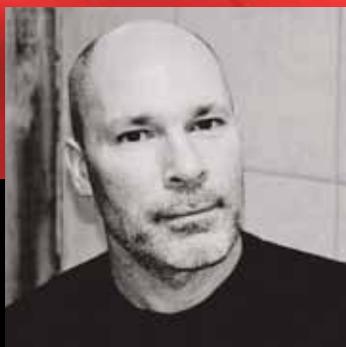


GETTING TO **THE HEART** OF THE MATTER



SOLVING CARDIOVASCULAR DISEASE THROUGH RESEARCH

2015 REPORT ON THE HEALTH OF CANADIANS





Decades of progress has saved countless lives and tangibly improved the health of generations of Canadians. BUT OUR BIGGEST RESEARCH CHALLENGES LIE AHEAD.

Sixty years of cardiovascular disease research in Canada has resulted in a deeper understanding of its root causes, some astonishing medical breakthroughs, and unprecedented insight into what needs to be done to promote heart health across the country.

Research has helped millions of Canadians and their loved ones by enabling earlier diagnosis, providing life-saving treatments and drugs, shaping environments that support them to make healthy choices, and arming them with the information they need to recognize and understand the disease and take action. It has paved the way for these advances by identifying the problems, asking the right questions and proposing, testing, and improving solutions.

Research underpins every success we have achieved in improving the heart health of Canadians, but what it has not yet done is solve heart disease.

The **Heart and Stroke Foundation 2015 Report on the Health of Canadians** looks back on 60 years of life-saving, ground-breaking research, comparing then and now. It also looks to what lies ahead, identifying problems that have yet to be solved as well as new challenges raised by our changing population.

For this report we spoke with 16 of Canada's top cardiovascular experts* to help us understand how disease prevention, treatment and care has changed over the past 60 years as a result of research. They

identified incredible advances. They also pointed to existing gaps that urgently need to be addressed, and new and alarming challenges.

We also **polled**** Canadians to find out how far they think we have come in heart disease prevention, research and care, and where they think work still needs to be done.

CREATING MORE **SURVIVORS**

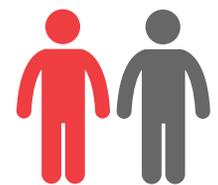
What has been the greatest accomplishment regarding heart disease over the past 60 years? It may seem daunting to narrow it down, but there is one obvious answer: survival rates.

The chances of dying from a heart attack have decreased five-fold. In the 1950s and 1960s, of those who made it to hospital after a heart attack, 30 - 35 per cent did not survive. Today that number has been reduced to about five per cent. Or put another way, nearly 95 per cent of Canadians who have a heart attack and get to a hospital will survive. Surprisingly, many Canadians do not know this — in

THEN AND NOW...

1950s: 65 - 70% of Canadians who made it to hospital after a heart attack survived.

TODAY: 95% of Canadians who make it to hospital after a heart attack survive.



1 IN 2 CANADIANS HAS BEEN TOUCHED BY HEART DISEASE

fact according to our **poll** fewer than one-quarter of Canadians realize that survival rates are now so promising. And yet, heart disease has an extensive reach across our country and throughout our communities, with more than half of Canadians **polled** reporting that someone close to them has had heart disease.

In 1952, cardiovascular disease (heart disease and stroke) was responsible for almost half (46 per cent) of all deaths in Canada;

that number has been cut almost in half but cardiovascular disease still accounts for more than one-quarter (27 per cent) of all deaths in Canada each year — more than 66,000 deaths.

THEN AND NOW...

1950s: Cardiovascular disease was responsible for almost half of all deaths in Canada.

TODAY: Cardiovascular disease is responsible for over one-quarter of all deaths in Canada.

Heart disease and stroke are the leading cause of hospitalization and the second leading cause of death in Canada. They are the biggest driver of prescription drug use and a leading cause of disability, and cost the Canadian economy more than \$20.9 billion every year.

The typical heart patient: Not what he used to be

The statistics around heart disease have changed over the past five to six decades and so have the people behind those numbers. In the 1950s, almost half of heart patients were smokers compared with 18 per cent today. Three-quarters of patients had high blood pressure, and of these, only 20 per cent were taking drugs to control it.

Dr. Eldon Smith began practicing cardiology in the 1960s and has seen a shift in the typical heart patient over his long career. When asked to describe the difference between then and now, he paints a shocking and detailed picture.

