. However, some of Dr. Yusuf’s greatest contributions in cardiology is not in management, but rather his global population health studies in prevention of cardiovascular disease. His collaborative case control trials that span the globe, such as INTERHEART, INTERSTROKE, and PURE, lays the strong foundation that make his vision of reducing cardiovascular disease by 50% in a generation a tangible future to look forward to.

Dr. Jack Tu

The creator of the first Canadian Cardiovascular Atlas

The Canadian Cardiovascular Atlas published in 2006 is a landmark publication that unveiled the reality of “geography is destiny” when considering cardiovascular disease (CVD) in Canada. It is the largest and most advanced report to examine the geographical disparities among CVD burden, treatments, and outcomes across the Canadian map. The Atlas identified the gaps of care within the Canadian health system and has helped change many lives with recommendations to improve cardiovascular care. This project was spearheaded by Dr. Jack Tu (March 1, 1965 – May 30, 2018), leader of the Canadian Cardiovascular Outcomes Research Team (CCORT), and a Canadian cardiologist with a vision ahead of his time. His passion in quality cardiac care led to several studies that challenged the status quo. In 2009, during a period of time when public report cards of hospital performance were gaining momentum, he published the world’s first cluster randomized trial of these practices - the EFFECT study - demonstrating that these reports do not necessarily improve quality of care in hospitals. In 2014, he led the development of the CANHEART health index as a tool to monitor the cardiovascular health of the Canadian population and later published the CANHEART Study in 2016 challenging the widespread notion that raising HDL cholesterol may lead to improved mortality. It was an unfortunate loss for the medical community when Dr. Tu’s career ended suddenly in 2018. However, his legacy of big data research and improving community-based cardiovascular care in Canada will be carried far into the future.
It was an exciting time in Ottawa on May 11, 1976 as the University of Ottawa Heart Institute (UOHI) opened its doors to the public. This health center would grow to be Canada’s largest in the treatment and prevention of cardiac disease. UOHI filled an important void in Canadian healthcare, before which patients had to travel to the United States for heart surgery. It may be difficult to imagine that in the humble beginnings of UOHI, the facility operated on a single surgeon - Dr. Wilbert Keon (May 17, 1935 – April 7, 2019), who carried 24/7 call for three years. Dr. Keon was a young Canadian surgeon working at Harvard when he was recruited to build a Canadian version of the Texas Heart Institute by Jean-Jacques Lussier, the Dean of Medicine at University of Ottawa returning from the US post his heart surgery. He certainly did not disappoint. As founder of the UOHI he spent the next three decades leading UOHI towards the world-renowned institute he had envisioned, consistently walking the leading edge of Canada’s medical community.

In 1986, Dr. Keon once again made history by successfully performing Canada’s first artificial heart transplant, which granted the patient a life-saving grace period before she received her donor heart and went on to enjoy twenty more years of life. His influence reached to those outside the cardiac field during his time as a Senator, during which he was heavily involved in various projects related to health care, including the creation of Canadian Institutes of Health Research (CIHR), which has since transformed medical research in Canada. Dr. Keon’s dream to forge the UOHI into a leader of cardiovascular medicine has become a magnificent reality and his legacy is continued by the lives he touched during his career.

