

Impacts of CIHR-funded research: A compendium of results

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1 Aging

1.1 Breaking down the myths of palliative care

Not everyone wants to be a caregiver

1.1A Overview

Dying at home is considered the “gold standard” of end-of-life care but, according to research by **Dr. Kelli Stajduhar** of the **University of Victoria**, while patients may feel this way, the family members who are caring for them don’t necessarily share their view.

1.1B Impact

When Dr. Stajduhar communicated her findings to her local health authority, the authority began to speak publicly about the difficulties of dying at home for families and opened 10 more palliative care beds to take the pressure off family caregivers.

1.1C First Published

CIHR Research Profile, 2009

1.2 New cells for old brains

Physical exercise promotes brain health

1.2A Overview

A 20-minute walk with the dog may not send you to the Olympics – but it may help maintain that Olympic-calibre brain as people age. **Dr. Brian Christie** of the **University of Victoria** was one of the first to demonstrate the now widely accepted notion that physical exercise can create new brain cells, resulting in better learning and memory skills among seniors. These effects hold true for all forms of exercise, even if they are mild. As well as creating new neurons, though, Dr. Christie has found that exercise improves communication among existing brain cells, probably due to increased blood flow from the exercise.

1.2B Impact

This research provides yet more evidence for the importance of remaining physically active as people age.

1.2C First Published

Research profile, August 2008

1.3 The adaptable brain

People with Alzheimer's disease can use other areas of their brain

1.3A Overview

Nearly a quarter of a million Canadians suffer from Alzheimer's disease and, by 2030, those numbers are expected to more than double, to nearly 500,000 Canadians. Research by **Dr. Cheryl Grady** of Toronto's **Baycrest Hospital** has found that people who suffer from early-stage Alzheimer's disease can engage other areas of the brain to perform memory tasks. Now, Dr. Grady and colleagues are looking at the brains of older adults before and after memory training to see which brain areas become engaged after the training.

1.3B Impact

Much of Dr. Grady's work is basic research, trying to understand the conditions that might encourage other areas of the brain to "take over" memory tasks. However, Dr. Grady's is also seeking to apply the knowledge gains from her research to encouraging such changes in the brains of older adults.

1.3C First Published

CIHR Health Research Results, 2003-04; updated 2009

1.4 Dancing your troubles away *Learning to tango can improve balance, memory*

1.4A Overview

Nine of 14 seniors (aged 62-90) who took tango lessons dramatically reduced their risk of a severe fall, compared to only three out of 10 seniors who walked twice a week, according to research by **Dr. Patricia McKinley** of **McGill University**. All of the seniors participating in the study had suffered a fall in the past year and had developed a fear of falling – a major factor in reducing their autonomy. Dancing led to better coordination and balance and, an added bonus, also led to improvements in “working” memory – needed for tasks such as reordering random letters or numbers in a logical sequence – that lasted for weeks after the end of lessons. Dr. McKinley has gone on to compare the benefits of tango with those of meditation for people with mild to moderate depression. She is also hoping to undertake an international study of the use of tango for people with age-related macular degeneration, with the ultimate goal of producing a “turn-key” program for use in community settings.

1.4B Impact

A community seniors’ centre in Montreal offers space for tango practice, while a tango club in Montreal offers afternoon classes for seniors and students, in part to foster inter-generational activities. Publicity generated by the original tango project has resulted in a dance and movement workshop to be offered in February 2010 as part of a Gait and Mental Function Congress. And Dr. McKinley is using dance and music as a vehicle to improve movement and quality of life in people with Parkinson’s disease at a Montreal seniors’ centre.

1.4C First Published

CIHR Health Research Results, 2004-05; updated 2009

1.5 The fall doctor is in *Preventing debilitating falls*

1.5A Overview

Half of all Canadians aged 70 and older fall each year. Of the thousands who break a hip, one-fifth will die within a year. **Dr. Vicki Scott** of the **University of British Columbia** has conducted research that helps home support workers and seniors themselves take an active role in preventing falls through an interactive falls prevention checklist and action plan to

identify and reduce risks. Dr. Scott also notes that it's important that we adapt our building codes and built environment, from sidewalks to stairs, to help prevent seniors from falling.

1.5B Impact

Dr. Scott's 2006 research resulted in a 43% reduction in falls over a six-month period among the study population. Her work has resulted in the publication of the Canadian Falls Prevention Curriculum (CFPC) in 2008. The CFPC builds on existing knowledge and skills of health professionals and community leaders working to prevent falls among seniors, by giving them the tools they need to select and integrate effective programs and policies.

1.5C First Published

Researcher profile, December 2007; updated 2009

1.6 Focus on eating well

Tools ensures seniors are getting the nutrients they need

1.6A Overview

Dr. Heather Keller from Ontario's **Guelph University** has developed a simple-to-use screening tool to help doctors and other health professionals spot possible risk factors for poor nutrition among their senior patients. The SCREEN© (Seniors in the Community Risk Evaluation for Eating and Nutrition) and an associated tool kit capture patient information about physical factors, such as difficulty chewing or swallowing, as well as social factors, such as eating alone or difficulties with shopping or cooking.

1.6B Impact

Dr. Heather Keller from Ontario's Guelph University has developed a simple-to-use screening tool to help doctors and other health professionals spot possible risk factors for poor nutrition among their senior patients. The SCREEN© (Seniors in the Community Risk Evaluation for Eating and Nutrition) and an associated tool kit capture patient information about physical factors, such as difficulty chewing or swallowing, as well as social factors, such as eating alone or difficulties with shopping or cooking.

1.6C First Published

Grey Matters, newsletter of the CIHR Institute of Aging, November 2007; updated 2009.

1.7 Helping seniors stay on their medication *Expanding pharmacists' roles is key*

1.7A Overview

In 2006, seniors in Canada between the ages of 60-79 had an average of 35 prescriptions in a year, while those aged 80 and over averaged 74 prescriptions – and this doesn't count over-the-counter and herbal medications. **Dr. Lisa Dolovich** of **McMaster University** has provided reliable research evidence that is helping seniors manage all of these prescriptions and avoid common problems, such as adverse drug reactions and remembering to take different medications in the right dosage at the right time. Her research demonstrated that having pharmacists in family physicians' offices helps to optimize medication regimes and improve monitoring of medications.

1.7B Impact

As a result of this study, the Ontario Ministry of Health now funds full-time pharmacist positions for family health primary care teams and, as of 2009, there are about 90 Ministry of Health-funded pharmacists in these positions.

1.7C First Published

CIHR Institute of Aging *Biennial Report, 2005-07*; updated 2009

1.8 Keeping seniors on the road – safely *Research a sound road map for policy*

1.8A Overview

CanDRIVE, a CIHR-funded interdisciplinary research program aimed at improving the safety of older drivers, is led by **Drs. Malcolm Man-Son-Hing** of the **Ottawa Health Research Institute** and **Shawn Marshall** of the **Élisabeth Bruyère Research Institute**. The program is now the accepted expert on older drivers in Canada.

1.8B Impact

CanDRIVE has written policies on driving and dementia for the Canadian Council of Motor Transport Administrators (CCMTA), the Canadian Medical Association and the Canadian Consensus Conference on Dementia. The program also participated in developing the 7th edition of *Determining medical fitness to operate motor vehicles*, a publication of the Canadian Medical Association that is the primary tool physicians use to decide when their patients should no longer be driving.

1.8C First Published

CIHR Institute of Aging, *Biennial Report, 2005-07*.

1.9 Getting better at detecting danger *Measuring the risks of frailty*

1.9A Overview

Frail seniors – as many as 20% of Canadian seniors – are at greater risk for acute and chronic diseases, disability and death. Being able to measure frailty in seniors delays efforts to prevent these outcomes. **Dr. Kenneth Rockwood of Dalhousie University** has developed and tested the Seven-Point Clinical Frailty Scale as an easy-to-use predictive tool to measure frailty in seniors.

1.9B Impact

The new scale is being used clinically at the Queen Elizabeth II Health Sciences Centre in Halifax to help physicians quickly and accurately measure the frailty of patients, enabling them to better manage the condition and reduce the risk of other serious ailments. It is also being beta tested by Providence Health Care in B.C. **Dr. Janet McElhaney, MD**, program director of Elder Care Acute Services at Providence Health Care and division head of geriatric medicine at the University of British Columbia (UBC). Estimates that the frailty Scale and Index could save \$4-billion out of Canada's \$17-billion acute care budget by improving the appropriateness of care to elderly. The scale, in a slightly expanded form, is also being used in a range of research studies, including REALISTIC-80 at Queen's University.

1.9C First Published

CIHR Health Research Snapshots, 2007; updated 2009

1.10 Preventing drug-related deaths in seniors with dementia *Study finds heightened risk in antipsychotic drugs*

1.10A Overview

Antipsychotic drugs are approved for treating psychotic conditions such as schizophrenia and mania. But they are also widely prescribed to manage behavioural symptoms of dementia, such as agitation, verbal or physical aggression and delusions, hallucinations or paranoia. According to research by **Dr. Sudeep Gill**, antipsychotic drugs are associated with an increased risk of death in elderly patients with dementia. Dr. Gill tracked seniors with dementia for 180 days after they started taking the drugs and, he says, given the short timeframe, even a slight increase in death rates is significant, particularly as these medications might not be beneficial for many elderly dementia patients.

1.10B Impact

The United States' Food and Drug Administration recently cited Dr. Gill's study in its decision to issue a warning about antipsychotic medications and its plans to add boxed warnings to the labels of these drugs.

1.10C First Published

CIHR Health Research Results, 2007-08.

1.11 Diagnosing urinary problems *New technique is pain-free, non-invasive*

1.11A Overview

Urinary problems become more frequent as people age, and have a significant impact on quality of life. Diagnosing urinary problems is done through a test that requires catheterization, which can be uncomfortable for many people – so much so that as many as 20-30% of patients turn down the test, progressing straight to medication or surgery. **Dr. Andrew Macnab** of the **University of British Columbia** has developed a pain-free and non-invasive way to diagnose urinary problems using near-infrared light. The technique has undergone extensive clinical testing in Canada and the United States. Vancouver-based Urodynamix has licensed the technology and is exploring new applications for it, including monitoring for excessive pressure on organs among patients in intensive care units.