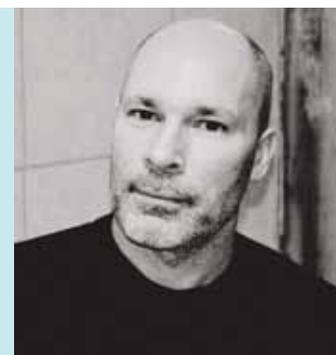
“Back then, 75 per cent of my patients were male. The average age was 55; they were married, employed, smokers, overweight, and sedentary. They usually had other risk factors such as high cholesterol and high blood pressure, which may have been diagnosed but were likely not being managed — the drugs were so awful they would not take them,” says Dr. Smith.

He contrasts this with what he sees today: “Now the average patient is older, still male dominated, but much less so. They still tend to be overweight, many have high blood pressure and elevated cholesterol, but these will mostly likely be managed.”

TIM'S STORY:

“I almost regret I don't have a mark to show.”

Four years ago Tim McEown, 52, was at home with his girlfriend Sarah when he experienced a heart



Tim McEown

attack, and he recognized what was happening almost immediately. Sarah called 9-1-1 and emergency medical services arrived in less than seven minutes. Tim was rushed to the hospital, had stents inserted through a three-quarter inch incision in his wrist up to his heart and felt immediately better. From the time the ambulance arrived to the surgery being completed was less than an hour and a half, and Tim was back home three days later.

“The contrast between my heart attack and my father's triple bypass surgery more than 20 years ago could not be more profound,” says Tim. “His surgery was invasive and traumatic while my experience, incredible as it may seem, left no more of a mark than having my blood taken. My dad was in hospital for more than a week and he was on the table for several hours. I was out of surgery in less than 70 minutes and home in three days, with little risk of post-surgical complications. I almost regret I don't have a mark to show for my near-death experience whereas Dad had his chest spread wide open and the scars to prove it.”

Looking at the statistics, today the average age of heart attack is 71, and in the 1950s it was much younger. How we talk about it has changed as well, as it used to be common for scientific papers to refer to the age of premature death as 60, but today we would describe anyone under 75 dying from heart disease as premature.

THEN AND NOW...

1950s: 60 YEARS OF AGE was considered a premature death.

TODAY: 75 YEARS OF AGE is considered a premature death from heart disease.

When a patient arrived at a hospital experiencing an acute myocardial infarction (AMI) — otherwise known as a heart attack — several decades ago, he or she was facing a long stay with weeks of bed rest, rudimentary treatment, and little, if any, rehabilitation. Today the average length of stay in hospital is about five days. Cardiac rehabilitation programs have been shown to help survivors recover to the fullest, although there are still huge gaps in access and only about one-third of those eligible are referred to a program.

Women and heart disease

Heart disease is no longer only a man's issue. More women are dying from cardiovascular disease than men, and it is a leading cause of death, disability and hospitalization. For women, the risk of developing heart disease increases after menopause. Although heart disease death rates are declining in general, the decline has been slower in women. In 2011, according

to Statistics Canada's most recent numbers, 33,196 women and 32,982 men died of heart disease.

And yet, heart disease is often underestimated in women, both by women themselves and health care professionals. Although chest pain is the most common symptom in both men and women, women are more likely to also have pain other than chest pain. Heart attacks go unrecognized in women more than half the time and there are differences in the treatments women and men receive. Women are less likely to receive preventive medications and some interventions such as angioplasty.

Dr. Karin Humphries explains that women often have worse outcomes than men with new types of procedures. "We optimize therapies on men and then we have to make improvements for use on women," she says. Dr. Humphries has identified the heart health issues that are specific to women as an area that will benefit greatly from further research.



**1 IN 100
BABIES
IS BORN WITH
A CONGENITAL
HEART
DEFECT
IN CANADA**

Children and heart disease

Babies are not typical heart patients. And yet, unfortunately about one in every hundred babies is born with a congenital heart defect — meaning that their hearts or nearby blood vessels do not develop normally.

Thanks to medical advances in Canada and around the world, survival of children with congenital heart disease has greatly improved. Sixty years ago,

CARLY'S STORY: "20 years ago, we would have lost her."

