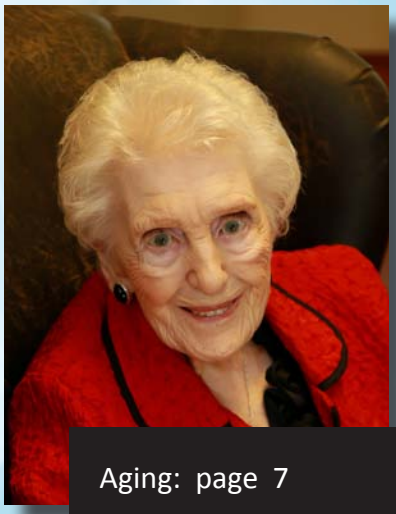
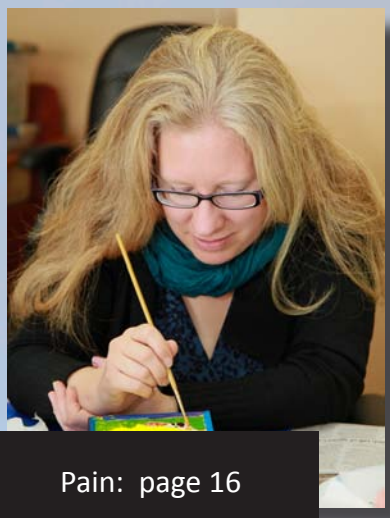
Research: finding solutions for today's health challenges

Capital Health

Research Annual Report 2011–2012





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Meeting our Region's Health Challenges

A message from Dr. Ray LeBlanc

There is no question that Atlantic Canada, and Nova Scotia in particular, faces some daunting health challenges. Due to our aging population and our high rates of obesity and other risk factors for such chronic diseases as diabetes, heart disease, cancer and osteoarthritis, we carry a burden of illness that is disproportionately large for our relatively small number of residents. As a result, we must come up with innovative ways to help people reduce their risk and to cope better with illness, disability and pain.

The good news is we have a dedicated community of researchers who are actively pursuing solutions to our most pressing health problems. This year's research report takes a look at how Capital Health researchers and their colleagues at Dalhousie University and the IWK Health Centre are changing the way we approach a wide range of conditions, so that more problems are headed off at the pass and more people can live healthier, more productive and higher-quality lives for longer. For example, our researchers are learning how:

- helping frail older people stay mobile in hospital can hasten their recovery and preserve their independence
- high-tech optical imaging can detect age-related eye diseases early, when vision loss can still be prevented
- empowering patients to make more informed decisions about heart surgery can improve outcomes, quality of life and satisfaction with care
- supporting people to make lifestyle change reduces cardiovascular risk more than medications
- helping people understand their eating behaviours enables them to make long-term changes
- new medications can manage diabetes better with fewer side effects
- gait and muscle re-training can delay the need for joint replacement surgery in people with osteoarthritis
- cancer can be beaten by more sophisticated targeted therapies
- people with Fabry disease can live longer, healthier lives
- alternative approaches, like creating art and practising qigong, can reduce suffering in people with chronic pain.

I'm always amazed by the creativity and determination of our researchers, and by the results they are achieving for the people we serve. I will miss my close involvement with the research community here in Halifax, as I wrap up my time as VP of Learning, Research and Innovation at Capital Health. The collaborative nature of research in this community has led to the creation of a new senior research leadership position that encompasses both Capital Health and the IWK. My esteemed colleague Dr. Patrick McGrath, former VP of Research at the IWK, has been appointed to this new role, which is Integrated VP of Research and Innovation for Capital Health and the IWK. I wish him every success as he leads our research community into a new era of increased teamwork and collaboration across our institutions. The people of the Maritimes are sure to benefit.

Aging and Vision

Shining light on new strategies for vision health

Researchers are seeking solutions to the looming problem of age-related vision loss in Nova Scotia – where a quarter of the population will be over the age of 65 by 2026.

Capital Health vision researchers are exploring new approaches to screening, monitoring and treating age-related eye diseases that gradually rob people of their sight.

"When it comes to vision loss, you're dealing with core issues of independence and ability to function in life," says Dr. Balwantray Chauhan, Mathers Chair in Ophthalmology and Visual Sciences Research at Dalhousie Medical School and Capital Health. "By the time people notice symptoms of macular degeneration or glaucoma, for example, the disease is already advanced. We must find ways to identify who is most at risk and treat them early, before their vision is impaired to the point where it leads to serious visual disability or blindness."

Dr. Chauhan is well on the way to developing technology that will enable such early identification. In 2011, he received $2.6 million from ACOA's Atlantic Innovation Fund and local partners to advance powerful new eye-imaging technologies he's working on with Germany's Heidelberg Engineering. The new devices will allow clinicians to track the fine details of disease-related changes in the retina and optic nerve, so they can tell if a patient is developing macular degeneration or glaucoma long before symptoms emerge.

While Dr. Chauhan pursues screening and monitoring technologies, Dr. Alan Cruess is evaluating potential new treatments for macular degeneration – the leading cause of blindness in the developing world. "Prevalence increases exponentially with age," notes Dr. Cruess, academic head and clinical chief of Ophthalmology & Visual Sciences. "At current rates, macular degeneration affects 15 per cent of people over the age of 80."

Capital Health researchers played a key role in clinical trials that led to the approval of Lucentis for macular degeneration. Since Penny Longley began receiving the injections from Dr. Alan Cruess in 2011, her eyesight has noticeably improved.

Dr. Cruess is optimistic, however, that the impact of macular degeneration will lessen even as the number of people with the disease rises. "We've already seen a game-changer in Lucentis, a new treatment that can halt and even reverse the most rapidly progressing form of macular degeneration," he says. "We're taking part in international clinical trials of new agents that could raise the bar even higher."

Discoveries in neuroscience also offer hope, according to Dr. Cruess. "We have strong vision and neuroscience research groups at Dalhousie, which are exploring new strategies for protecting and regenerating the neurons that form the retina and optic nerve," he says. "Such strategies could prevent or reverse age-related damage to the eye… it's an exciting time for vision research here at Dalhousie and Capital Health."