1.11B Impact

The device has been approved for use in both Canada and the United States and is being marketed, although lack of a fee code for its use is slowing down its widespread adoption. Dr. Macnab is continuing his work, including using near infrared light on a vaginal probe to diagnose stress incontinence in women due to weakness in the pelvic floor (usually as a result of childbirth), as well as a wireless version of the device that makes diagnosis in children, particularly, much easier.

1.11C First Published

CIHR Health Research Results, 2006-07; updated 2009

1.12 Keeping seniors on their feet *Restoring a sense of stability*

1.12A Overview

CIHR-funded researcher **Dr. Stephen Perry** of **Wilfred Laurier University** spent 15 years studying how to prevent falls among seniors. Dr. Perry's research led him to develop a new kind of shoe insole that improves balance and prevents seniors from falling. The sole has a thin ridge that extends around the side and back of the insole. When the wearer goes off-balance, he/she senses the ridge and readjusts balance. Normally, natural pressure sensors on the soles of our feet provide the information we need to stay upright. As we age, however, we lose sensitivity in our feet, making balance more difficult and making us prone to falls.

1.12B Impact

When a group of 20 seniors wore the Sole Sensors for 2 weeks, they had half the falls of a similar group who didn't wear the insoles. The Sole Sensor has been commercialized by Ontario-based Hart Mobility and is scheduled to appear on the market in 2009.

1.12C First Published

Grey Matters, the newsletter of the CIHR Institute of Aging, March 2007, Updated 2009

2 Bones, Joints, Nerves and Skin

2.1 Keeping employed

Dealing with arthritis on the job

2.1A Overview

Arthritis is the leading cause of disability in Canada and, as our population ages, the number of people with arthritis is expected to increase. Arthritis is not, however, just a disease of old age. It generally hits hardest when adults are between the ages of 45 and 65 – in the prime of their lives. **Dr. Monique Gignac** of the **University of Toronto** tracked almost 500 employed people with arthritis for five-six years. Based on this research, she calculated that the average economic cost of arthritis disability is \$11,500 per year per person. Of this, 41% is due to lost productivity, 37% from stopping working or changing jobs and the remaining 22% is due to decreased working hours and/or absenteeism. Workers made a number of adjustments to manage their disability, such as: working longer days to fit in more rest breaks; reorganizing work spaces to reduce or avoid lifting, using a more comfortable chair, using a stool to raise legs or replacing computer mouse.

2.1B Impact

Dr. Gignac's research is being developed into presentations and workshops for people with arthritis, both in Canada and across Europe. It has also provided input to a guide being prepared by the Arthritis Society in Canada that will provide people with strategies to help them manage their disease and employment. Her work has led to further research that is creating and testing a workplace intervention for people with rheumatoid arthritis.

2.1C First Published

Research profile, September 2007; updated 2009

2.2 Pain receptor could be linked to arthritis

Identification of the receptor could lead to new drugs to treat arthritis

2.2A Overview

Chronic pain and reduced mobility and function are the most common outcomes of arthritis. Now, **Dr. John Wallace of McMaster University**, has identified a pain receptor, the PAR2 receptor, that he believes is linked to inflammatory diseases such as arthritis. There is also good evidence from human studies that the receptor plays a role in irritable bowel syndrome.

2.2B Impact

Several pharmaceutical companies now have programs to develop ways to block the PAR2 receptor.

2.2C First Published

Research profile, September 2007; updated 2009

2.3 In the swim of things

Increasing mobility for people with arthritis

2.3A Overview

Exercise can improve balance, strength and mobility and prevent falls, but seniors with hip osteoarthritis often find it difficult to participate in such exercise due to pain. Dr. Catherine Arnold of the University of Saskatchewan conducted a two-year clinical trial to study the effect of aquatic exercise alone and aquatic exercise combined with education on reducing the risk of falls in seniors with osteoarthritis in their hips. She found that the participants in the combined education and exercise group had greater gains in their confidence that they could prevent a fall and greater improvement in functional performance compared both to those who had exercise alone and to those who had no intervention.

2.3B Impact

The study has led to the establishment of a community aquatic and education program for older adults with mobility restrictions and/or at risk of falling.

2.3C First Published

CIHR Health Research Results, 2005-06; updated 2009

2.4 Think twice before you cut

What if surgery doesn't help arthritis of the knee?

2.4A Overview

About half of all Canadians will deal with arthritis of the knee at some point, whether because of age or injury. Arthroscopic knee surgery, which removes small torn bits of cartilage or smoothes the rough edges of the joint surface, has long been the standard treatment. However, **Dr. Bob Litchfield** of the **University of Western Ontario** conducted a trial in which all participants received therapy and education, but only half received surgery. He followed the patients for up to two years and found no difference between those who received surgery and those who didn't.

2.4B Impact

The publication of Dr. Litchfield's results sparked a debate in the orthopedic surgeon community. While there are some instances where surgery is justified, Dr. Litchfield hopes his results will encourage orthopedic surgeons to consider non-operative therapies before cutting. Dr. Litchfield plans to explore his finding's application in a further knowledge translation study.

2.4C First Published

CIHR-CMAJ Top Canadian Achievements in Health Research Awards, 2009; updated 2009

2.4D Category

Clinical practice – treatment

2.5 Relieving arthritis pain safely

Ontario research develops new alternative

2.5A Overview

With many prescription pain relievers from arthritis taken off the market in recent years, people with arthritis have few options. Many people already take glucosamine, derived from crab shells, to relieve their pain. **Dr. Tassos**

Anastassiades of Queen's University has developed a series of new, synthetic compounds based on glucosamine which have been shown to be effective in reducing inflammation and preventing bone loss in animal models.

2.5B Impact

The compounds have been shown to have low toxicity and to have potential both as a pharmaceutical and a nutraceutical. They have been patent protected and Dr. Anastassiades is working with the Canadian Arthritis Network to find a partner for human applications.

2.5C First Published

CIHR Health Research Results, 2004-05

2.6 Danger – bones at risk!

Anti-depressants can affect bone health

2.6A Overview

Daily doses of anti-depressants can help mental functioning. But, in people over 50, they can weaken bones and make them more prone to fractures. **Dr. David Goltzman of McGill University** tested the bones of more than 5,000 people taking popular forms of anti-depressants called selective serotonin reuptake inhibitors (SSRIs). He found that those taking SSRIs daily were twice as likely to have weaker hip bones and vertebrae, putting them at greater risk of breaking bones.

2.6B Impact

The U.S. Food and Drug Administration is considering revising guidelines to incorporate the latest knowledge on the impacts of SSRIs on bone health. In the meantime, there is a wider understanding that treatment for depression using SSRIs among people over 50 should also include strategies for preventing osteoporosis, such as regular bone mineral density tests and lifestyle measures such as getting enough calcium and vitamin D in diets, exercising, stopping smoking and drinking moderately.

2.6C First Published

Research profile, November 2007; updated 2009

2.7 Fighting bone disease through cellular healing *Convincing cells to grow new bone*

2.7A Overview

Brittle and broken bones caused by diseases ranging from cancer to osteoporosis or trauma could benefit from new cell-based therapy for bone healing. **Dr. Laurie McDuffee** of the **University of Prince Edward Island** is developing a way to take bone cells from adult donor bone and bone-related tissue and stimulate them to become mature, bone-forming cells, also known as osteoblasts. The cells can then be transplanted into diseased bone.

2.7B Impact

The technology has been tested both in the lab and in animals, specifically horses. Initial results were promising and the testing is expected to be complete in mid-2010. At that point, if results continue to be positive, the technology will be a step closer to use in humans, where it can help doctors treat orthopaedic patients and improve the quality of life for people with bone disease.

2.7C First Published

CIHR Health Research Results, 2003-04; updated 2009

2.8 Home is where the recovery is *Hip and knee replacement patients recover better at home*

2.8A Overview

The number of Canadians waiting for hip and knee replacements remains high. Often these waits are due to a shortage of hospital bed spaces needed for recovery from the surgery. **Dr. Nizar Mahomed** of the **Toronto Western Hospital, University Health Network**, led a group called the Total Joint Network that developed a program to reduce wait times, shorten patient recovery time and save money for taxpayers. They studied two groups of patients: one that spent five days in acute care in hospital, followed by home visits from a rehabilitation specialist and another that spent three days in acute care, followed by seven days of inpatient rehabilitation. Surprisingly, they found that the patients who recovered at home had better health outcomes and similar levels of satisfaction with their treatment. The team then turned its attention to hip-fracture patients, reducing wait times for surgery to less than two days and reduced overall rehabilitation stay to 29 days.

2.8B Impact

The home-based approach to recovery from hip- and knee-replacement surgery saved more than \$10 million in health-care costs in the Greater Toronto Area. Of the hip fracture patients, 20% more patient returned to their pre-injury health status. Their return to health is saving the province about \$17 million per year by helping hip fracture patients avoid long-term care facilities. Both models of care have been incorporated into the Ontario Bone and Joint Health Network Initiative to disseminate them across Ontario.

2.8C First Published

CIHR-CMAJ Top Canadian Achievements in Health Research Awards, 2009; updated 2009

2.9 Regenerating movement *Treating spinal cord injuries*

2.9A Overview

Neurons play a critical role in helping the nervous system send messages throughout the body but, once damaged, they typically do not regrow, leaving people with spinal cord injuries in wheelchairs. **Dr. Timothy O'Connor** of the **University of British Columbia** is leading a team that is searching for chemicals that will help neurons grow. The team is using a technology known as high-throughput screening, which uses a combination of robotics and high-speed computer technology, to test thousands of chemical each day. Once the team has identified chemicals that will promote neuron growth, the next step is testing in animals, in the hopes of developing a treatment for humans with spinal cord injuries.

2.9B Impact

Dr. O'Connor's work led to the identification of a compound that enhanced growth of neurites (a growth out of a neuron, either an axon or a dendrite, that promotes connections between neurons). When tested in animal models, it did not promote regeneration of cut nerves, but stimulated sprouting of intact nerves in the spinal cord. This is promising because compensatory sprouting may be a more viable way to stimulate functional recovery in a damaged central nervous system.