With the advancement of modern surgical techniques and innovations, an increasing number of patients with congenital heart defects (CHD) live into adulthood and reach old age. However, the age shift in CHD patients brought to light new challenges in cardiac care, as many of these patients experience lifelong complications from their underlying heart defect. The world was in need of another evolution in the field of cardiology - adult congenital heart disease (ACHD). Canada had been on the forefront of CHD management with contributions such as Abbott’s Atlas of Congenital Heart Defects, Bigelow’s hypothermia research for open heart surgery, and Mustard’s TGA repair as described in the previous segments. So perhaps it was not surprising that the first international ACHD guidelines were published in Canada, by the Canadian Cardiovascular Society in 1996.
Dr. Gary Webb (January 3, 1943 - October 19, 2021) led the development of these guidelines. He was revered as the Father of ACHD in Canada, and recognized as a pioneer of the subspecialty internationally. After his cardiology training at University of Toronto, Dr. Webb joined the Toronto Congenital Cardiac Center for Adults as co-director in 1980, taking over as director in 1986 until 2004. This center was one of the first ACHD clinics in the world, and it created many generations of ACHD specialists. To unite the ACHD providers throughout the country and around the globe, Dr. Webb founded the Canadian Adult Congenital Heart (CACH) network and the Congenital Heart International Professionals (CHIP) network, respectively. He proactively shared educational materials and expert opinions, making an effort to ensure free access of these resources and promote scientific exchanges. His vision for international collaboration was largely what provided the fertile grounds for a young subspecialty such as ACHD to become as influential as it is today.

Dr. Heather Ross

A passionate advocate for heart failure care

Dr. Heather Ross is a cardiologist, heart failure researcher, and one of Canada’s greatest explorers. Dr. Ross found her passion for heart failure in medical school, when she experienced the passing of her grandmother who suffered from the same condition. Following this passion, she joined the Ted Rogers Centre for Heart Research (TRCHR), which houses the largest Advanced Heart Failure program in Canada, specializing in advanced therapies of end-stage heart failure, including mechanical circulatory support and heart transplantation. Unfortunately, financial constraints often limited patients’ options of care. One of the therapies severely limited by funding was mechanical hearts, which provide temporary pumping assistance for the patient until a transplant heart becomes available.

In 2006, Dr. Ross created the Test Your Limits campaign to raise awareness and funds for research and treatments of heart failure, as well as promote exercise in the general population. Test Your Limits involved expeditions to extreme environments such as Antarctica with a group of explorers that included both health care providers and transplant patients. Not only did this initiative inspire others, it also inspired Dr. Ross herself. The first expedition in 2006 ended in a near-death experience, where Dr. Ross suffered from pulmonary edema, describing the feeling as “drowning in your own bodily fluid”. This first-hand experience gave her incredible insight and
transformed her compassion for her heart failure patients: “I only felt it for hours. We have patients who live that way. It’s profound.” Despite the terrifying encounter, Dr. Ross remains an avid traveler and explorer, and with an even deeper dedication for her patients, she continues to change the landscape of modern cardiac care for heart failure with her research in digital health and remote patient monitoring. She is a co-creator of the Medly app, which currently monitors over 600 heart failure patients in real-time, and a founder of TRANSFORM HF, an initiative to achieve equitable specialized care across the country via technology. These projects paint an exciting future where medicine can finally overcome “geography is destiny” and high quality specialty care will no longer be a privilege exclusive to urban centers.

Dr. Jacqueline Saw

World leader in spontaneous coronary artery dissection (SCAD)

Dr. Jacqueline Saw is a Canadian interventional cardiologist and a world leader in the research and treatment of spontaneous coronary artery dissection (SCAD), a condition that often presents as myocardial infarction in young women who are otherwise healthy. As a young woman, Dr. Saw empathizes with this patient group, and derives great fulfillment in helping these women find answers to this poorly understood disease. She leads various studies that provide valuable perspective on the uncharted territories of SCAD, including the Canadian SCAD study examining the features of SCAD presentation and short-term complications, the SAFER-SCAD study investigating the effect of statins and angiotensin-converting enzyme inhibitors on SCAD symptoms, and the Canadian SCAD Genetic Study inspecting certain genetic variants associated with SCAD. Dr. Saw also created a classification system for variants of SCAD on angiogram and an algorithm to facilitate the angiographic diagnosis of SCAD.