Dr. Balwantray Chauhan was recently named the inaugural Dr. R. Evatt and Rita Mathers Chair in Ophthalmology and Visual Sciences Research. This endowed research chair will provide perpetual support for vision research, thanks to the generosity of the late Mrs. Peggy St. George. Mrs. St. George bequeathed $9 million to the Department of Ophthalmology & Visual Sciences, in memory of her stepparents, the Mathers. Dr. Mathers was a leading Halifax ophthalmologist. The endowed chair will enable Dr. Chauhan to advance his revolutionary optical imaging research, which will improve the understanding, diagnosis and treatment of vision-threatening diseases.

Research addresses complex issues around aging

Dementia and driving

It's never easy to give up driving privileges – and people with dementia may not appreciate the safety risk they pose to themselves and others if they continue to drive. After learning that primary care physicians in Nova Scotia are not always comfortable tackling this issue, geriatric medicine specialist Dr. Paige Moorhouse and her colleagues developed a program to help doctors help their dementia patients hang up the car keys for good. In partnership with the Canadian Dementia Knowledge Translation Network and the Nova Scotia Health Research Foundation, they've launched the 'Not If But When' website (www.nibw.ca), which provides physicians with Nova Scotia-specific information and evidence-based tools to help them accurately assess their patients' fitness to drive. It also provides caregivers with safety information and strategies for coping as they help someone with dementia stop driving.

Social vulnerability

Geriatric medicine specialist Dr. Melissa Andrew is working to isolate the impact of social factors on successful aging, by analyzing health outcomes of fit seniors over 70. She and her colleagues found that even among seniors with no identified medical or functional problems, the most socially vulnerable were 22 per cent more likely than the least socially vulnerable to die within five years. "Having a support network of family, friends and neighhours, being able to get around, feeling in control… these kinds of factors are very important, above and beyond lifestyle choices, for the life expectancy of seniors," Dr. Andrew says. "We're bringing this issue to the fore, so the entire medical team has a stronger understanding of how social factors are affecting people and how these can be addressed."

Aging and Frailty

Making mobility a priority for seniors in hospital

As our population ages, new approaches are needed to help frail elderly people recover from illness and retain their independence following a hospital stay.

If there's one thing Dr. Kenneth Rockwood wants people to understand, it's the crucial importance of staying mobile. Not only is physical activity the key to healthy aging, it is also the key to helping frail elderly people recover from illness. On the flip side, declining mobility predicts poor outcomes for these people.

"We found that people over the age of 65 whose mobility and balance deteriorate within 48 hours of being admitted to hospital have a high risk of dying," says Dr. Rockwood, director of geriatric medicine research at Capital Health and Dalhousie Medical School. "In fact, 71 per cent of the patients in our study whose mobility and balance declined in those first two days ended up dying within 30 days. Among the patients whose mobility and balance improved or stayed the same, only 4 per cent died in this time frame."

This stunning finding was published in the December 2011 issue of *The Journal of General Internal Medicine*. Now Dr. Rockwood and postgraduate research fellow, Dr. Olga Theou, are taking a closer look at the mobility of frail older people in hospital, with an eye to designing interventions that could change this grim prognosis.

"The big problem is that people in hospital, especially frail elderly people, spend most of their time lying in bed – so they lose their mobility," notes Dr. Theou, a native of Greece whose background includes kinesiology and rehabilitation, with a focus on aging and frailty. "So their pneumonia may be cured, but by the time they're ready to leave, they can't walk… so now they can't go home and they may lose their independence."

The researchers are measuring the actual mobility of older adults admitted to hospital in Capital Health, using accelerometers and an assessment tool called HABAM (Hierarchical Assessment of Balance and Mobility). Dr. Rockwood developed this tool with geriatrician colleague, Dr. Chris MacKnight, as an easy and inexpensive way to gain an objective measure of mobility and balance – from unable to move off pressure points, to able to walk independently.

Dr. Kenneth Rockwood, director of geriatric medicine research at Dalhousie Medical School and Capital Health, and Kathryn Allen Weldon-Dalhousie Medical Research Foundation Chair in Alzheimer Research.

"Once we know how much people are moving, we'll be able to compare these measures to their clinical data to see if people who move more are able to leave the hospital sooner, and if they continue to do well afterwards," says Dr. Theou. "The next step will be to see how much we can improve people's recovery by helping them spend more time walking, or even just standing, during their hospital stay."

Postgraduate research fellow Dr. Olga Theou meets with Patricia Uens in Capital Health's Geriatric Assessment Unit. Dr. Theou is assessing the mobility and balance of seniors in hospital, to see how this relates to their health. She and her supervisor, Dr. Kenneth Rockwood, want to know if interventions to increase physical activity in hospital can improve older patients' outcomes and quality of life. The research is supported by the QEII Foundation's Fountain Innovation Fund and Dalhousie Internal Medicine Research Fund.

Assessing frailty in emergency situations

Paramedic Judah Goldstein wants to find the best ways to measure an older person's degree of frailty on the scene of a 911 call. With his PhD supervisor, Dr. Kenneth Rockwood, he's comparing rapid frailty screening tools that families can complete while paramedics work to stabilize the person and determine whether he or she needs to go to the hospital. "It's really important for doctors, nurses and paramedics in the emergency department to know how frail a person is, because frailty has a dramatic impact on the signs of acute illness," Mr. Goldstein explains. "For example, a heart attack may cause a frail senior to fall or to experience some confusion, and it may not cause any of the symptoms we see in a fit senior or a younger person. Without a sense of the person's frailty, recognition of a heart attack or other serious condition could be delayed." Having an accurate measurement of a person's degree of frailty at the outset will help emergency health professionals provide the most appropriate care.

Cardiac Care

Helping people make the right surgery decisions

Capital Health researchers are designing and testing new tools to help people make the right heart surgery decisions – especially those whose frailty puts them at risk of poor outcomes from surgery.