Shawn Dohey and Krista Spears' joy at the arrival of their new baby Carly was quickly tempered with panic when they learned she had a congenital heart defect that would require open-heart surgery. At four months old, Carly underwent heart surgery at IWK Health Centre in Halifax, and two and a half years later she is a typical, energetic three-year-old who loves ballet, swimming, gymnastics and playing with her two dogs. If asked about her zipper scar, Carly is happy to explain she was born with a special heart.

"We are grateful to the Heart and Stroke Foundation for the research they have funded over the past six decades. It's hard not to get emotional when we realize that had our beautiful daughter been born 20 years ago, we would have lost her. It is thanks to groundbreaking research accomplishments made possible with support from a generous public that we are today the proud parents of a healthy, active little girl who was born with a special heart. She is our little three-year old hero!" says Krista.



Carly Dohey

THEN AND NOW...

1950s: Fewer than **20%** of infants born with complex heart defects reached adulthood.

TODAY: More than **90%** of infants born with complex heart defects reach adulthood.

fewer than 20 per cent of infants born with complex heart defects reached adulthood, but today, more than 90 per cent do. Improved care throughout their lives can help them to avoid or manage complications and live life to its fullest.

GETTING TO THE HEART OF IT: IDENTIFYING RISK FACTORS

Research has driven every improvement in cardiovascular health. But the journey is far from over. Before we were able to properly diagnose and treat heart disease, let alone prevent it, much time and effort went into the first step of trying to identify the symptoms and understand the causes.

Research into the identification and understanding of the risk factors that influence cardiovascular disease has had a monumental impact, and holds even greater promise for the future. In the 1950s doctors did not have a good grasp of what heart disease was, what caused it, or how to treat or prevent it. By identifying the risk factors researchers were able to pinpoint the causes and develop tools to treat and manage them, which reduced the risk of first or subsequent heart attacks, and of developing heart failure.

Highs and lows of blood pressure and cholesterol

Recognizing high blood pressure (hypertension) and high cholesterol as major risk factors for both heart disease and stroke were turning points and provided direction for further exploration. For example, once the link between these elevated conditions and heart attacks was established through population studies, the obvious question was whether lowering them would prevent heart disease, and if yes, how could this be done?

Tests were developed to measure the conditions, drugs were developed to treat them, and research trials were carried out that revealed their efficacy. However, patients experienced side effects from the first drugs developed, and there were complaints that the treatments were worse than the disease.

More research resulted in better drugs. More importantly, further investigation revealed that both conditions could be reduced by lifestyle changes such as being tobacco-free, eating a healthy diet and being physically active. All of this information then needed to be disseminated to healthcare providers and included in clinical practice guidelines, and further communicated to Canadians.

RISK FACTORS YOU CAN DO SOMETHING ABOUT:

- **EAT A HEALTHY DIET.** Aim for between five and 10 servings of vegetables and fruit every day.
- **BE PHYSICALLY ACTIVE.** Try to get at least 150 minutes of moderate- to vigorous-intensity activity per week, in bouts of 10 minutes or more.
- **BE SMOKE FREE.**
- **IF YOU CHOOSE TO DRINK,** consume alcohol in moderation. Women should limit themselves to two drinks a day, to a weekly maximum of 10; and men to three drinks a day to a weekly maximum of 15.
- **MANAGE STRESS.** Identify the source of your stress, talk to friends and family and take time for yourself.
- Know and control your **BLOOD PRESSURE.**
- Keep your **BLOOD CHOLESTEROL** in check.
- Manage **DIABETES.**
- Achieve and maintain a **HEALTHY WEIGHT:** Watch your waistline.



9 IN 10
CANADIANS
HAVE AT LEAST
ONE RISK
FACTOR FOR
HEART DISEASE
OR STROKE

Take our free Heart&Stroke Risk Assessment at heartandstroke.ca/risk.

RISK FACTORS YOU CANNOT CONTROL:

- Age
- Gender
- Family history
- Ethnicity
- History of stroke or transient ischemic attack (TIA or “mini-stroke”).

Despite advances made around risk factors, gaps remain and new challenges lie ahead. Nine out of 10 Canadians have at least one risk factor for cardiovascular disease, but according to our **poll**, only 12 per cent Canadians are aware of this fact. There is clearly still a need to raise awareness.

We now understand which behaviours increase risk. What we don't know is how best to help people make healthier choices. And gains have not been even across the risk factors. Where we have made tremendous improvement in managing hypertension and high cholesterol and decreasing smoking rates, we have lost an incredible amount of ground in physical activity, healthy weights (overweight and obesity), nutrition, and diabetes.