With advancing research and growing knowledge in SCAD, it is evident that in addition to diagnostic challenges, the lack of a disease-specific rehabilitation program also poses as a significant barrier in SCAD management, especially since SCAD patients have been found to have high rates of major adverse cardiac events after the first event. The typical cardiac rehabilitation program involves an intense exercise component, which may not be applicable in SCAD patients given the potential association between strenuous physical activity and SCAD. Recognizing the gap in care, Dr. Saw and her team created the world’s first SCAD-specific cardiac rehabilitation program in 2011, which showed improvements in symptoms and decreased cardiovascular events in an initial review. With the continued efforts of Dr. Saw and other SCAD researchers around the world, the once rare condition is rapidly gaining interest in the medical community, and patients can hope to receive more timely and targeted care in the future.
Dr. Sonia Anand
A leader in diversity

Dr. Sonia Anand is a Canadian vascular specialist and epidemiologist best recognized for her research and efforts in improving women’s health, particularly in the field of cardiovascular disease (CVD). It was only a few decades ago that women were denied cardiovascular care due to a lack of education and awareness of the CVD prevalence and presentations in the female sex. As a result, the historical decline for CVD mortality in women was delayed for more than two decades compared to that in men, and the death rates between the sexes were only equalizing beginning in 2012. Other minority groups also suffer the same drawbacks of under-representation and hence lack population-specific strategies to prevent and treat CVD. Dr. Anand’s research focuses on ethnic communities that are at high risk of CVD, identifying genetic predispositions in various ancestries and examining health behaviors in different cultures. She established the Gender Research and Cardiovascular Evaluation Network (GRACE) Network, which promotes gender-based research in CVD and ensures public accessibility of the research results. Dr. Anand’s contributions have not only helped clinicians better understand the implications of CVD in diverse populations, but also empowered women to take their cardiovascular health into their own hands. Her dedication to ethnic minorities extends into the COVID-19 pandemic, as she now leads the COVID CommUNITY – South Asian study, a trial that aims to better understand the effect of the COVID-19 vaccine in the South Asian population. As a professor at McMaster University, her passion for the health of women and ethnic communities will surely be passed onto the next generation of physicians to better care for the increasingly diverse patient populations.

Dr. Alexandra Bastiany
The first black female interventional cardiologist in Canada

Dr. Alexandra Bastiany was not expecting to make history when she followed her childhood dream of becoming an interventional cardiologist. She soon learned afterwards that she is the first black female interventional cardiologist in Canada, and her journey has ignited the dreams of young Black girls all over the country. This is an exciting first step to improve the diversity of not only the cardiovascular field, but the medical field in general. It is no secret that patients gravitate towards doctors who look like them, who speak their language, or who understand their backgrounds. However, with only 20% of cardiovascular specialty physicians and 6% of interventional cardiologists being women in Canada, there is still much more to be desired. Dr. Bastiany has experienced first-hand the biases and microaggressions associated with her gender and race. She has since established herself as...
a strong ally and mentor for minorities like herself, hoping to be a guiding light for those with similar struggles and welcome more minority individuals into the field of medicine.

Significant progress has been made since the 19th century, when Dr. Maude Abbott was rejected entry into the male-only medical program at McGill University. Dr. Bastiany’s accomplishment is an encouraging sign that the cardiovascular society has matured not just medically, but also socially. With the efforts of Dr. Bastiany and other mentors in promoting the representation of minority groups in medicine, the future of cardiovascular care is bound to be more diverse than ever before.

In conclusion

From the CCS classification systems, to the annual Canadian Cardiovascular Congress, the CCS has established a remarkable presence in the field of cardiology. As one of the most sparsely populated countries in the world, our community may be small in numbers, but we are never short of inspirational giants who pioneer groundbreaking research and leave key footprints in the history of cardiovascular research, education, prevention, and management. Thanks to the Canadian pioneers in cardiovascular medicine, Canada’s impact in cardiovascular medicine was evident far before the CCS was established. Now working as a unified force, we are constantly uncovering new knowledge, improving quality of care, and inspiring future generations. Happy 75th Anniversary to the CCS and to all the members of the Society! We are on route to a future with unlimited potential.

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