Dr. Greg Hirsch and his colleagues want people with serious heart conditions to fully understand the potential risks and benefits that surgery poses for them, so they can make the best possible decision.

"People who are frail, in particular, face a higher risk of complications from cardiac surgery," explains Dr. Hirsch, head of the Division of Cardiac Surgery at Capital Health and Dalhousie Medical School. "They're more likely to be admitted to intensive care and to develop ventilator-associated pneumonia or delirium. We want to provide people with user-friendly decision-making tools so they can properly weigh these risks against the potential benefits of surgery."

The Canadian Institutes of Health Research has awarded Dr. Hirsch and his team $300,000 to design and test these decision-making tools. The funding also provides for a decision coach – nurse Michelle St. Laurent – to assist patients and families as they work through the process.

The researchers have completed a series of focus groups with heart surgery patients and health care professionals. The insights they've gained will help them design decision-making materials and processes that work. "One of the big things we learned is that patients want to receive information about the pros and cons of surgery much earlier – soon after their diagnosis – so they have time to process it," notes Dr. Hirsch.

Once the decision-making tools are complete, the researchers will enroll heart surgery candidates in a clinical trial to see if the new tools and decision-making process improve patients' comprehension of the relative risks and benefits of the procedure for them. They will also assess patients' anxiety and how good they feel about their decision to go ahead or forego surgery.

Reginald Allen is one of more than 50 cardiac surgery patients who took part in focus groups to help Dr. Greg Hirsch (right) and his research team plan and develop effective surgery decision-making tools. Mr. Allen and his surgeon, Dr. John Sullivan, had a clear discussion about risks and benefits before going ahead with cardiac surgery. He has made an excellent recovery and is pleased to share his experiences here with Dr. Hirsch.

"Ultimately, people need to feel confident they'll be able to return home after surgery with a good quality of life," says Dr. Hirsch. "If they do experience a complication, being prepared for this possibility ahead of time will help with their recovery."

Cardiovascular Health

Cutting the risk of cardiovascular disease

Rates of cardiovascular disease are rising with the overall age and risk levels of our population – but reducing risk through lifestyle change can prevent death and disability.

The ANCHOR study has found that changing lifestyle behaviours has more impact than medications on reducing cardiovascular risk. Led by cardiologist Dr. Jafna Cox, the study involved more than 1,500 patients in family medicine clinics in the Capital and Cape Breton health districts.

"At the beginning of the study, a third of the patients had a low risk of a major cardiovascular event such as a heart attack or stroke, just over half were at moderate or high risk, and the rest already had established disease," says Dr. Cox, who holds the Heart & Stroke Foundation of Nova Scotia Endowed Chair in Cardiovascular Outcomes Research. "The aim was to keep low-risk patients from progressing to a higher risk category and to reduce risk in the other groups. Most low-risk patients were kept that way, while a third of the moderate-risk patients and nearly half of the high-risk patients significantly cut their risk."

Overall, participants lost weight, quit smoking, and gained better control of their blood pressure, sugars and lipids. And while patients on medications were required to stick with their prescriptions, there was no significant increase in medication use over the study period to account for the across-the-board risk improvements.

"We can only conclude that lifestyle changes made the difference," notes Dr. Cox, who worked with Capital Health psychologist Dr. Michael Vallis to design the study's lifestyle-change intervention. As he explains, "We used a behaviour change counselling approach that took each patient's risk and readiness to change into account. Depending on their needs, patients were connected with nurses, dietitians, pharmacists, social workers, psychologists, physiotherapists and community lifestyle programs."

Drs. Cox and Vallis and the ANCHOR team are now working with the most successful study participants to see if such minimal interventions as quarterly phone calls can keep them on track. They're also interviewing people who did not respond to the intervention, to learn more about the barriers they faced and how they could be overcome.

ANCHOR study coordinator Krista Courtney-Cox (left), Dr. Jafna Cox and ANCHOR participant Heather Fralick discuss how involvement in the study has helped Ms. Fralick work hard to keep her risk of heart disease low. Ms. Fralick says taking part in the study has made her more aware of temptations and barriers and how she can overcome them to maintain positive health behaviours for the long term.

Obesity

Addressing root causes to reach healthier weights

Atlantic Canada has the highest obesity rates in a country where a quarter of adults are obese. Capital Health researchers are using sophisticated approaches to behaviour to address the root causes of obesity and help people reach healthier weights – and avoid obesity-related problems like diabetes, osteoarthritis, cardiovascular disease and cancer.

Telling people to eat healthier foods and exercise more is not an effective way to help them lose weight. As Capital Health behavioural psychologist and researcher Dr. Michael Vallis explains, health professionals have to learn to help people understand how their feelings and environment influence their eating and exercise behaviours.

"Once people understand the barriers that make it hard for them to get enough exercise or to eat healthy meals, and the triggers that lead them to unhealthy choices, they're in a position to change," says Dr. Vallis, who leads Capital Health's Behaviour Change Institute. "It's our job to help them gain these important insights and support them to act on their own solutions. We need to elicit rather than prescribe."

Through the Behaviour Change Institute, Dr. Vallis is teaching health professionals how to elicit long-term behaviour change in their patients. "We're moving away from the idea that only psychologists can talk to people about feelings and behaviour," he notes. "There aren't enough of us to meet the needs… we're sharing this knowledge so health professionals in many fields have the skills to address core issues at the root of obesity."

Dr. Michael Vallis

These skills include learning how to ask non-judgmental questions, how to help people understand their environment's influence on their behaviour, and how to help them set and achieve their goals.

To ensure the professionals he's training are acquiring the necessary skills, Dr. Vallis has developed and validated a competency rating scale with funding from the Capital Health Research Fund. "We've tested the scale by measuring professionals' competencies before and after the training," he says. "We've found that their scores are substantially higher after the training."

The doctors, dietitians, nurses, nurse practitioners, pharmacists and other health professionals Dr. Vallis has trained are now working throughout Capital Health to help people makes changes to cut their risk of obesity-related chronic disease.