Clearing the smoke to make room for heart health

Ask researchers to provide one example of a positive change in the population that has improved heart health over the past 60 years, and almost to a person the answer is “smoking.” Ask them for their top three, and some still reply “smoking, smoking, and smoking.”



The decrease in smoking rates in Canada has been dramatic, from about 50 per cent in the 1950s to much less than half that today. Dr. Andrew Pipe, a physician and one of the country's leading tobacco researchers, points out that this shift in behaviour started with a shift in thinking.

“Forty years ago smoking was thought of as a lifestyle choice. It was everywhere — even doctors used to smoke. The transformation has been profound as public attitudes have changed and public policies and programs have been put in place,” says Dr. Pipe.

But he warns that the battle is far from over. Smoking has decreased significantly, but 16 per cent of adult Canadians still engage in a behaviour that is the leading cause of preventable disease, disability and

death. Heart and Stroke Foundation-supported research has shown the value of tobacco cessation programs in healthcare settings, and he notes that continued advocacy for stronger legislation to restrict tobacco sales and use is very important.

The proliferation of e-cigarettes is also posing new challenges. “The tobacco industry will attempt to use such products to destabilize smoke-free policies and discourage quitting,” says Dr. Pipe. Much is still unknown about these new products. The Heart and Stroke Foundation has called for further study into their potential harms and benefits, along with public policy to regulate them.

FROM UNDERSTANDING TO BETTER OUTCOMES

Dr. Eldon Smith identifies the etiology — or physical causation — of a heart attack as an illuminating example of how research over several decades enhanced our understanding of what actually happens in the body, leading to better treatment and improved outcomes in patients.

“We thought that patients went from 50 per cent occlusion — or narrowing of a coronary artery — to 70 per cent to 100 per cent when a heart attack occurred. But what we realized through studies was in fact that most heart patients only had a 50 per cent occlusion and it was a clot that actually caused the AMI [acute myocardial infarction]. This led us to using thrombolytics which are clot-busting drugs.”

Prescriptions for healthier hearts

The number of drugs available to manage risk factors and heart disease has exploded over the past few generations, from a scant few 50 years ago to 10 different classes of drugs today, with hundreds within each class. These medicines have continued to improve over time through further exploration, which has increased their effectiveness and their suitability for individual patients, and has decreased various side effects and improved how well they are tolerated.

A variety of drugs have been developed and enhanced to manage blood pressure since the 1970s:

- Beta blockers protect the heart from having subsequent attacks.
- ACE inhibitors cause blood vessels to relax and decrease blood volume, leading to lower blood pressure.



as imaging equipment, as well as incremental improvements and new uses for what already exists, for example a drug with fewer side effects.

Sophisticated imaging equipment, such as magnetic resonance imaging (MRI) scanners and CT (X-ray) scanners, has made diagnosis faster and more precise. Cardiac surgical techniques have evolved from nothing, to highly invasive procedures, to minimally invasive procedures.

In the first part of the last century there were virtually no surgical options — no safe ones at any rate. In 1954, the first open-heart surgery was performed in Canada, using a technique developed through a Foundation research grant. As the name implies, the procedure involves literally cutting open the chest; over time this has been modified to much smaller incisions.

Open-heart surgery has more and more been replaced by less invasive procedures. Angioplasty, one type of cardiac catheterization, is a non-surgical technique that involves a collapsed balloon being inserted via a needle puncture of the skin into a narrowed artery and then inflated to open the artery up. Often a stent is then inserted to ensure the vessel remains open.

Transcatheter aortic valve implantation (TAVI) is another innovative and less invasive valve replacement procedure developed in Canada about 15 years ago. It is available to older patients and others with significant valve problems who would not be able to tolerate open-heart surgery used in these cases.

- Statins are used to lower cholesterol and are effective at both preventing cardiovascular disease as well as treating those who have it.
- Anticoagulants and anti-platelets such as acetylsalicylic acid (ASA, commonly referred to as Aspirin) can be used to prevent dangerous blood clots from forming.

Cardiologists can be positively lyrical when describing how certain drugs have advanced treatment and care. “Statins came along and changed the world,” says Dr. Eldon Smith, “And the use of beta blockers — wow! Where would we be if we did not have beta blockers?”