2.9C First Published

CIHR Health Research Results, 2006-07; updated 2009

2.10 Reducing scarring from burns

Protein provides target for treatment

2.10A Overview

Serious burns can be treated – but the scars left behind can be debilitating, resulting in limitations to mobility and nerve damage. **Dr. Aziz Ghahary**, now of the **University of British Columbia**, but at the **University of Alberta** when he conducted the research, has discovered a protein that could provide a target for slowing, or even preventing, scarring by interfering in the biological processes that cause scarring. Scarring happens when there is overproduction of extracellular matrix (ECM) proteins and lack of degradation signals. The protein discovered by Dr. Ghahary, called keratinocyte-derived anti-fibrogenic factor (KDAF) enhanced substances that send degradation signals.

2.10B Impact

A patent filed on the discovery was licensed to Vancouver-based Augurex Life Sciences Co. in 2007 and the product is en route to commercialization as a method for early diagnosis of arthritis as well as for treatment purposes.

2.10C First Published

CIHR Health Research Results, 2004-05; updated 2009

2.11 Staying active on wheels

Guidelines improve lives of people in wheelchairs

2.11A Overview

Paralympians are some of the most exceptional athletes out there. But all people with spinal cord injuries, not only those who harbour Olympic dreams, can see dramatic improvements in their lives by adding some physical activity. Greater arm strength makes it easier to transfer from wheelchair to car; more leg strength means a person can take off his own trousers at night. **Dr. Kathleen Martin Ginis** from **McMaster University** has conducted research to determine how much physical activity is enough. For instance, the general recommendation of 30-60 minutes a day is too much for people in wheelchairs, as it is much more work to wheel a chair than to walk. Based on her research, Dr. Martin Ginis is developing physical activity guidelines and a physical activity guide for Canadians with spinal cord injury.

2.11B Impact

Guidelines will provide assistance to people with spinal cord injury as well as those involved in rehabilitation, physical training, etc., aiding in daily functioning, psychological well being and chronic disease prevention.

2.11C First Published

Research profile, August 2008; updated 2009

2.12 Working out on the run *Fitting fitness into a busy life*

2.12A Overview

It's tough to find time to exercise at all, much less for the recommended 60 minutes a day. So **Dr. Martin Gibala of McMaster University** has good news for you – training using very short bursts of high-intensity exercise can be as beneficial as longer periods spent exercising at moderate intensity. Dr. Gibala looked at the impact of interval training: short bursts – say 30 seconds – of exercise at a fast pace, then stopping completely or slowing down for a few minutes, then repeating the cycle several times. He compared two groups of people – one that did 2.5 hours of high-intensity cycling over two weeks and one that did 10.5 hours of moderate cycling over the same period. At the end, both groups showed similar increases in the enzymes produced in thigh muscles. These enzymes are chemical compounds that burn fat and carbohydrates for energy. Now Dr. Gibala is looking at long-term effects of interval training in people in different age groups and at different fitness levels.

2.12B Impact

This finding will provide people who can't find time for sustained exercise a different strategy to improve their health and wellbeing with physical activity. Dr. Gibala is currently following up on his research to expand its results.

2.12C First Published

Research profile, January 2008; updated 2009

2.13 Diagnosing arthritis earlier *Tool assists with osteoarthritis of the knee*

2.13A Overview

Osteoarthritis is the most common type of arthritis in Canada, affecting three million people, or one in every ten. Early diagnosis can enhance treatment possibilities and slow the progression of disability. **Dr. Jolanda Cibere** of the **Centre for Hip Health and Mobility at the University of British Columbia** has developed a tool that helps physicians diagnose osteoarthritis of the knee at an earlier stage. The tool uses MRI, x-ray, biomarkers, clinical assessment and questionnaires to comprehensively assess patients with knee pain. Dr. Cibere and her team are developing a video to educate family physicians, medical students and physiotherapy students, as well as researchers, about the tool's use.

2.13B Impact

The tool is being used by the National Institutes of Health in the United States as part of its Osteoarthritis Initiative to ensure data are reliable and standardized. It has also been used by osteoarthritis researchers in their work and Dr. Cibere has had inquiries about its use by researchers in the United States and United Kingdom. The educational video, as well as other knowledge translation tools, will be available in late 2009.

2.13C First Published

CIHR Health Research Results, 2003-04; updated 2009

2.14 How do you mend a broken bone? *Glue it back together, of course!*

2.14A Overview

Nearly 1.5 million Canadians suffer from osteoporosis, putting them at risk of breaking bones from simple daily activities. The causes seem simple; the consequences, however, are significant – long hospital stays and difficulty getting around. A Canadian research team led by **Dr. Gamal Baroud** of the **University of Sherbrooke** is helping patients with broken vertebrae get out of hospital and back to their active lives more quickly using a kind of super glue in a procedure called vertebroplasty. During the procedure, a needle is threaded up the spine and a small amount of liquid cement injected into the break. The cement hardens after just 20 minutes. Once done, says Dr. Baroud, up to 90% of patients can walk pain free. Instead of days or weeks in the hospital, they leave within a few hours. Dr. Baroud has been working

to reduce the risks of the procedure, which include the liquid cement leaking out of the bone, by using new mineral cements that closely resemble bone.

2.14B Impact

Dr. Baroud's research has resulted in a simple device that provides accurate delivery and safety controls at a lower cost than existing devices, as well as additional devices that improve patient safety by reducing cement leaking and intra-vertebral damage. The first generation of products is scheduled for approval in the United States and Canada in 2009, with a second generation scheduled for approval in early 2010.

2.14C First Published

Research profile, November 2007; updated 2009

2.15 On your mark

New method for predicting rate of osteoarthritis progression

2.15A Overview

Osteoarthritis affects one in ten Canadians. Suffering from the disease is like operating in a void – sufferers have no clue when the disease will suddenly take a turn for the worse. A research team led by **Dr. Robin Poole** of **McGill University** has found a new and accurate way to track the progression of osteoarthritis. The team found that biomarkers in the blood can predict the severity of the disease's progression by measuring collagen degradation.

2.15B Impact

Pharmaceutical companies are using the technology for detecting the biomarkers for disease-modifying drug development and are involved in preclinical studies and clinical trials. The assays to test for the biomarkers is produced and marketed by IBEX Technologies in Montreal. Mr. Paul Baehr, President and CEO of IBEX, estimates that the assay kits make up a quarter of company revenues and help keep it profitable "Dr. Poole's contribution has helped us considerably," says Baehr.

2.15C First Published

CIHR Health Research Snapshots, 2007; updated 2009

2.16 Making a new hip last longer *Fighting bone loss around implant*

2.16A Overview

Physicians are seeing demand for hip replacements among younger patients growing. But they are often reluctant to carry out the surgery, partly because the implants can fail after 20 years or more, due to severe loss of bone around the new joint. **Drs. Helen Burt** and **Tim Durance** of the **University of British Columbia** have developed a tiny sponge made of biodegradable material and stuffed with stem cells that grow human bone. The sponge can be implanted along with the new hip and prevent the bone loss that can make a second implant necessary. Further research has found that the sponge is effective both in the lab and in animals.

2.16B Impact

The development of the sponge is a major breakthrough for hip-replacement patients. The researchers have filed two patents on the process and these are moving to national patent protection in key countries around the world. The University of British Columbia has licensed both patents to a Canadian company that is pursuing commercial applications.

2.16C First Published

CIHR Health Research Results, 2004-05; updated 2009

2.17 Giving cartilage a helping hand *New polymer stimulates cartilage regeneration*

2.17A Overview

When cartilage in joints is destroyed, whether by injury or arthritis, joint replacement surgery is often the answer. But there may be an alternative. **Dr. Michael Buschmann** and a team of scientists and engineers at **Montreal's École Polytechnique** have developed a gelling polymer called BST-CarGel® that can stimulate the regeneration of new cartilage. When applied to a joint, it forms an adhesive scaffolding within the damaged cartilage on which the body's own cells can then build new cartilage.

2.17B Impact

BioSyntech, a Quebec company, is commercializing the discovery and is currently conducting a clinical trial of BST-CarGel® in Canada, Spain and South Korea. Interim results from the trial have shown statistically significant

improvements in repair tissue quality at 12 months post-treatment due to BST-CarGel® treatment. Final results are expected in 2010.

2.17C First Published

CIHR Health Research Results, 2004-05; updated 2009

2.18 The search for an end to chronic pain *Basic research yields dividends*

2.18A Overview

People who suffer from chronic pain can tell you just how debilitating a condition it is. Yet, there are no drugs currently available to treat severe pain. **Dr. Terrence Snutch** from the **University of British Columbia** spent many years investigating how N-type calcium channels contribute to chronic pain and other neurological disorders and understanding how they mediate pain transmission. Dr. Snutch was the first scientist in the world to describe the molecular basis for clinically important calcium channels in the cardiovascular, endocrine and nervous systems.

2.18B Impact

In March 2006, Vancouver-based Neuromed Pharmaceuticals Ltd. Signed the largest-ever licensing deal with Canadian history with Merck & Co., Inc., worth up to \$475 million, to further develop NMED-160, the drug that Dr. Snutch developed from his research. In August 2007, Neuromed and Merck & Co. discontinued development of NMED-160, but continue their collaboration to develop alternate therapies based on N-type calcium channels.

2.18C First Published

Researcher profile, July 2006; MP newsletter, spring 2006; updated 2009

2.19 Research, rinse and spit *Oral rinse can help detect infection*

2.19A Overview

One of the standard ways to detect infection is by checking levels of white blood cells called neutrophils. High neutrophil levels provide protection against infection, while low levels denote susceptibility to infection. Neutrophil levels are usually checked with a blood test, **but Dr. Michael Glogauer** of the **University of Toronto** has developed an oral rinse that

can detect neutrophil levels and monitor a person's susceptibility to infection. The rinse has been tested in children who have received bone marrow transplants. By monitoring neutrophil levels with the rinse, the research team could accurately predict whether the patient was at risk of infection up to one week earlier than the standard blood measurement of neutrophils. The rinse can also be used in patients receiving chemotherapy. The drugs involved in chemotherapy tend to eliminate neutrophils so, if the oral rinse can show a high level of neutrophils, they could potentially be dismissed from hospital earlier due to the lower possibility of infection, translating into cost savings for the health-care system.