The knowledge she's gained through courses at the Behaviour Change Institute has added a new dimension to the work Bernice Pancura (right) does as a dietitian at Capital Health. "I still talk to people about food, but now I also help them understand and accept themselves so they can move forward with a sense of control," says Ms. Pancura. She has been helping Kathy Lusk (left) build confidence and commitment to her goals, both through one-on-one sessions and an eating behaviour group she facilitates with Dr. Michael Vallis.

Diabetes

Clinical trials pave the way to control and prevention of diabetes

More than 70,000 Nova Scotians have type 2 diabetes and the rates continue to climb with the rising levels of obesity. Capital Health researchers are testing new medications with promising effects.

Physicians and research coordinators in the Division of Endocrinology have been involved in more than a dozen clinical trials of diabetes medications in the past two years. Of several studies still in full swing, most focus on new drugs for controlling type 2 diabetes with fewer negative side effects.

"There are whole new classes of drugs not yet on the market that offer significant potential benefits," says Dr. Tom Ransom, a Capital Health endocrinologist and assistant professor at Dalhousie Medical School. "We like to be involved at this early stage, so we can become comfortable and knowledgeable about new diabetes drugs and their uses before they are even approved for all patients."

Having more safe and effective diabetes drugs gives doctors the tools to individualize therapy to meet patients' varying needs. As Dr. Ransom notes, some diabetes medications trigger some people's blood sugars to drop too low, resulting in heart palpitations, trembling, blackouts and other problems of hypoglycemia. Some new drugs, however, decrease the risk of hypoglycemia, offering a safer alternative for these people.

In one current study, however, the researchers are testing an approved diabetes medication on people who do not have type 2 diabetes.

"When testing this diabetes medication a few years ago, we noticed that not only were people getting their sugars under control, they were also losing weight," Dr. Ransom says. "Now we're involved in the international SCALE trial to see if this medication is a safe and effective weight-loss agent for obese people who don't have diabetes."

The researchers also want to know if the drug can prevent diabetes. They're looking closely at a sub-group of people in the SCALE trial who are at an especially high risk of diabetes due to high fasting glucose levels and impaired glucose tolerance, in addition to obesity. "Half the patients will receive the drug and half will receive a placebo, internationally, so over time we will see if the medication prevents diabetes in people at risk," says Dr. Ransom. "This would be quite exciting."

In a separate trial of the same medication (the LEADER trial), the researchers are exploring if this drug could be beneficial for people with diabetes who are at high risk of cardiovascular disease.

Research coordinator and certified diabetes educator Laura Lee Magennis works closely with patients, including Roger Gerrard. Mr. Gerrard is taking part in the LEADER study, an international clinical trial of a type 2 diabetes medication that often contributes to weight loss. They want to know if this drug could be a safe and effective diabetes treatment for people at high risk of cardiovascular disease.

Osteoarthritis and Back Pain

Innovative solutions to disabling conditions

Researchers at Capital Health and Dalhousie University are determined to find ways to better treat and prevent osteoarthritis and recurrent low back pain – the two leading causes of disability in Nova Scotia.

The rising rates of obesity in Nova Scotia are putting a strain on our aging population's knees, ankles and hips, leading to rising rates of osteoarthritis and an ever-increasing demand for joint replacement surgery. That's why Capital Health orthopedic surgeons like Dr. Michael Dunbar have teamed up with physiotherapy professor Dr. Cheryl Kozey and biomedical engineering professor Dr. Janie Astephen Wilson.

"We need to develop ways to manage the progression of osteoarthritis, so we can keep people's joints healthier and delay the need surgery for as long as possible," says Dr. Dunbar. "The implants used to replace failing joints only last about 20 years, so we don't want to put them in middle-aged people if we can help it."

Drs. Kozey and Astephen Wilson are learning how people's unique ways of walking influence their risk of developing lower-limb osteoarthritis.

"We've identified gait and leg-muscle activation patterns that are clearly associated with the development and progression of osteoarthritis," says Dr. Kozey. "Now we're exploring how we can change those walking patterns – through braces, orthotics, gait retraining or muscle training – to slow down the wear and tear on those joints."

Gait analysis is also helping the researchers determine which kind of joint replacement implant will work best for which patients, to avoid implant failures and costly revision surgeries.

At the same time, Dr. Kozey is studying how the activation of muscles in the abdomen and back affect people's risk and recovery when it comes to low-back injuries.

"We've found that certain trunk-muscle activation patterns are associated with a healthy back while others are associated with injury," she says. "This helps us predict which back-injury patients are more likely to re-injure themselves, and gives us a clear sense of what exercises people need to do to prevent and recover from back injuries."

Dr. Michael Dunbar, orthopedic surgeon, professor of surgery and biomedical engineering

Physiotherapy professor Dr. Cheryl Kozey uses a variety of sophisticated techniques to analyze gait and muscle-activation patterns in healthy people and in people with knee and back problems. Her data is leading the way to new approaches to muscle training and gait modification that will reduce the human and economic impact of these common, debilitating conditions.

Cancer

Clinical trials usher in a new era of targeted treatment

Growing numbers of cancer patients are taking part in carefully selected trials of new targeted therapies, thanks to the efforts of the team at ACCRU.

Enrollment to clinical trials for cancer therapies has almost doubled at Capital Health since 2009, thanks to the dedicated and knowledgeable staff at ACCRU (Atlantic Clinical Cancer Research Unit). "We've been working hard to put more efficient procedures in place and to select the trials that best meet our patients' needs," says Dr. Daniel Rayson, ACCRU's director and a medical oncologist at Capital Health and Dalhousie Medical School. "Due to improvements in our processes, Halifax is now a preferred site for conducting cancer clinical trials in Canada, from both industry and academic perspectives."

The past few years have seen an explosion of new targeted therapies that offer significant benefits for some patients. "Targeted therapies aimed at specific proteins or genes that trigger cancer cell growth offer new hope for many diseases and usually have fewer side effects compared to typical chemotherapies," Dr. Rayson says. "We're playing a role in this cancer-treatment transformation by helping identify what treatments will work best for which patients."