Better equipped than ever to save lives

All of the equipment, devices, procedures and treatments developed to diagnose and treat heart disease have been the result of countless hours on the part of researchers from around the world, including Canada. This includes big breakthroughs such as heart transplants, and brand new technologies such

RESEARCH MILESTONES THAT MATTER

Dr. Wilfred Bigelow performs first successful open-heart surgery on a patient in Canada at Toronto General Hospital using a surgical technique developed through a Foundation research grant.	First coronary care unit established at Toronto General Hospital with Foundation funding. To this day, CCUs remain the gold standard for treating acute cardiovascular illness worldwide.	The Foundation introduces CPR to Canada by initiating the Emergency Cardiac Care System and creating the first CPR training program.	Dr. Adolfo de Bold discovers atrial natriuretic factor (ANF) the hormone that controls high blood pressure, sparking a revolution in blood pressure research.	Human genome mapped with Foundation funding, mapping out over 84,000 DNA sequences related to heart disease and stroke.	Foundation funded research enables first-ever in-utero surgery to correct congenital heart defects.	INTERSTROKE study identifies 10 risk factors that account for 90% of the risk of ischemic and intracerebral hemorrhagic stroke worldwide.
1950s	1960s	1970s	1980s	1990s	2000s	2010s

THEN AND NOW...

1950s: Survivors were often sick and lived a life of restriction.

TODAY: Survivors can thrive and lead even healthier lives than before.

A revolution in recovery

Fewer Canadians are losing their loved ones, thanks to success we have seen, but the flip side is that more people — an estimated 1.6 million in Canada — are now living with the effects of cardiovascular disease.

Comparing the quality of life in heart disease survivors between “then” and “now” reveals a true transformation according to Dr. Eldon Smith. People are not only surviving, they are thriving. Fifty years ago if someone survived a heart attack, they were often very sick and lived a life of restriction. They convalesced for months and were sent home and often advised to buy a rocking chair and watch TV, they were told not to return to work and to avoid physical activity, including sex. Their lives never went back to normal.

Survivors today are often discharged home within a few days, and can be back to work in a few weeks. Many return to live a normal life, and if they follow a cardiac rehabilitation program they can make remarkable changes and lead an even healthier life.

According to our **poll**, most Canadians (almost nine in 10) correctly believe someone who survives a heart attack should start to exercise within a few weeks. In fact, physical activity is important for recovery following an event and reduces the risk of a second heart attack. However the **poll** revealed misconceptions about recovery: only six in 10 Canadians believe heart attack survivors should resume sexual activity, drive, or return to work within a few weeks, and only one in four feel it is OK to fly. In reality, most people can do all this and more soon after a heart attack.

New challenges threaten progress

As much as we have improved heart health in many areas, we are in danger of losing the gains we have worked so hard for as some risk factors for heart disease increase sharply. Illustrating how our lifestyles have changed, not always for the better, diabetes rates in heart attack patients have sky rocketed from 17 per cent to 31 per cent in a matter of decades. There are about 2 million Canadians living with diabetes — more than six per cent of the population, and according to the Canadian Diabetes Association, this number will jump to 11 per cent by 2020.

Across the population rates of overweight and obesity are greater than ever. More than half of Canadian adults — 60 per cent — are overweight or obese. Even more troubling, obesity rates in children have tripled over the past 30 years — from three per cent to nine

SANDRA'S STORY: “Open-heart surgery is one of the most profound experiences.”

Sandra Thornton was born with a heart murmur, but brushed it off whenever it was mentioned at a medical visit. Just after her 51st birthday the healthy and active mother of three recognized she was having a heart attack and was admitted to hospital where an angiogram revealed an artery with a 90 per cent blockage. She underwent angioplasty and experienced a rocky recovery but was able to return to her active life. During her recovery she discovered that her heart murmur was the result of a problem with her aortic valve, and it would eventually need to be replaced. Seven years later she was told it was time and underwent open-heart surgery.

“If I had been born in my grandmother’s generation my outcome would have been different. The experience of open-heart surgery is probably one of the most profound experiences I’ve been through in my life, but I’m here today. Research has given me an opportunity twice now to extend my life, to be productive, to carry on with my career, and most of all to enjoy my family and my grandchildren,” Sandra says. “I hope to live to a ripe old age.”