2.19B Impact

Dr. Glogauer has patented the test in the United States (with a patent pending in Canada) and is working with a Canadian company, CHX Technologies, to take it to market. The next step is a clinical trial in 2010, partly funded by CIHR, to demonstrate the test's ability to predict the onset of periodontal disease. Mr. Ross Perry, owner of CHX Technologies, sees baby boomers as the largest potential market for the PD rinse test. "We're excited about commercializing the test because we know that older patients are really keen about preventive medicine and maintaining their teeth intact for as long as they can."

2.19C First Published

Researcher profile, October 2006; updated 2009

3 Cancer

3.1 Go ahead, make a change

Hair dyes pose no cancer risk

3.1A Overview

A long-running debate about the use of permanent hair dyes and their possible link to cancer has been resolved by **Dr. Mahyar Etminan** from the **McGill University Health Centre** in Montreal and the **Vancouver Coastal Health Research Institute**. Dr. Etminan analysed data from 79 scientific studies and found that there is no marked increase in cancer risk with the personal use of hair dyes.

3.1B Impact

Dr. Etminan has removed a First Published of concern for the many Canadians who colour their hair.

3.1C First Published

CIHR Institute of Cancer Research, *Annual Report, 2005-06*

3.2 Detecting melanoma

Device makes it quick and easy

3.2A Overview

Most skin cancers can be cured if caught early. But the majority of melanomas, one of the most deadly forms of skin cancer, arise spontaneously, not from moles, and can be easily missed by a visual inspection. **Drs. Harvey Lui** and **Haishan Zeng** of the **University of British Columbia** and the **Vancouver Coastal Health Research Institute** have developed an optical device, the Raman Spectrometer, that provides an easy, fast and non-invasive way to detect melanomas.

3.2B Impact

The device has been tested in clinical trials and the university has patented the device. The researchers are looking for industrial partners to speed the transfer of the technology to clinical use.

3.2C First Published

CIHR Institute of Musculoskeletal Health and Arthritis, *On the Move*, Vol. 5, No. 2, Summer 2007.

3.3 Co-opting the common cold

Cold viruses could kill tumours

3.3A Overview

The common cold got its name for a reason – cold viruses are found just about everywhere, they stick around for a long time and they invade all kinds of different cells in the body. That makes them good at infecting humans – but also makes them a good weapon in the fight against cancer. **Dr. Mary Hitt** of the **University of Alberta** is using cold viruses to target cancer cells while leaving healthy cells alone. In preliminary results, the virus she is using has shown an ability to target human breast cancer cells. Another shows potential for making tumour cells self-destruct. Dr. Hitt is also exploring the use of positron emission tomography (PET) imaging to track the virus after it is administered.

3.3B Impact

While not yet ready for testing in humans, if successful, it could lead to an effective, non-toxic form of breast cancer treatment.

3.3C First Published

Research profile, October 2007; updated 2009

3.4 Ovarian cancer: The search for an early-warning system

Searching for genetic markers

3.4A Overview

Ovarian cancer is the second-most common gynaecological cancer in North America. Because there are few warning signs, however, most cases aren't diagnosed until the cancer is quite advanced, leading to high mortality rates. **Dr. Anne-Marie Mes-Masson** of the **University of Montreal** has been looking for a way to detect ovarian cancer since 1991, focusing on genetic markers that could be detected in the blood. The closer she and her team get to finding a marker or group of markers that could form the basis of a blood test, the more interest the corporate world is showing in her work.

3.4B Impact

Dr. Mes-Masson and her team have submitted patent applications on two of the most promising candidates for markers and are extending their search to other candidates. They plan to validate the markers in a large cohort study of pre- and post-menopausal women, including those with no cancer, with benign ovarian disease, with cancer, at high risk for developing ovarian cancer and with other cancers, such as breast cancer. While the commercial potential is high, the technology's ability to save lives is even greater.

3.4C First Published

Research profile, September 2008; updated 2009

3.5 An exercise in survival

Physical activity an important part of health after breast cancer

3.5A Overview

The good news is that survival rates for breast cancer now hover around 85%. The bad news is that breast cancer survivors are at risk of other long-term, life-threatening illnesses, especially if they fit the profile of a breast cancer survivor – over 50 and overweight. Regular exercise is part of the prescription for staying healthy, but it can be difficult for breast cancer survivors. **Dr. Catherine Sabiston of McGill University** is investigating ways that breast cancer survivors can incorporate exercise into their daily lives, helping them regain the sense of control they lost when they were diagnosed with cancer.

3.5B Impact

Helping women integrate exercise into their daily lives will reduce their risk of other long-term health problems like heart disease or osteoporosis.

3.5C First Published

Research profile, April 2009

3.6 Preventing unnecessary treatment... and side effects

Not all prostate cancer needs treatment

3.6A Overview

The majority of men with prostate cancer will die with the disease, not of it. The trick is telling whose disease will progress slowly and not cause trouble and whose disease is more aggressive and needs treatment. The price of unnecessary treatment is high – both to the health-care system and to the individual who is treated and who may suffer side effects such as impotence and incontinence. **Dr. Marianne Sadar** of the **British Columbia Cancer Agency** has found novel gene sequences that are associated with an aggressive form of prostate cancer and is testing to see whether the presence of these gene sequences indicate a need for treatment. Her work has provided hope that there are prognostic markers that can distinguish aggressive disease. If this is the case, the markers will be able to be detected with simple blood or urine tests, making them easy to find and easy to follow.

3.6B Impact

Developing specific markers for aggressive prostate cancer could lead to the possibility of new testing technology with commercial potential.

3.6C First Published

Research profile September 2008; updated 2009

3.7 Age poses no barrier

Treating prostate cancer benefits men of all ages

3.7A Overview

Prostate cancer is the most common form of cancer in Canadian men. Now, a landmark study by **Dr. Shabbir Alibhai** of the **University Health Network** and **University of Toronto** has found that there is no reason to deny aggressive treatment men over the age of 65 with prostate cancer because of their age. His study counters perceptions that older men won't benefit from treatments such as radical prostatectomy or radiation treatment.

3.7B Impact

Previous studies have shown that older patients often don't receive potentially life-prolonging surgery and radiation treatment. Now, physicians can recommend treatment for these patients, knowing that they will benefit.

3.7C First Published

CIHR Institute of Cancer Research, *Annual Report, 2003-04*

3.8 Some are more aggressive than others

Distinguishing one ovarian cancer from another

3.8A Overview

Ovarian cancer affects about one in 70 Canadian women and, because it is usually detected in later stages, it is a particularly deadly disease. **Dr. Mario Filion** from the **University of Montreal** leads a team that has identified genes whose presence may signal that the cancer is more or less aggressive and distinguish cancerous tissue from normal ovarian tissue. He is using these "candidate" genes, as they are known, to screen drugs as potential treatments. Dr. Filion and his team have developed therapeutic monoclonal antibodies against the best targets and are testing them in animal models.

3.8B Impact

Dr. Filion's research could lead to new treatment strategies for ovarian cancer. Clinical trials are expected to begin by 2011 for the most advanced therapeutic monoclonal antibodies in combination with chemotherapy. Dr. Filion is the founder of Alethia Biotherapeutics, a Montreal company focusing on developing therapeutic monoclonal antibodies to treat ovarian cancer, as well as metastatic cancer and the bone loss that accompanies metastatic cancer.

3.8C First Published

CIHR Institute of Cancer Research, *Annual Report 2004-05*; updated 2009.

3.9 New cervical cancer screening tool

Simple diagnostic tool differentiates strains of HPV

3.9A Overview

Human papillomavirus (HPV) is responsible for the majority of cervical cancers – but only some strains of the virus actually cause the cancer. **Dr. Damian Labuda** of the **University of Montreal** and **Hopital Sainte-Justine Research Centre** has developed a low-cost and convenient HPV diagnostic kit that can discriminate between 39 different types of HPV.

3.9B Impact

Univalor, the technology transfer body of the University of Montreal and its affiliated schools and hospitals, has made Dr. Labuda's technology available for licensing to a partner who will commercialize this technology.

3.9C First Published

CIHR Institute of Infection and Immunity, Microcosm III (newsletter), Winter 2008

3.10 New uses for common drugs

Antibiotic can fight cancer

3.10A Overview

Ninety per cent of the time, people who die of cancer are killed when the cancer spreads beyond its original site. So researchers are focussed on finding ways to prevent cancer from spreading. **Dr. Gurmit Singh** of **McMaster University** has found that tetracycline – a common and inexpensive antibiotic most commonly used to treat acne – can prevent breast and prostate cancer tumours from spreading to the bone. The drug works by preventing an enzyme called matrix metalloproteinase from attacking bone tissue and allowing the tumours to spread.

3.10B Impact

Dr. Singh has started a small clinical trial in Hamilton. Patients have shown no adverse effects and there has been some evidence that the markers of bone metastasis were lowered. However, a large clinical trial is needed before the drug can be adopted clinically. Dr. Singh hopes to conduct the trial in a developing country, where there is less access to more expensive drugs.

3.10C First Published

CIHR Health Research Results, 2003-04; updated 2009

3.11 New hope for leukemia treatment

Gene is essential for proliferation of stem cells

3.11A Overview

In recent years, growing attention has been paid to the role of stem cells in the proliferation of cancer cells. **Dr. Guy Sauvageau** of the **University of Montreal** has identified a gene called Bmi-1 that is essential for the proliferation of stem cells involved in leukemia.

3.11B Impact

Dr. Sauvageau and his team are finalizing an assay, or test, that will allow them to screen for compounds that will inhibit Bmi-1.

3.11C First Published

CIHR Health Research Results, 2003-04; updated 2009

3.12 Attacking cancer with a virus

Technique leaves healthy tissue alone

3.12A Overview

Cancer treatment can be effective, but its side effects can be difficult, mainly because chemotherapy and radiation attack all tissue, not only the tumour cells. **Dr. John Bell** of the **Ottawa Hospital Research Institute** has been working for several years on viruses that kill cancer cells by growing inside the tumour cells and killing them, while leaving healthy cells alone. The viruses also express additional genes that stimulate the body's own immune system to fight the cancer cells. Among the challenges has been the development of a manufacturing process to ensure high-purity viruses that can be injected into patients.

3.12B Impact

Dr. Bell is working with Ottawa biotechnology company Jennerex, which he co-founded, to test the virus in humans as a necessary step to making the virus clinically available to treat various forms of cancer. His group has developed a manufacturing process that can be scaled to the commercial

level and is currently preparing viruses that can be used to treat patients. Dr. Bell also founded the Canadian Oncolytic Virus Consortium, which brings together researchers across Canada who are developing cancer-killing, or oncolytic, viruses.