Dr. Rayson is the lead investigator of a national study from the Canadian Cancer Society Research Institute that's testing a new therapy for aggressive triple-negative breast cancer. "This cancer lacks all three proteins that current treatments target," he explains. "We're testing a new agent that targets a different protein altogether. So far, we're finding it can help stabilize the disease, with few side effects."

Experienced clinical research staff, like ACCRU's research manager, Sharon Hebb, also work with local cancer clinicians to help them design and conduct their own clinical trials. For example, Dr. Rayson, Ms. Hebb and other ACCRU staff members helped thoracic surgeon Dr. Gordon Buduhan and medical oncologist Dr. Stephanie Snow design and launch a local clinical trial. This is testing a new protocol they've devised that uses a relatively gentle chemotherapy regimen to shrink cancers of the esophagus before surgery. The researchers hope this approach will result in fewer chemo side effects and fewer complications from surgery.

Dr. Daniel Rayson and Sharon Hebb lead the ACCRU team of 17 staff members in a concerted effort to advance cancer treatment through clinical trials.

Gynecological oncologist Dr. Jim Bentley, meanwhile, has partnered with Halifax-based ImmunoVaccine Technologies, through ACCRU, to test a cancer vaccine for ovarian cancer. This vaccine sensitizes the immune system to proteins found on ovarian cancer cells, so it can mount a more effective attack on the cancer.

"We're moving into new territory with cancer clinical trials," Dr. Rayson notes. "It's exciting, because the trials provide patients with access to the newest treatments, as well as closely monitored, state-of-the-art care"

Cancer

Targeting the seeds of metastasis

Capital Health cancer surgeon teams up with Dalhousie cancer biologist to learn how cancer stem cells lead to metastasis – with substantial support from an anonymous donor.

An anonymous donor – grateful for the care a family member received while ill with cancer – has enabled surgical oncologist Dr. Carman Giacomantonio to establish a new research lab with his scientific colleague, Dr. Paola Marcato, in Dalhousie Medical School's Tupper Building. This donor's generous gifts to the QEII Foundation and Dalhousie Medical Research Foundation will also allow the researchers to set up the region's first breast cancer tumour bank.

"The tumour bank will provide us with a facility for storing samples of breast cancer tissue from women who undergo breast cancer procedures," says Dr. Giacomantonio, who was instrumental in establishing the breast health centre at the IWK and is currently chief medical director for Cancer Care Nova Scotia. "These will be available to the entire cancer research community for analysis."

Drs. Marcato and Giacomantonio are already studying patients' breast cancer tissues, some of which are provided to them through their collaborator, surgical oncologist Dr. Lucy Helyer.

"We have already identified a marker on breast cancer stem cells that is strongly associated with invasive cancers," says Dr. Marcato. "Patients who show higher levels of this marker have worse outcomes… we see it as a target for treatment, not just prognosis."

The tumour bank will allow the researchers to learn more about cancer stem cells and how they could be targeted to stop cancers from spreading. "Cancer stem cells are the big challenge, because they resist chemotherapy and radiation," notes Dr. Giacomantonio. "You can kill all the regular cancer cells in a patient's body but still be left with cancer stem cells… so the cancer can recur and metastasize. We're determined to find effective ways to kill cancer stem cells."

Dr. Carman Giacomantonio and Dr. Paola Marcato in their new lab.

New medications offer hope to melanoma patients

Dr. Mimi Davis specializes in treating melanoma, a form of skin cancer that can be very difficult to treat if it is not caught in its earliest stages. The last few years have seen the emergence of several promising new drugs she hopes can help patients like Ronald Carleton. "Scientists have identified a number of molecules that can be blocked to slow down the progression of melanoma," she says. "Some of them provide prolonged survival for some patients, but may have problematic side effects for others. Clinical trials are essential for finding out which patients will benefit most from which new medications."

Fabry Disease

New solutions to a centuries-old inherited disease

While less than three per cent of Canada's population lives in Nova Scotia, the province is home to a quarter of the nation's citizens with Fabry disease.

For the first time in 16 generations, Nova Scotians with Fabry disease have real hope for longer, better lives. Since the mid-18th century, descendents of one of Lunenburg's founders, French immigrant Anna Catherina Barbara Leau, have carried a genetic mutation that causes Fabry disease. This mutation impairs the production of a key lipid-metabolizing enzyme, leading to the accumulation of large fatty molecules in the cells.

"Fabry disease affects almost every cell in the body, leading to widespread tissue damage and eventually to organ failure," says Dr. Michael West, director of the Nova Scotia Fabry Disease Program, which looks after young patients at the IWK Health Centre and adults at Capital Health. "It's a genetic disease in which the buildup of fats in the cells begins before birth and progresses until symptoms emerge in childhood."

Among the earliest signs of the disease are distinctive spots called angiokeratomas that break out on the skin. By their 30s or 40s, a person with Fabry could be facing some very serious problems, including severe neuropathic pain, kidney failure, heart failure, and a risk of stroke 13-times greater than that of the general population.

Dr. West is leading a cross-country clinical trial comparing two new enzyme therapies that could dramatically alter the fate of people with Fabry disease. "It's the largest controlled study of Fabry disease treatment in the world," notes Dr. West, who works with research coordinator Kaye LeMoine to manage the trial. "Over the six years of the study, we have found that both therapies result in three-fold declines in serious events, like kidney failure and heart attacks."

Even as he and his colleagues work to get the new therapies approved, Dr. West is preparing to enroll patients in a new national study of a potential cure for Fabry disease. "It's a breakthrough approach that puts a normal version of the faulty gene into a patient's blood stem cells, turning them into enzyme factories," he explains. "If it proves to be safe and effective, it will transform lives – especially those of younger people with Fabry disease."

Dr. Michael West, a nephrologist, is director of the Nova Scotia Fabry Disease Program and professor in the Department of Medicine at Dalhousie Medical School.