Sandra Thornton



percent, and one-third of Canadian children are either overweight or obese. As well, the population is aging and as people get older, their chances of developing cardiovascular disease increase.

An aging population combined with poor diets, high obesity and diabetes rates and physical inactivity will stall, if not reverse, the progress we have made against heart disease and stroke. All Canadians are at risk, but seniors and Indigenous peoples are particularly vulnerable.

The immense amount of work around risk factor identification and management is rightfully credited as an important achievement, but it has only taken us so far. Experts know what Canadians need to do to be heart healthy — eat better, get more exercise, maintain a healthy weight, quit smoking, consume alcohol in moderation, and manage stress — but we are not seeing these changes happen.



98%
OF CANADIANS FEEL
RESEARCH
IS IMPORTANT TO
**HEART
HEALTH**

According to our **poll** Canadians also know what needs to be done, and they know they need support to do it. When asked to identify the top three factors that could improve heart health, a large majority named healthier lifestyle choices as most important. The other two most popular choices were more information to help manage risk factors such as telephone hotlines and other types of support, and better diagnostic tests and tools.

A HEART HEALTHIER FUTURE: WE CAN GET THERE FROM HERE

The first step in solving a problem is recognizing there is a problem. That cardiovascular disease is a public health crisis in Canada is long established. Much has been done and many have been involved over the past

60 years to tackle the issue, but there is still a great deal to be done. Work will continue to build on the advances that have come before, but it will also need to take on the many new challenges that lie ahead.

It is unsurprising that, when asked how important more and better research is to Canadians' heart health, our **poll** revealed 98 per cent of respondents feel it is somewhat or very important. Specifically Canadians believe the highest priorities for heart health research should be:

1. Better individualized assessment and treatment plans based on someone's medical history, lifestyle and genetics
2. Better tools and support to help people make healthy lifestyle choices
3. Better understanding of the genetic causes of heart disease and how to address them
4. New tests to diagnose heart disease.

The cardiovascular experts we interviewed identified several areas where focused research could bring important new advances.

Building a world that supports healthy change

Dr. Paul Dorian points to research as the best hope for identifying how to help Canadians make healthy changes. "We need a better understanding around how to change behaviour across the population. Many of the diseases we treat are in theory preventable and by activities that do not require a doctor."

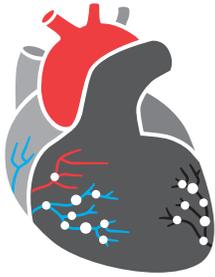
Moving from knowledge to action is easier said than done, especially in the current environment, which does not support many Canadians to make healthy choices. Barriers that Canadians face include:

- neighbourhoods that were not designed to support physical activity
- lack of availability of healthy foods and proliferation of unhealthy choices that are heavily promoted
- the highly addictive nature of tobacco
- a deluge of confusing and often contradictory health information
- lack of time
- financial pressures.

Regenerative medicine restoring damaged hearts

Heart failure commonly occurs when the heart becomes damaged or weakened by disease, and means blood is not moving around the body as it should especially during increased activity or stress.

Heart failure is on the rise as more people survive heart attacks and other acute heart conditions. As people with damaged hearts are living longer, they become more susceptible to heart failure. It is estimated that 50,000 new patients are diagnosed each year.



500,000 CANADIANS ARE LIVING WITH HEART FAILURE

Although outcomes and quality of life for heart failure patients have dramatically improved, for the estimated 500,000 Canadians living with heart failure, there is room to do more. Work continues into finding new ways to repair damaged hearts by repairing muscle using stem cells, and other therapies to stop cells from dying or to regenerate new cells. Most research has focused on the left ventricle in heart failure with good results. Dr. Lisa Mielniczuk is doing

research into right heart failure, which is less common but poses a greater risk. She is working to understand its mechanisms, identify who is at greatest risk, and ultimately develop new therapies.

Dr. Mielniczuk is unequivocal about the progress we have made but just as clear about what still needs to be done to improve the heart health of Canadians. “We can identify patients earlier, we can diagnose disease with more accuracy, we have better treatments, and this has impacted survival,” she says. “But there are still limits to what we understand and this affects patients. We have moved forward in 50 years but we still have more patients who need transplants; heart failure patients are dying and that is not acceptable. We need better treatments with

fewer complications and more work around prevention.”