3.12C First Published

CIHR Health Research Results, 2003-04; *CIHR Annual Report, 2003-04*; updated 2009

3.13 Fighting multi-drug resistance

Resistance a serious impediment to cancer treatment

3.13A Overview

Whether it happens right from the start or only after initial treatment, some cancer tumours are inherently resistant to drug treatment. Often, the culprit is a family of proteins, called Multidrug Resistance Proteins, or MRPs, that pump chemotherapy drugs out of cancer cells. **Drs. Roger Deeley** and **Susan Cole** of **Queen's University** led a team that discovered the first of these proteins. He has since developed antibodies that can inhibit MRP activity, as well as MRP materials that can be used in the process of developing drugs that can circumvent the problem of multidrug resistance.

3.13B Impact

The antibodies and assays are available for licensing or purchase through Queen's University technology transfer office.

3.13C First Published

CIHR Health Research Results 2003-04; updated 2009

3.14 Drug combination works where single drugs don't

Montreal researcher combines chemotherapy drug with antibiotic

3.14A Overview

Chemotherapy can be effective – but only up to a point. Many patients' tumours stop responding to standard chemotherapy drugs after initiating treatment. **Dr. Jerry Pelletier** of **McGill University** has found that combining an antibiotic and a chemotherapy drug, in a compound called silvestrol, resulted in tumours in mice going into long-term remission.

3.14B Impact

Silvestrol has been shown to be effective against different cancer, including breast, prostate and leukemia. Dr. Pelletier is working with colleagues to create a synthetic version of the compound so that it can be available in large enough quantities to test in humans. He has also filed for patent protection on the compound and is working with the government of Malaysia, which holds the main patent on the compound. While basic research continues, Dr. Pelletier would like to involve a biotech company to help commercialize the compound.

3.14C First Published

CIHR Health Research Results, 2004-05; updated 2009

3.15 New hope for deadly form of brain cancer

Discovery is first advance in 30 years

3.15A Overview

Glioblastoma is the most common and the deadliest form of brain cancer. More than 1,100 Canadians are diagnosed with glioblastoma every year; most die within nine-to-twelve months of diagnosis. **Dr. Greg Cairncross** of the **University of Calgary** led the Canadian arm of an international study that found a new drug called temozolomide may prolong the lives of some people with glioblastoma, with patients surviving an average of 15 months.

3.15B Impact

The discovery of the benefits of temozolomide is the first advance in managing glioblastoma in 30 years. In 2006, Health Canada approved the drug for use in combination with radiotherapy for adults with newly diagnosed glioblastoma, under the name TEMODAL®. The drug is now used world-wide in the initial treatment of glioblastoma in patients aged 18-70. Follow-up clinical trials are underway to explore expanded indications for its use, including in less aggressive brain cancers and in elderly patients with glioblastoma. The trial for elderly patients, using temozolomide in combination with radiotherapy, is being led from Canada.

3.15C First Published

CIHR Health Research Results, 2004-05; updated 2009

3.16 New insights into cancer development

New function for old protein contributes to cancer development

3.16A Overview

It's been known for some time that the overproduction of a protein known as c-Myc plays a key role in the development of cancer. **Dr. Sabine Mai** of the **University of Manitoba** has taken that knowledge a step further. She has demonstrated that, when c-Myc is present at a certain level, the ends of chromosomes become “sticky” and join together. When the cell divides, these conjoined chromosomes break apart, but at a different location. The cycle continues, as these altered chromosomes continue to attract new chromosomes, with whom they will fuse and then break in new locations when the cells divide. This creates genetic instability and leads to uncontrolled growth of cells – in other words, cancer.

3.16B Impact

Dr. Mai and her team have discovered that a part of the protein, Myc box II, appears to be necessary for the development of this cycle of genetic instability and tumour growth. They are now pursuing research based on understanding and inhibiting the initiation of tumour growth. They also hope their research will lead to the development of a diagnostic tool to determine who is at risk of cancer and monitor the progress of the disease.

3.16C First Published

CIHR Health Research Results, 2005-06; updated 2009

3.17 Safe, inexpensive drug may be a cancer killer

Attacks lung, breast and brain cancer cells, leaves healthy cells alone

3.17A Overview

A drug used for decades to treat metabolic disorders has been found to kill lung, breast and brain cancer cells – but not healthy cells. **Dr. Evangelos Michelakis** of the **University of Alberta** has shown that dichloroacetate (DCA) shrinks tumours, using both animal and human tissue. DCA has

numerous advantages: it can reach areas in the body that other drugs cannot and, since it is not patented, it would likely be an inexpensive drug to administer.

3.17B Impact

While it is too early to say definitively that DCA is a treatment for cancer, Dr. Michelakis continues to assess its safety and efficacy in treating cancer, with two early-phase clinical trials now ongoing.

3.17C First Published

CIHR Health Research Results 2006-07; updated 2009

3.18 Blocking premature cell death *Protein promotes, inhibits apoptosis*

3.18A Overview

Programmed cell death, also called apoptosis, is an important function in the body, one that is shared by all cells. The process is useful in eliminating cancerous cells, for instance, but it can also result in cells dying prematurely, as happens to neurons in Alzheimer's disease. **Dr. Peter Greer** of **Queen's University** has found a protein called calpain that can both promote and inhibit apoptosis. He has found that blocking calpain harms the efforts of breast cancer cells to grow. Dr. Greer and his team are now investigating whether calpain deficiency can reduce metastasis, which is most often the cause of death in patients with breast cancer. Other researchers have also found that mice bred to not have calpain are resistant to neuron death under conditions that mimic Parkinson's disease and Alzheimer's disease (Dr. F. David Park, University of Ottawa) and that these "knock-out" mice also are defective at releasing infectious malaria-related parasites, pointing to an exciting new target in malaria.

3.18B Impact

Dr. Greer and his team have found evidence that chemotherapy drugs work better in calpain-deficient tumours, boding well for combining calpain inhibitors with currently used chemotherapy drugs.

3.18C First Published

CIHR Health Research Results, 2005-06; updated 2009

3.19 Physical activity reduces risk of breast cancer *30-40% reduction for post-menopause women*

3.19A Overview

Physical activity may reduce the risk of breast cancer by 30-40% in post-menopausal women, according to research conducted by **Dr. Christine Friedenreich** of **Albert Health Services**. Additional research conducted by Dr. Friedenreich has shown that exercise influences breast cancer risk by decreasing endogenous estrogen levels, decreasing body fat levels and improving insulin resistance. She is now continuing this research to examine exactly what dose of exercise is needed to have the most impact on these mechanisms.

3.19B Impact

This research has been used in developing physical activity guidelines for cancer prevention published in 2007 by the American Institute of Cancer Research/World Cancer Research Fund.

3.19C First Published

CIHR Health Research Results, 2003-04; updated 2009

3.20 Virus targets cancer cells *Clinical trials underway in U.S., U.K.*

3.20A Overview

The potential of viruses to target cancerous cells while leaving healthy cells alone holds out hope for new and innovative cancer treatments. **Dr. Patrick Lee** of **Dalhousie University** has developed a virus called a reovirus that shrinks cancer tumours. He has developed a drug called Reolysin that can be used in human cancers, avoiding the traumatic side effects of chemotherapy. Recent research has found that reovirus is effective against breast cancer stem cells.

3.20B Impact

Reosylin is currently being tested in seven phase I/II and phase II clinical trials in the United States and United Kingdom by Calgary-based Oncolytics Biotech Inc. and the company is getting ready to launch phase III trials.

3.20C First Published

CIHR Health Research Results, 2003-04; updated 2009

4 Child, Youth and Maternal Health

4.1 Improving outcomes for infants

Drug combination reduces hospitalization for babies with lung infection

4.1A Overview

In Canada, about 35 in 1,000 babies are hospitalized each year with bronchiolitis, an inflammation of the tiny airways in the lungs, usually for about two-to-four days. It is the most common infection that puts infants into hospital. These hospitalizations amount to hefty health care costs— at least \$23 million. **Dr. Amy Plint** of the **University of Ottawa** has found that combining two drugs – epinephrine, a hormone, and dexamethasone, a steroid – when babies come to the emergency room significantly reduces hospitalizations. Both drugs have been used on their own but they had not been studied in combination. Dr. Plint led a clinical trial that involved 800 infants aged six weeks to 12 months at eight pediatric hospitals across Canada. The study found that 35% fewer infants who received both drugs required hospitalization. The results of her study were reported in the *New England Journal of Medicine*.

4.1B Impact

The ability to treat infants with medication in the emergency department reduced the need for hospitalization, potentially saving the health-care system millions each year and improving outcomes for infants and their families.

4.1C First Published

New England Journal of Medicine, May 14, 2009.

4.2 Schools as centres of activity

Program has benefits years later

4.2A Overview

Children in school spend six hours a day at their desks – and recess may be spent playing electronic games or chatting with friends instead of being active. The result – fewer than half of Canadian children get the daily physical activity necessary for their healthy growth and development. Action

Schools! BC is a program designed to help elementary schools create individual school action plans to promote healthy living.

4.2B Impact

The program is having a significant impact on activity levels, awareness of healthy eating and even academic achievement of participating children. As of 2008, more than 15,000 teachers in some 1,500 schools in British Columbia are delivering Action Schools! BC to 400,000 children in kindergarten through grade 7. The province has provided \$15 million to support the program until 2010. With daily physical activity now mandatory in BC schools, the province is promoting Action Schools! BC as a way for schools to meet the requirement.

4.2C First Published

Research profile, August 2006; August 2008

4.3 Balance is the key

Protecting teenaged athletes from injury

4.3A Overview

Staying active is important for teenagers – but so is staying injury free. **Dr. Carolyn Emery** of the **University of Calgary** has found a way to reduce injury rates among teenaged athletes through training on a wobble board. A wobble board is a disk perched on half a ball, with the rounded side of the ball touching the floor. By standing on the board and carrying out dynamic activities while trying to maintain balance, teens who play fast-moving sports like basketball can help prevent knee and ankle injuries.