James Greencorn, a resident of Fairmont, Nova Scotia, meets regularly with Dr. Michael West to ensure that his Fabry disease is as well-managed as possible. Mr. Greencorn is taking part in a clinical trial of two new enzyme therapies that are proving to reduce the serious effects of Fabry disease.

Pain

Alternative approaches to easing the agony

Art therapy intern Don Stevens creates a safe environment for people with chronic pain to work on art projects and, if they wish, to share their experiences. He has been volunteering his expertise to work with patients in the QEII's pain management unit since January 2012. "A second weekly class has been added to accommodate the people who have found the sessions to be beneficial in managing their pain," Mr. Stevens says. "The art therapy sessions provide the opportunity for participants to express their pain through the creative process."

Capital Health researchers are taking unconventional approaches to helping people cope with pain – whether rooted in cancer, arthritis, nerve injury or myriad other possible causes.

As Dr. Mary Lynch knows from years of working with people who live with chronic pain, it's important to amass a large selection of therapeutic tools. "Different people respond to different approaches and it takes more than medication to alleviate suffering and restore quality of life," says Dr. Lynch, director of research, QEII Health Sciences Centre Pain Management Unit, and professor of anesthesia, psychiatry and pharmacology at Dalhousie Medical School.

Art as a path to healing is of longstanding interest to Dr. Lynch, who recently co-published the findings of a project exploring the experience of artists who live with chronic pain.* "We were interested in the process through which artists are able to continue to create," she says. "We found that, even though it was often very painful for the artists, the act of creating art was meaningful, therapeutic and transformative. It provided a distraction from suffering, a sense of purpose and accomplishment, and a feeling of joy that at times transcended the pain."

As Dr. Lynch explains, severe chronic pain has a devastating effect on quality of life and ability to function. It can lead to social isolation, depression and an increased risk of suicide. "There is something extremely health promoting about the act of creating," she says. "Previous research has found that art-making facilitates healing… our work has supported the positive impact that creating art can have on pain."

Photo by John Sherlock, re-printed with permission of Dalhousie Medical Research Foundation

Dr. Mary Lynch

Movement therapies can also stimulate our defenses against pain, as Dr. Lynch and her colleagues learned last year when they conducted a clinical trial of qigong as a treatment for fibromyalgia. As she notes, "Qigong had a positive effect on pain, sleep and function, with the greatest results for those who practiced 45 minutes a day or more."

*The findings were published in the *Journal of Arts and Health*, 2012, with co-authors Caitlin Sinclair, MSc, Community Health & Epidemiology, Raewyn Bassett, PhD, Faculty of Health Professions, and Gail Sloan, RN, MSc, Bioethics.

QEII Foundation

Cycling for pancreatic cancer care

With every pedal, cyclists with the Craig's Cause Pancreatic Cancer Society are helping to ensure all pancreatic cancer patients in Nova Scotia are receiving the best care.

Founded by Stefanie Condon-Oldreive, in memory of her father who passed away after an eight-week battle with pancreatic cancer, Craig's Cause has been working with the QEII Foundation to raise awareness and funds for pancreatic cancer research at the QEII since 2006.

This year, the group raised over $135,000, which will help surgeons and researchers at the QEII assess the quality of care delivered to pancreatic cancer patients across the province. This is part of an ongoing study, *Clinical Epidemiological Analysis of the Quality of Care and Resource Utilization of Patients Affected by Pancreatic Cancer* in Nova Scotia, conducted by Dr. Michele Molinari, Dr. Scott Hurton, Dr. Geoff Porter, Dr. Mark Walsh and the Cancer Outcome Research (COR) team.

"We're looking to see if the quality of care is sufficient or if we can identify some areas where we are deficient in Nova Scotia," explains Dr. Molinari.

Quality of care is measured by comparing the experiences of more than 1,100 patients over the last ten years to existing quality-of-care guidelines used in other health centres across North America and Europe. The guidelines establish standards for such elements of care as wait times from diagnosis to treatment, treatment planning and the availability of certain services.

"The first thing is to see if there are any limitations with access to proper treatments and then if they are receiving treatment, are they receiving the same quality of care as other provinces?," Dr. Molinari explains. The study has only just begun, but Dr. Molinari suspects the findings to reveal some variability in the care provided. "We know there are patients who don't get referred to surgeons or who are referred too late, so they're not receiving high-quality care and we need to find those deficiencies in our system."

Dr. Molinari notes that quick access to the best treatment is particularly critical for pancreatic cancer patients because they face the highest mortality rate of all cancers – 94% of patients die within five years of their diagnosis.

The study is anticipated to take two years to complete. Dr. Molinari is hopeful that it will help ensure a standardized quality of care for all pancreatic cancer patients coming to the QEII, not just patients from Nova Scotia.

To date, the passionate Craig's Cause group has raised more than $520,000 – an impressive achievement.

Craig's Cause Maritime Bike Tour

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September 2011 and March 2012 Research Fund Award Recipients

The Capital Health Research Fund competition is held twice a year. Researchers planning to carry out original research are eligible to apply for funding. Research funding awarded in the past year totalled $306,582.

September 2011 Awards

Name	Department	Award	Research Description
John Fisk	Rehabilitation and Supportive Care Services	$14,933	A study of retinal nerve fibre layer thinning, vision and cognition in persons with multiple sclerosis
Nicholas Giacomantonio	Medicine/Division of Cardiology	$14,953	The effects of a 12-week cardiovascular rehabilitation exercise program on inflammatory markers and traditional coronary artery disease risk factors in patients with rheumatoid arthritis
Dietrich Henzler	Anesthesia/Division of Critical Care	$14,404	The influence of transpulmonary pressure on ventilator associated lung injury during partial ventilator support with bi-level positive airway pressure (BIPAP)
Peter MacDougall	Anesthesia	$14,542	The relationship between outpatient opioid utilization and surgery of the chest: a retrospective review of the Combined Opioid Anesthesia Perioperative (COAP) dataset
Arleigh McCurdy	Medicine/Division of Hematology	$5,000	Development of a novel Dabigatran-based peri-operative bridging anticoagulation protocol for patients on chronic warfarin therapy
Dipan Mistry	Surgery/Division of Otolaryngology	$4,961	Hearing sensitivity in patients with migraine
Jonathan Bailey	Surgery/Division of General Surgery	$4,722	The association between frailty and short-term mortality, morbidity and cost-of-care in elderly patients undergoing non-elective abdominal surgery
Chris Skedgel	Atlantic Clinical Cancer Research Unit	$9,081	An elicitation of societal preferences for the allocation of health care resources in cancer
Xaiowei Song	Medicine/Division of Geriatric Medicine	$15,000	Investigation of brain functional activation and synchronization changes in early Alzheimer's disease – a pilot magnetoencephalography (MEG) study