Measuring quality of life

With so many Canadians living with heart disease, and this number only expected to increase, the need to better understand, measure and improve quality of life is critical. Several measurement instruments exist and studies are underway, but this remains an area with immense potential to improve the lives of cardiovascular patients across the country.

Predicting the future

Imagine a world where the chances of developing heart disease can be predicted. Exciting prospects lie in early detection by being able to identify well in advance who will develop heart disease, then further study this information to be able to prevent the disease. Work is being done to identify genetic markers that will reveal which genes predispose a person to cardiovascular disease — information that could help stop the disease before onset or halt its progression. Breaking down the DNA code could help explain why heart disease runs in families, and will help develop the individualized drug treatments of tomorrow.

The facts do not speak for themselves

While certain health information is routinely collected, important gaps do exist; for example, we do not know how many Canadians suffer heart attacks each year.

Sometimes the information is right there in front of us, but it takes analysis, process and planning to make use of it to improve prevention, treatment and care options. It can also take considerable time and effort to convince individuals, the medical community, institutions and systems to implement new innovations in health care and change their practice patterns.



Dr. Jafna Cox is blunt when describing the challenges he sees in having the evidence available from clinical research used effectively to improve patient outcomes. “There is huge inertia in applying new data relating to effective treatments, even when proved through extensive research efforts including large clinical trials.” He further points out that the biggest immediate opportunities lie not in collecting more data, but in learning to synthesize the information we already have around existing treatments and best practices and to ensure it is quickly and successfully transferred to the bedside.

As a member of the Improving Cardiovascular Outcomes in Nova Scotia (ICONS) study, Dr. Cox has witnessed first-hand the power of using data effectively to improve outcomes for heart patients. The study was a partnership of physicians, nurses, pharmacists, patients and their advocacy groups, government and industry. It monitored cardiovascular disease in the province by measuring practices and outcomes, producing a database and a registry. As a result of collecting and analysing information and applying what was learned, more patients received better care and treatments, and therefore had better outcomes. The study was such a success that the Nova Scotia Department of Health took it on and kept it going.

Translating what we know into action

Knowledge translation is an area that holds immense potential for furthering progress in heart health. It is often described as the use of research or “putting knowledge into action.” It is a dynamic process that involves sharing information with all the right players, and using information to inform decisions about prevention, care, treatment, rehabilitation, and creating the systems and policies to support this.

Dr. Scott Lear is another passionate believer in maximizing the knowledge and evidence we collect, and involving the right players to put it to work. “We need to look outside of clinical and other traditional areas to share our work. Researchers also need to engage with policy makers in order to influence decisions. Tobacco control is a great example of translating evidence. The evidence of harm through second-hand smoke was translated into anti-tobacco legislation and regulation in novel ways such as in workplaces and public places to protect non-smokers. But this also had the effect of leading smokers to quit as it became less convenient to smoke.”



Time is not on our side

Research takes time. It is plodding and methodical, and can change direction. Results can be surprising, or not apparently useful for direct application right away, but then can end up being valuable down the road. As Dr. Michel White explains, research is central and critical to understand, treat and prevent disease, but it is a nuanced process that does not always happen quickly. “It is not black and white. It can take some time to reproduce the findings, adopt the findings, and then apply them.”

The investigation on the use of beta blockers in heart failure is one good example. “The first paper on beta blockers was in the late 1970s and it took a year to publish, but then took another 10 – 15 years for people to believe this played a significant role in the treatment of patients with heart failure. It took many years for the treatment to be adopted in the clinical arena.”

This is also a good example of a therapy that might have been adopted faster. This would have allowed more patients to have benefited from the unique effects of beta blockers. Getting proven new therapies and procedures adopted into practice more quickly could have a positive impact with more Canadians avoiding or surviving heart disease, making the best recovery possible, and living life to the fullest.

INVESTING IN THE FUTURE

Exciting possibilities lie ahead to tackle a disease that continues to affect millions of Canadians and their families each year, as long as our investment in heart disease and stroke research can keep pace with the increasing burden. We must maintain and increase our investment in research to improve prevention, treatment and care to continue to improve the heart health of Canadians and bring us closer to solving heart disease.

HOW HEART AND STROKE FOUNDATION FUNDED RESEARCH IS MAKING A DIFFERENCE

Pacemakers, blue-baby surgery, clot-busting drugs — these are all breakthroughs that started with Heart and Stroke Foundation funded research. Since its inception in 1952, the Foundation has invested more than \$1.4 billion in vital heart and stroke research, making it the largest contributor in Canada after the federal government. Last year we invested almost \$34 million in research across Canada and we have committed to raise \$300 million for research over the next decade.