4.3B Impact

Training programs using wobble boards reduced injuries when delivered in physical education classes at the junior-high level. The research findings should influence policies related to injury prevention practices in both community sport and school settings.

4.3C First Published

Research profile, August 2006; updated 2009

4.4 Heads up! *Taking kids' concussions seriously*

4.4A Overview

It used to be thought that a child's brain would recover more quickly from injury than adults' brains. But it turns out that a child's brain may actually be more sensitive to the effects of concussion. **Dr. Dave Elleberg** of the **University of Montreal** conducted the world's first large-scale study of the effects of sports-related concussion in children. Using a more sensitive test than is generally used, he found that mild concussion affects the brain cells and that neurons don't respond as rapidly even up to a year after a concussion. While the effects might go unnoticed in an adult, even a small change can have pronounced effects in a child, such as difficulty focusing. The key to recovery is "brain rest" -- no sports activities until a week with no symptoms and no tiring mental activity, such as school, either. Dr. Elleberg also observed that, while coaches are aware of the need to recover after a concussion, parents require education about how to respond when their child suffers a concussion.

4.4B Impact

Dr. Elleberg has advised Quebec's Ministry of Health and Social Services of the need to respond to concussions in children and has received a positive response.

4.4C First Published

Research profile July 2007; updated 2009

4.5 Addressing pre-eclampsia *Common condition can lead to heart disease*

4.5A Overview

Pre-eclampsia is a leading cause of maternal and child illness and death worldwide, affecting 5-8% of all pregnancies. The condition is characterized by high blood pressure and the presence of protein in urine. In addition to placing mothers and babies in immediate danger, the condition also contributes to the development of heart disease for both. **Dr. Graeme Smith** of **Queen's University** is examining the role of pre-eclampsia in heart disease. He has found that pre-eclampsia doesn't so much cause heart disease in mothers as act as a signal for future risk.

4.5B Impact

The development of pre-eclampsia identifies a predisposition toward heart disease, enabling physicians to undertake interventions to prevent the disease. Dr. Smith is preparing guidelines for physicians.

4.5C First Published

CIHR Health Research Results, 2003-04; updated 2009

4.6 Caffeine – it's not just for adults anymore

Caffeine helps regulate breathing of very premature babies

4.6A Overview

Apnea is one of the dangers lying in wait for very premature babies – it affects about 85% of babies born prior to 34 weeks' gestation. **Dr. Barbara Schmidt** of **McMaster University** has found that about a third of babies treated with caffeine for apnea – interrupted or irregular breathing due to their prematurity – required extra oxygen, compared to about half of those who received a placebo. The latter group also needed an extra week of ventilator therapy to support their breathing, compared to the babies who received caffeine. Caffeine increased the likelihood of surviving without neurodevelopmental disability to the end of the second year of life, by reducing rates of cerebral palsy and cognitive delay. The caffeine helped to regulate the babies' breathing. In 2008, the trial received the inaugural "Trial of the Year" award from the Society for Clinical Trials.

4.6B Impact

Of all drugs used in the neonatal intensive care unit, caffeine is, to date, the only drug that has been shown to reduce disability in very pre-term children. While caffeine is not yet licensed for this indication outside the United States, it is being used.

4.6C First Published

CIHR Health Research Results, 2005-06; updated 2009

4.7 Breathing easy – it's not easy work

Premature babies get help taking their first breath

4.7A Overview

Until the 1980s, Respiratory Distress Syndrome (RDS) claimed the lives of many babies born even just a few weeks premature. Their tiny lungs couldn't inflate properly. Some people believed the babies couldn't produce enough of a natural material called pulmonary surfactant, which is needed to reduce the surface tension of water within the lung and causes the lung's surface area to expand. **Dr. Fred Possmayer**, professor emeritus at the **University of Western Ontario** demonstrated in the lab that surfactant could help premature rabbits breathe easier and survive. He then went further, and found a way to purify the substance so it could be used in human babies.

4.7B Impact

Thanks to the surfactant and other medical interventions for premature babies, the risk of dying due to RDS is much lower. The company Dr. Possmayer founded makes surfactants for more than 99% of the neonatal intensive care units in Canada.

4.7C First Published

CIHR-CMAJ Top Canadian Achievements in Health Research Awards, 2009

4.8 Sunscreen and DEET

Mix with care

4.8A Overview

Rare is the child who goes outside in summer without the double protection of sunscreen and DEET. But are they truly protected? **Dr. Xiaochen Gu** of the **University of Manitoba** has looked at the combination of the two products and found that mixing the two reduces the protection they offer individually and may increase long-term health risks. DEET and sunscreen are intended to work on the skin's surface, but combining the two increases the amount of and rate at which the active ingredients pass into the body.

4.8B Impact

The research provides valuable information about two widely used products. Parents can take steps to reduce the risks of combining DEET and sunscreen while ensuring their children's protection by applying DEET on clothing rather than on skin, or by applying sunscreen first and DEET afterward. Other steps they can take including washing them off with soap and water after use and avoiding the use of DEET on hands or face.

4.8C First Published

Research profile, July 2007

4.9 Managing children's mental health from a distance *Programs help families and family physicians*

4.9A Overview

Children's mental health is a difficult issue for families and family physicians, who often find it difficult to treat. Nonetheless, in areas far from a city, family physicians may be the only ones who can provide care. **Dr. Patrick McGrath** of **Dalhousie University** has developed two programs – Managing our Moods and Family Help – to help families and family physicians manage problems ranging from depression to attention deficit disorder to more serious mental illnesses.

4.9B Impact

Currently, Dr. McGrath's programs are serving hundreds of families with children with anxiety and disruptive behaviour disorders across Nova Scotia and in one health district in Ontario. He is negotiating contracts with health districts in several other provinces. Families report they are delighted with the access they have to convenient and effective interventions for their children and administrators are pleased with the cost-effective service for hard-to-serve families. A company is being formed to market the programs.

4.9C First Published

CIHR Health Research Results, 2004-05; updated 2009

4.10 Inoculating girls against eating disorders *Tools support healthy body weights*

4.10A Overview

When kids, girls in particular, reach the age of 12, they enter a vulnerable period filled with conflicting information about what constitutes a healthy body type and weight. **Dr. Gail McVey** of **Toronto’s Hospital for Sick Children** has developed tools and programs to help “vaccinate” students during this vulnerable period and prevent risk factors that can trigger eating disorders such as anorexia nervosa and bulimia. The tools include a series of Web-based resources that can be used by teachers and students as part of daily classroom activities and cover topics such as media literacy, healthy eating, the impact of teasing, the impact of adult role models and active living.

4.10B Impact

The website, called “The Student Body”, is being widely used in Ontario and is providing a model for other provinces as they develop programs to prevent eating disorders. Dr. McVey also participated in a recent revision of the Ontario physical education and health curriculum, using evidence from her research to inform the new curriculum. The website is part of a larger body of research that has resulted in the creation of peer support groups in Hamilton that are still going strong, eight years after the completion of the initial research and the creation of a comprehensive, school-wide, year-long initiative in the Peel region of Ontario whose impacts were still being felt the following year.

4.10C First Published

CIHR Health Research Results, 2005-06; updated 2009

4.11 Stepping into better nutrition *CIHR-funded tool assesses nutrition in preschoolers*

4.11A Overview

Childhood is a time of growth – but sometimes it’s hard to know if children are getting the nutrition they need to support their growth. The Nutrition Screening Tool for Every Preschooler (NutriSTEP®), developed by **Dr. Heather Keller** of the **University of Guelph**, is a screening questionnaire that helps identify nutrition risks or problems among children aged 3-5. Designed for use by parents, caregivers or community professionals, the questionnaire takes no more than five minutes to complete.

4.11B Impact

NutriSTEP is a licensed product. It is free to anyone in Ontario, but people out of province and in other countries pay a small fee. As of spring 2010, over 150 licenses have been issued. NutriSTEP is used in a variety of settings across Canada such as screening programs organized by regional health units, hospital settings, and 'school readiness fairs' (health screening) for preschoolers. It is now used by provincial agencies in New Brunswick, Manitoba, Ontario, British Columbia and Alberta, as well as by many family doctors. In Ontario, NutriSTEP® has been adopted by the Ontario Public Health Association's Nutrition Resource Centre. The program is being monitored by the Ontario Ministry of Health Promotion and will be a requirement of the proposed Ontario Public Health Standards, which set the minimum standard for public health programs and services in the province.

4.11C First Published

CIHR Institute of Nutrition, Metabolism and Diabetes, *INMD Update*, October 2007; *Your Health Research Dollars at Work*, 2007-08; updated 2009.

4.12 Enhancing early childhood opportunities

Saskatchewan project maps neighbourhood effects

4.12A Overview

Children in Saskatoon, as a group, lag behind national norms in physical health and well being, language and cognitive development, communication skills and general knowledge. Their parents similarly scored below average on parenting skills and their mothers scored below average on maternal mental health. These findings come from a study by **Dr. Nazeem Muhajarine** of the **University of Saskatchewan**, entitled *Understanding the Early Years in Saskatoon*. The study also found links between the families and neighbourhoods where children lived and how likely they were to thrive in learning environments when they arrived at school. Dr. Muhajarine and his team then worked with school boards, provincial ministries, community agencies and associations, aboriginal organizations and municipal politicians and planners to apply their findings to policies and programs.

4.12B Impact

The team's research has contributed to improved programs and services for children in Saskatoon. Saskatoon's public and separate school boards have established board-wide literacy programs and the public board has reported

significant gains in literacy as a result. The boards have also established full-day, every-day kindergarten pilot programs. The study team is advising the public board as it transforms one of its elementary schools into an integrated centre providing, in addition to education, child care and community support services. The provincial government has funded additional speech and language pathologist to work with children, in part based on the team's findings. The Saskatoon Public Library has improved access to services in underprivileged areas and, in the summer of 2009, will open a new branch to better serve these communities.

4.12C First Published

Moving population and public health knowledge into action: CIHR Institute of Population and Public Health Knowledge Translation Casebook, 2006. Additional details from Knowledge to Action: A Knowledge Translation Casebook, 2008, and A Celebration of Excellence in Canadian Health Research, 2006.