March 2012 Awards

Rob Adamson	Surgery/Division of Otolaryngology	$15,000	Development of an active implant to stimulate peri-implant bone formation and for in-vivo assessment of osseointegration
Manohar Bance	Surgery/Division of Otolaryngology	$14,988	Calibration of measures for in-vitro assessment of bone conduction implants
Kathryn Birnie	Psychology/Faculty of Science	$3,530	Examining the role of spirituality and religion in coping and managing with chronic pain
Sean Christie	Surgery/Division of Neurosurgery	$14,575	Isolation of microRNAs from injured rodent spinal cord tissue in the context of lipid peroxidation

Name	Department	Award	Research Description
Sultan Darvesh	Medicine/Division of Neurology	$14,999	A pilot study to evaluate butyrylcholinesterase radioligands as molecular imaging agents for multiple sclerosis
Jill Duncan	School of Health Administration	$2,163	Hypertension treatment guidelines specific to the frail elderly: an evaluation of the impact of education on prescribing in a long term care facility in Nova Scotia
Patrick Froese	Emergency Medicine	$7,440	Assessment of extremity injuries by advanced care paramedics to determine the need for diagnostic imaging
Nick Giacomatonio	Medicine/Division of Cardiology	$14,995	Development of the step test as an alternative method for assessing exercise tolerance in adults with risk factors for cardiovascular disease
Carl Jarvis	Emergency Medicine	$13,650	Effect of education on staff familiarity with an emergency department disaster plan
Stephanie Kaiser	Medicine/Division of Endocrinology	$9,888	Acromegaly morphometric scale and psychopathological scoring
Earl Kowalczyk	Surgery/Division of Orthopedics	$5,000	Biomechanical analysis of periprosthetic fixation for Vancouver Type B1 fractures using 4.5mm locked plates
Myron Kwapisz	Anesthesia	$14,944	The use of fibrinogen concentrate in high-risk cardiac surgery: a prospective, double-blinded, randomized, controlled study
Marilyn McKay-Lyons	Medicine/Physical Medicine and Rehabilitation	$15,000	Exploring potential synergistic effects of aerobic exercise and cognitive training on cognition after stroke
Laurel Murphy	Emergency Medicine	$4,600	Comparison of the King Vision Video Laryngoscope with direct laryngoscopy in easy and difficult airway simulations
Barbara Pavlova	Psychiatry/Mood Disorders Program	$14,622	Cognitive behavioural therapy for social phobia in people with bipolar disorder: a pilot study
Christopher Richardson	Surgery/Division of Orthopedics	$11,313	Synoptic reporting of total hip and knee arthroplasty operative reports: demonstrating content coverage with SNOMED CT
John Ross	Emergency Medicine	$7,400	Validation of simulation based assessment methodology for evaluating resuscitation skills in emergency medicine postgraduate trainees
Kathleen Spurr	School of Health Science/Respiratory Therapy	$9,879	Creation of a tool for assessing evidence based decision-making knowledge and skills in health care professionals
Andrew Travers	Emergency Medicine	$15,000	The impact of a novel collaborative program between emergency medical services and long term care: an observational study

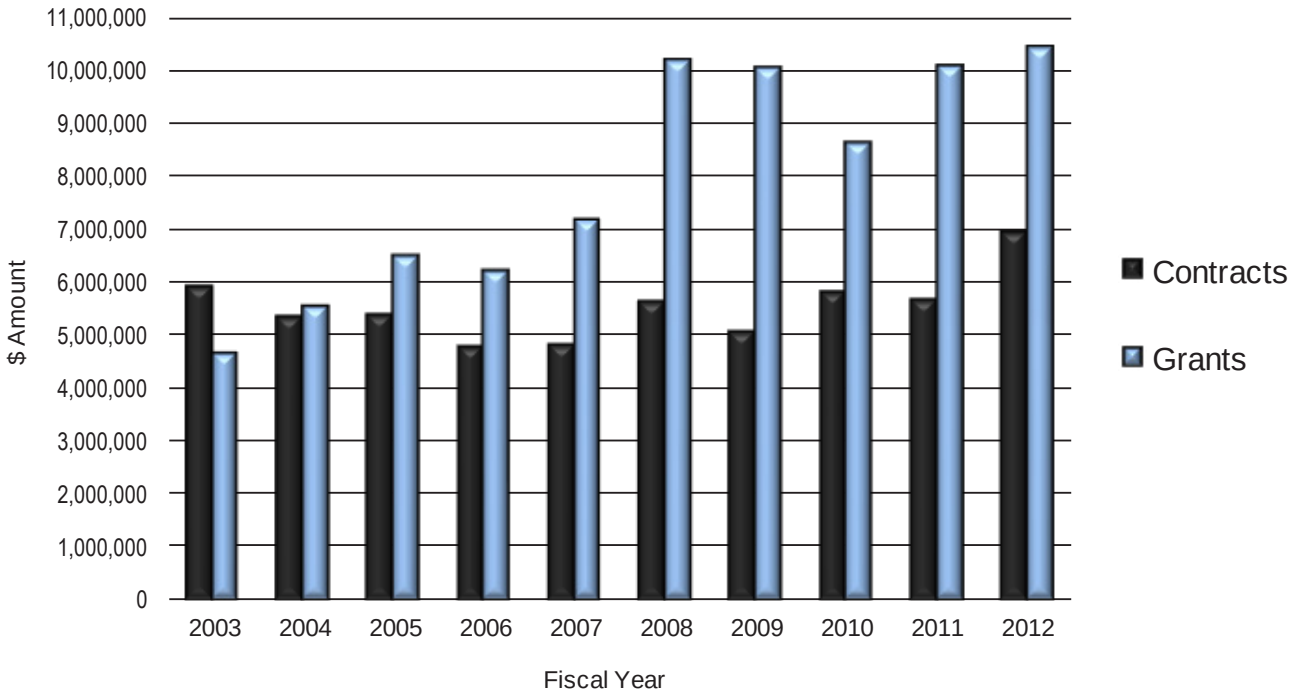
Capital Health Research: All Research Accounts