Research will continue to prevent disease, save lives and promote recovery

Investing in world-class research has never been more important. With the support of our donors and volunteers, we will continue to fund research with the greatest potential, no matter where it is happening in the country, to tangibly improve the health of Canadian families in these areas:

- **Improving diagnosis, treatment and care.** Exciting research opportunities lie in early detection by being able to identify who will develop heart disease. Canadians want better individualized assessment and treatment plans, and a better understanding of the genetic causes of heart disease and how to address them.
- **Addressing all risk factors.** Much progress has been made to diagnose and manage risk factors such as high blood pressure, but new challenges — an aging population combined with poor diets, high obesity and diabetes rates and physical inactivity — threaten to stall or reverse that progress. All Canadians are at risk, but seniors and Indigenous peoples are particularly vulnerable.
- **Supporting all Canadians to make healthy choices.** Canadians know what needs to be done but they need support to do it. Research will help us understand how to change behaviour across the population.
- **Creating healthy public policy.** Research is the basis for important policy decisions that affect the population.
- **Collecting and translating knowledge.** There is an important role for research in gathering data, establishing surveillance and monitoring systems, and translating the knowledge into timely action.
- **Promoting recovery.** With more Canadians surviving and living with the effects of cardiovascular disease, more research is needed to support them to make the best recoveries possible and improve quality of life.

*The Heart and Stroke Foundation is greatly appreciative of the experts who agreed to be interviewed for this report and the tremendous expertise they provided:

Dr. Todd Anderson, Director, Libin Cardiovascular Institute of Alberta; Academic Department Head, Cardiac Sciences Professor, University of Calgary

Dr. Jafna Cox, Heart and Stroke Foundation of Nova Scotia Endowed Chair in Cardiovascular Outcomes Research; Professor, Departments of Medicine and of Community Health and Epidemiology, Dalhousie University; Staff Cardiologist, Division of Cardiology, Capital Health, Halifax, Nova Scotia

Dr. Jean-Pierre Després, Professor, Department of Kinesiology, Faculty of Medicine, Laval University

Dr. Paul Dorian, Scientist, Keenan Research Centre of the Li Ka Shing Knowledge Institute, St. Michael's Hospital; Professor, Medicine and Cardiology, St. Michael's Hospital, University of Toronto

Dr. Robert Hegele, Distinguished Professor of Medicine and Biochemistry, Schulich School of Medicine and Dentistry, Western University

Dr. Karin Humphries, Associate Professor, Faculty of Medicine, University of British Columbia; UBC-Heart and Stroke Foundation Professor in Women's Cardiovascular Health

Dr. Lorrie Kirshenbaum, Director of Research Development, Faculty of Health Sciences, College of Medicine, University of Manitoba, St. Boniface Research Centre

Dr. Scott Lear, Professor, Faculty of Health Sciences, Simon Fraser University; Pfizer/Heart and Stroke Foundation Chair in Cardiovascular Prevention Research at St. Paul's Hospital

Dr. Gary Lopaschuk, Distinguished Professor, Mazankowski Alberta Heart Institute, University of Alberta

Dr. Doug Manuel, Senior Scientist, Ottawa Hospital Research Institute

Dr. Lisa Mielniczuk, Associate Professor of Medicine, University of Ottawa; Cardiologist, Ottawa Heart Institute

Dr. Andrew Pipe, Chief, Division of Prevention and Rehabilitation, University of Ottawa Heart Institute

Dr. Eldon Smith, Emeritus Professor, University of Calgary; Chairman, Strategic Advisory Board, Libin Cardiovascular Institute of Alberta

Dr. Duncan Stewart, CEO & Scientific Director, Ottawa Hospital Research Institute

Dr. Andreas Wielgosz, Cardiologist, The Ottawa Hospital

Dr. Michel White, Clinical Scientist and Director of the Heart Research Program, Montreal Heart Institute

**The poll was conducted by Environics Research Group. A total of 2,006 respondents 18 yrs+ were interviewed by telephone during the period November 6-16, 2014. The margin of error for a sample of this size is +/- 2.19%, 19 times out of 20. The results were weighted to match the demographic makeup of the Canadian population.