4.13 Reducing smoking among mothers

FACET program targets pregnant women, new mothers

4.13A Overview

In both Canada and the United States, it is estimated that between 20 and 30% of pregnant women smoke and, while half try to quit during pregnancy, nearly all of them (70-90%) have resumed smoking within a year after giving birth. The Families Controlling and Eliminating Tobacco (FACET) project took a different approach to smoking cessation by focusing on couple dynamics and routines. The program, developed by **Dr. Joan Bottorff** of the **University of British Columbia** and her team, focuses on smoking and tobacco reduction in the context of women's interactions and relationships with their partners. It takes a women-centred approach, addressing the smoking in the context of women's lives and their relationships, rather than focusing on fetal health, and it avoids stigmatizing women's smoking.

4.13B Impact

The research findings have been used in a Health Canada report focusing on the development of guidelines for a "quit smoking" telephone counselling protocol for pregnant women and new mothers. Information from the booklet developed as part of this project has been adapted for use by the US National Cancer Institute, Tobacco Control Branch for its website for pregnant smokers. The team is now focusing its efforts on new and expectant fathers, because of their finding that becoming a father is when

many men are motivated to quit, as well as the fact that if their partner smokes, many women take up smoking again once their child is born.

4.13C First Published

Knowledge to Action: A Knowledge Translation Casebook, 2008; updated 2009.

4.14 New revelations about ovulation *It's not what we've thought*

4.14A Overview

The traditional model of the menstrual cycle has it that a group of follicles grows together during the cycle, with one selected in waves. **Dr. Roger Pierson** of the **University of Saskatchewan** has discovered that's not exactly how it works. He's found that follicles develop in waves, with women experiencing two-to-three periods of follicular development each month, though, like the traditional understanding, only one egg is selected for ovulation.

4.14B Impact

The original discovery that women ovulate in waves has underpinned the development of "seasonal" oral contraceptives that result in women having fewer periods each year. It has also resulted in the development of a new emergency contraceptive technique, currently in clinical trials, as well as two protocols for ovarian stimulation in women undergoing assisted human reproduction. One protocol, for low doses of ovarian-stimulating drugs, is in clinical trials, while the other, for better use of the regular doses of ovarian stimulating drugs, is still at the research stage.

4.14C First Published

CIHR Health Research Results, 2004-05; updated 2009

4.15 Answering questions for concerned parents *Scale assesses likelihood of walking for children with cerebral palsy*

4.15A Overview

Parents of children with cerebral palsy often want to know whether their children will ever walk. **Dr. Peter Rosenbaum** of **McMaster University**,

where he holds a Canada Research Chair in Childhood Disability, has developed the Gross Motor Function Classification System (GMFCS) to assess the likelihood of the children walking.

4.15B Impact

The GMFCS is in use in more than 20 countries around the world, and the team continues to get requests for translation. Virtually every publication about cerebral palsy uses the GMFCS as a descriptor of the motor status of the people they are writing about. In fact, the system is not explained any more because it has become part of the language of the field. Teams in Sweden and Australia have demonstrated a direct relationship between level of the GMFCS and risk of hip dislocation, so that physicians can now focus on those at risk of dislocation, rather than x-raying everyone, as was previously the case. The creation of the GMFCS has led to the creation of a Manual Abilities Classification System by the team, working with colleagues in Sweden, and a Communication Function Classification System, also developed by the team in collaboration with international colleagues. Dr. Rosenbaum is working with colleagues to create an Autism Function analogue.

4.15C First Published

CIHR Health Research Results, 2004-05; updated 2009

4.16 Stopping a preventable disorder

Test enables early diagnosis of fetal alcohol spectrum disorder

4.16A Overview

While there are no national statistics on the prevalence of fetal alcohol spectrum disorders (FASD) in Canada, it is estimated that 280,000 Canadians are affected by the disorder. FASD is caused by maternal alcohol consumption during pregnancy and is the most common reason for developmental delays in Canada. Now, a novel test can determine if new mothers were drinking during their second trimester of pregnancy. The test, developed by Dr. Gideon Koren of Toronto's Hospital for Sick Children, measures the fatty acid ethyl esters (FAEEs) found in meconium, a baby's first stools, obtained within the first two or three days of birth.

4.16B Impact

The test has been adopted as a national standard for diagnosing FASD, one of five so adopted by the Public Health Agency of Canada and the only one to screen newborns. It is now in use across Canada.

4.16C First Published

Research profile, Sept. 2005; updated 2009

4.17 Giving newborns at risk a better chance

Network ensures best outcomes for newborns in intensive care

4.17A Overview

The Canadian Neonatal Network is a research and knowledge translation initiative aimed at improving the health and quality of health care for newborn babies. The network, made up of researchers, clinicians and administrators from 27 Canadian hospitals and 16 universities across Canada, conducts evidence-based collaborative research with an emphasis on the implementation of practice and policy changes.

4.17B Impact

This internationally recognized network has contributed to the development of policies to better allocate neonatal resources in British Columbia. The network completed the first-ever comprehensive description of outcomes and practices in Canadian neonatal intensive care units; this enabled one institution to reduce its incidence of infections by half. As well, its findings regarding retinopathy of prematurity (an eye disease that affects premature infants) will halve the number of infants routinely screened, reducing costs by more than \$1 million each year. The network has also, together with researchers from the United States, developed a neonatal illness severity score called SNAP-II. This patented tool has become the international standard for assessing the severity of neonatal illness and comparing outcomes from hospital to hospital. SNAP-II has also been licensed to companies for risk assessment, setting insurance premiums and incorporating into hospital patient monitoring equipment.

4.17C First Published

Evidence in action, acting on evidence: CIHR Institute of Health Services and Policy Research Knowledge Translation Casebook, 2006.

4.18 Common procedure not effective *Amnioinfusion, thought to prevent neonatal lung infection, doesn't work*

4.18A Overview

Meconium aspiration syndrome (MAS) is a rare, but severe, neonatal lung infection caused when a newborn inhales a combination of meconium and amniotic fluid during labour and delivery. Meconium is the material that fills the fetal intestinal tract during pregnancy; when inhaled, it can cause a partial or complete blockage of the baby's airway when it exhales. Amnioinfusion was thought to reduce the risk of MAS by diluting the meconium. But **Dr. William Fraser** of the **University of Montreal** led an international randomized trial that demonstrated that it is ineffective at preventing MAS.

4.18B Impact

The American College of Obstetrics and Gynecology has modified its guidelines on the management of meconium-stained amniotic fluid as a result of the study. In addition, the American Pediatric Association Neonatal Resuscitation Program has modified its recommendations on amnioinfusion as well.

4.18C First Published

CIHR Health Research Results, 2005-06; updated 2009

4.19 Bridging the “know-do” gap *The case of home fortification with Sprinkles*

4.19A Overview

According to the United Nations, micronutrient malnutrition, or “hidden hunger” affects some two billion people worldwide, including 750 million children. About half of all child deaths in developing countries are associated with this insidious form of malnutrition. **Dr. Stanley Zlotkin** of **Toronto's Hospital for Sick Children** has developed a small sachet with a day's supply of powdered micronutrients like iron, zinc and vitamin A that can be added to any semi-liquid food, such as porridge or yoghurt without changing its taste, colour or texture. He called it Sprinkles. Dr. Zlotkin then worked with stakeholders to produce and distribute Sprinkles where it is needed most.

4.19B Impact

Sprinkles has reached 2.5 million at-risk children in more than 20 countries. Individual countries, such as Pakistan, Bangladesh and Mongolia, have included home fortification with powdered minerals and vitamins as a component of their country-wide nutritional strategies for children. And the World Health Organization, the World Food Programme and the United Nations Children's Fund have published policy guidelines for the use of micronutrient fortification as a component of relief aid. *"The work that Dr. Zlotkin has published and (that of) other collaborators in consultation with him, this is what informs most of the program's introduction and scale-up in many of these countries. We have taken that work, taken the best lessons from it and applied it,"* says **Ms. Nita Dalmiya, UNICEF nutrition specialist.**

4.19C First Published

Knowledge to Action: A Knowledge Translation Casebook, 2008

4.20 Building a better booster seat *Making cars safer for children*

4.20A Overview

Each year, Canadian children suffer very high rates of death and serious, life-changing injury in road crashes. Those most at risk are four-to-eight-year-old children, who are using seatbelts alone to keep them safe, rather than the booster seats they need. In fact, only 28% of children in Canada actually use them. **Dr. Anne Snowdon** and her team at the **University of Windsor** built on these findings by interviewing children to find out why they didn't use booster seats. They found that children in this age group find booster seats uncomfortable and too much like baby seats, so they decided to build a better booster seat that would be more acceptable to the children.

4.20B Impact

The research team partnered with Magna International to develop a new generation of booster seats, called the Clek. The seat launched in Canada in 2006, in the US in 2007 and is now in progress to launch in 15 other countries worldwide.

4.20C First Published

CIHR, *Portraits of Partnerships: Annual Report 2007-08*

5 Diabetes

5.1 Diabetes linked to depression

Evidence shows depression contributes to development of type 2 diabetes

5.1A Overview

It's reasonable to think that suffering from a chronic disease could lead to depression. But according to the **University of Alberta's Dr. Jeffrey Johnson** and his colleagues on the Alliance for Canadian Health Outcomes Research in Diabetes (ACHORD), the evidence actually shows the opposite – that depression may contribute to the earlier onset of type 2 diabetes in people who are susceptible. In fact, younger patients with type 2 diabetes were 23% more likely to have experienced on or more depressive episodes before they developed diabetes, compared to a control group. Dr. Johnson and his colleagues hypothesize that depression could result in behaviours such as weight gain, less physical activity and higher rates of smoking or alcohol abuse, all of which contribute to the development of type 2 diabetes. On the other hand, people with type 2 diabetes, after five years, were no more likely to have developed depression than those without the disease.

5.1B Impact

Physicians can now help patients suffering from depression avoid the behaviours that could lead them to develop type 2 diabetes.

5.1C First Published

CIHR Institute of Nutrition, Metabolism and Diabetes, *INMD Update*, January 2006

5.2 Aerobics? Weights?

It's not either/or; both work better together

5.2A Overview

More than two million Canadians have diabetes, and 90% of them have type 2 diabetes. Regular exercise can help to manage type 2 diabetes, but what kind of exercise is best? Dr. Ron Sigal from the University of Calgary and Dr. Glen Kenny from the University of Ottawa led the DARE (Diabetes Aerobic and Resistance Exercise) randomized control trial to determine the

impact of aerobic exercise, resistance exercise or a combination of the two. They found that, while both forms of exercise improved glycemic control, combining the two outweighed the benefits of either.