Statement of Revenue and Expenses (April 1, 2011 to March 31, 2012)

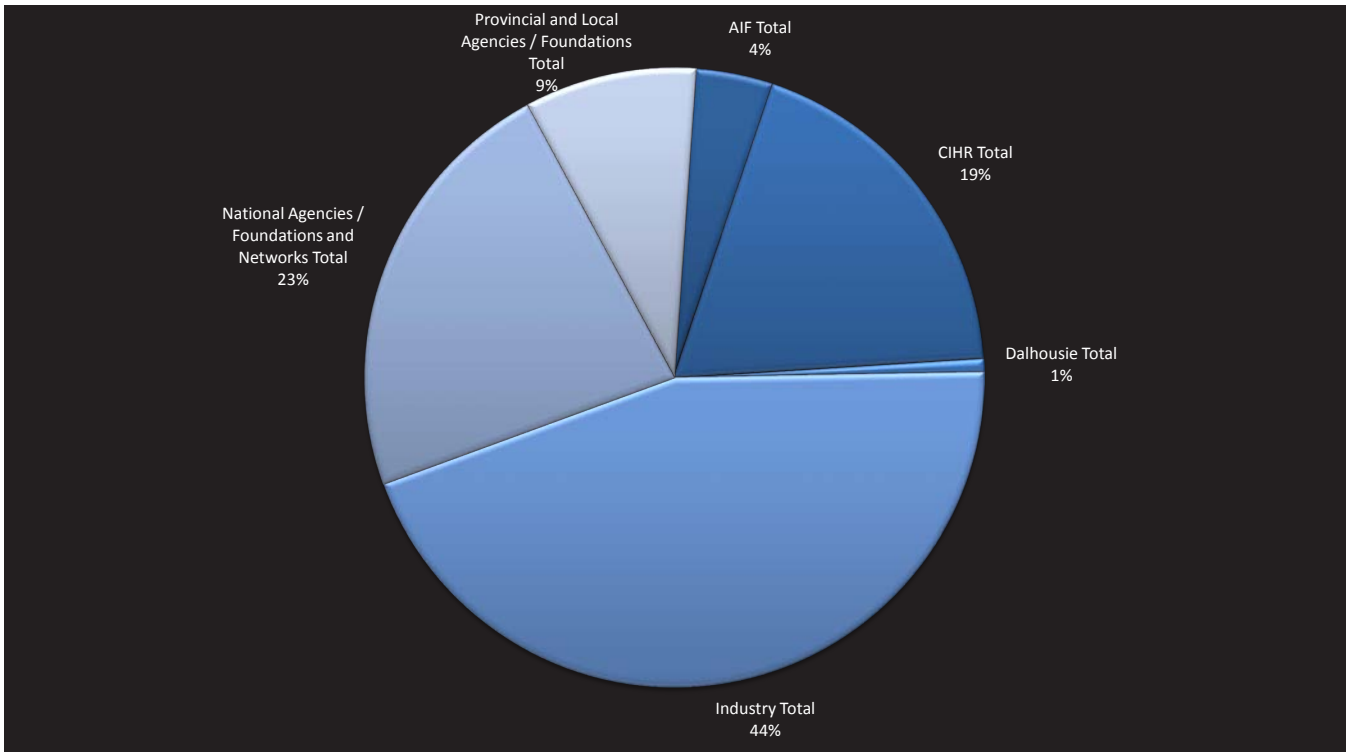
Opening Balance April 1, 2011	**$**	**23,339,609**
Revenue		
Grants		10,369,811
Contracts		6,891,709
Federal Indirect Costs Program		805,127
Interest on Investments		564,249
Donations & Other Revenue		351,838
Research Overhead		1,043,085
Ethics Review Fee		275,000
Record Retention Fee		17,464
Total Revenue	**$**	**20,318,284**
Expenses		
Compensation		10,338,872
Supplies and Services Expenses		
Clinical Laboratory Services		513,143
Communications		43,956
Diagnostic Imaging Services		344,100
Equipment		345,626
Recoveries of Expenses		(405,725)
Maintenance		81,348
Medical/Surgical Supplies		25,925
Other Expenses		490,900
Overhead		1,586,771
Pharmacy Services and Drugs		121,097
Printing/Office and Computer Supplies		279,353
Purchased Services/Professional Fees		385,457
Transfers Offsite		2,809,195
Travel/Professional Development		521,515
Participant Reimbursement		212,054
		7,354,715
Total Expenses	**$**	**17,693,587**
Net Inflow/Outflow		**2,624,697**
Unrealized Gain (Loss) on Investments		**(239,007)**
Ending Balance March 31, 2012	**$**	25,725,299

Contract Overhead Distribution	**11/12**
Capital Health Research Services	868,801
Capital Health Research Development	174,284
Faculty of Medicine, Dalhousie University	217,610
University Departments	326,076
TOTALS	**$ 1,586,771**

Research Project Revenue



Sources of Grant and Contract Revenue



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In addition to the Research Ethics Board executive and office staff, the board has 72 volunteer members. These members are drawn from the community, the legal profession, medical staff and hospital employees.

Capital Health Research Annual Report 2011-2012
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CANADA'S TOP
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RESEARCH
HOSPITALS
2012
RE$EARCH
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Discovery and Innovation for Health