5.2B Impact

People seeking to manage their type 2 diabetes with exercise now know that, for best results, they should combine aerobic and resistance exercise.

5.2C First Published

CIHR Institute of Nutrition, Metabolism and Diabetes, INMD Update, October 2007

5.3 Traditional approaches to diabetes

Cree healers and elders help to identify potential treatments

5.3A Overview

Among the Cree of northern Quebec, the prevalence of diabetes has increased from 4.1% in 1989 to 12.5% in 2002. Dr. **Pierre Haddad** of the **University of Montreal** has worked with Cree healers and elders to identify plants that have traditionally been used to relieve symptoms of diabetes. This marriage of traditional medicine with modern science is a novel approach to relieving the burden of diabetes in this affected population. He and his team have studied more than ten medicinal plants from the Boreal forest, including the inner bark of the balsam poplar, the leaves of the creeping snowberry and the needles of the white spruce. A priority ranking of the medicinal plants studied, based on the scientific evidence, corresponded “strikingly well” with the plants most respected by elders.

5.3B Impact

Clinical studies are now underway in one Cree community using traditional medicine to treat diabetes.

5.3C First Published

CIHR Health Research Results, 2003-04; updated 2009

5.4 A case of nerves

Potential new cure for type 1 diabetes?

5.4A Overview

Malfunctioning pain nerves may play a role in type 1 diabetes, according to research by **Drs. Hans-Michael Dosch** and **Michael Salter** of the **Hospital for Sick Children, University of Toronto**. They have found that faulty nerve cells don't produce enough of a hormone called substance P, which affects the amount of insulin produced and the way it works. The result is chronic stress for islet cells, which then die, triggering an immune response that further damages the surviving islet cells. Injecting substance P into mice stopped the inflammation and cured the diabetes for weeks to months. Subsequent research has found that substance P may also be effective against type 2 diabetes.

5.4B Impact

Research is ongoing in this area. The researchers are seeking regulatory approval and funding for clinical trials in humans, with trials for type 2 diabetes likely to start sooner than those in people with type 1 diabetes.

5.4C First Published

CIHR Canadian Research, International Impact, 2007; updated 2009

5.5 Getting to the heart of the matter

Preventing cardiovascular disease deaths in people with diabetes

5.5A Overview

Some 80% of people with diabetes die from cardiovascular disease. High levels of sugar in their blood cause fat cells to accumulate on blood vessel walls. **Dr. Geoffrey Werstuck** of **McMaster University** has discovered that a molecule called valproate can reduce levels of glucose in the blood and lessen fat accumulation in the cells lining blood vessel walls.

5.5B Impact

Researchers have since discovered that valproate inhibits the enzyme glycogen synthase kinase (GSK)-3. Because valproate has side effects in humans, Dr. Werstuck and his team have developed a screening procedure to identify new and better GSK-3 inhibitors and testing them in mouse models of cardiovascular disease.

5.5C First Published

CIHR Health Research Results, 2004-05; updated 2009

5.6 Developing better treatments for type 1 diabetes

Canadian researchers perfecting islet cell transplant, taking basic research to the bedside

5.6A Overview

In type 1 diabetes, the body's own immune system destroys insulin-producing cells in the pancreas, resulting in little or no insulin production. People with type 1 diabetes overcome this inability to produce insulin by injecting an artificial form of insulin, often several times each day. **Dr. Ray Rajotte** of the **University of Alberta** has carried out pioneering work in islet cell transplantation to overcome the need for daily injections. He helped to create the Edmonton Protocol, a revolutionary procedure for transplanting normal, insulin-producing islet cells into a person suffering from type 1 diabetes. Now, Dr. Rajotte and his team are trying to address two major problems: trying to eliminate the need for continuous immunosuppressive drugs (which protect the islets from immune system attacks); and working to develop an unlimited supply of islet cells. In Canada, 400 pancreases are donated each year, while there are more than 6,000 people diagnosed with type 1 diabetes each year. A new First Published of islet cells, therefore, is needed. Dr. Rajotte and his team are working with colleagues internationally on using islet cells from neonatal pigs as a possible solution to the shortage of donor pancreases.

5.6B Impact

Since the Edmonton Protocol was first developed, in 2000, 160 patients have received islet cell transplantation in Edmonton. Fifty centres worldwide are offering islet cell transplantation based on the Edmonton Protocol; they have treated another 600-700 patients. Islet cells from neonatal pigs have succeeded in curing diabetic monkeys for up to one year and Dr. Rajotte and his colleagues are trying to establish human clinical trials to test the cells in humans. As well, in November 2007, the Alberta Diabetes Institute, largest free-standing diabetes research institute in North America, opened at the University of Alberta. The Institute will house more than 40 scientists, along with graduate students, research fellows and technicians – all told, in excess of 400 people working in all aspects of both type 1 and type 2 diabetes research. The institute is a direct result of the work on islet cell transplantation carried out in Edmonton.

5.6C First Published

CIHR Health Research Results, 2006-07 (among others); updated 2009

5.7 Easing diabetes pain with insulin *Benefits may go beyond blood sugar*

5.7A Overview

People with diabetes often develop a condition known as diabetic neuropathy, in which nerve cells in the skin begin to die off, resulting in pain. **Dr. Douglas Zochodne** of the **University of Calgary** has discovered that insulin, already used by people with diabetes to maintain their blood sugar levels, may also boost nerve growth and help stop pain.

5.7B Impact

A human trial of intranasal insulin for diabetic neuropathy is in the planning stages, awaiting ethical approval from the University of Calgary.

5.7C First Published

CIHR Health Research Results, 2006-07; updated 2009

5.8 Prevent heart disease, save money *It's a win-win all around*

5.8A Overview

So-called water pills, or diuretics, are inexpensive alternatives to newer, more expensive drugs, but just as effective at preventing a heart attack or heart disease in people with diabetes. **Dr. Frans Leenen** of the **University of Ottawa Heart Institute** was the Canadian lead on a joint Canadian-US study that also found that diuretics were better for treating most people with blood pressure problems. The need to control blood pressure is especially urgent for people with diabetes.

5.8B Impact

Since publication of these findings, guidelines for treating hypertensive patients with diabetes now recommend the use of diuretics as the first line of treatment. Several studies in the United States and Canada over the past decade have shown a reversal of the downward trend in the use of diuretics.

5.8C First Published

CIHR Health Research Results, 2004-05; updated 2009

6 Genetics

6.1 Discovery of gene linked to Bardet-Biedl Syndrome

Hereditary disorder is often fatal

6.1A Overview

Bardet-Biedl Syndrome (BBS) is a potentially fatal hereditary disease characterized by blindness, obesity, kidney dysfunction and learning disabilities. It affects men more than women and, although quite rare, has a high incidence in Newfoundland (one in 17,000, compared to an overall incidence of one in 160,000). It is one of a family of diseases called ciliopathies. **Drs. Michel Leroux** and **Oliver Blacque** of **Simon Fraser University** discovered the sixth gene to be linked with the disorder, called BBS8. They have also cloned other genes implicated in BBS, notably BBS3 and BBS5.

6.1B Impact

The work of Drs. Leroux and Blacque has had an impact, not only on BBS research, but on cilia research more generally. While their work has had an impact in advancing biomedical knowledge, it could also help in the development of tests to screen for and correct the cellular defects linked to the development of BBS.

6.1C First Published

CIHR Health Research Results, 2003-04; updated 2009

6.2 Yeast: Good for more than just beer or bread

Landmark study reveals protein interactions

6.2A Overview

Proteins are the workhorses of all living organisms, carrying out all the cellular processes necessary for life. But, as powerful as they are on their own, their true power and complexity comes from the work they do together, in their interactions. A team led by **Drs. Jack Greenblatt** and **Andrew Emili** of the **University of Toronto** has recorded the most comprehensive and reliable map of protein interactions in a living organism – in this case, yeast – to date.

6.2B Impact

The structure and interactions of proteins in yeast cells are virtually identical to those in humans. The research will help, therefore, in the study of many human diseases that result when proteins and protein interactions go awry. The team has extended its mapping effort to study the physical interactions of membrane proteins – the interface of a cell with its environment, which is biologically important but has previously been difficult to measure.

6.2C First Published

CIHR Canadian Research, International Impact, 2007; updated 2009

7 Global Health

7.1 Combating the greatest threat to global health *The science of reducing tobacco use*

7.1A Overview

One hundred million people during the 20th century lost their lives because of tobacco-related causes. Today, smoking kills more people than AIDS, malaria and tuberculosis – combined. And, because tobacco use is increasing in low- and middle-income countries, the global tobacco epidemic will reach unprecedented proportions in the 21st century. The nations of the world, under the auspices of the World Health Organization, have adopted the Framework Convention on Tobacco Control, the first-ever international health treaty. The International Tobacco Control Evaluation Project (ITC), led by **Dr. Geoffrey Fong** of the **University of Waterloo**, with his colleagues **Drs. Mary Thompson** and **David Hammond**, is an international collaboration that has become the world's authority on the effectiveness of tobacco control policies. They have evaluated the impact of such policies on attitudes and behaviours in 20 countries that make up more than 50% of the world's population and 60% of the world's smokers. The team has found, for instance, the graphic warnings on cigarette packages lose their impact over time, suggesting that tobacco-control measures may need continual strengthening to keep them effective.

7.1B Impact

Countries including Ireland, France, Malaysia, the United Kingdom and China have used findings from the ITC Project to shape their tobacco control policies.

7.1C First Published

CIHR-CMAJ Top Canadian Achievements in Health Research Awards,
2009

8 Health services delivery

8.1 Been to intensive care?

Don't forget your medications!

8.1A Overview

If you're a senior taking medication for chronic diseases, being in an intensive care unit can be dangerous to your long-term health, according to **Dr. Chaim Bell** of **St. Michael's Hospital** in Toronto. Dr. Bell studied a group of patients at Ontario hospitals and found that, when discharged from the intensive care unit, one-third had at least one of their medications unintentionally discontinued.

8.1B Impact

At the local level, Dr. Bell and his colleagues have developed an electronic discharge tool to assist in ensuring medication reconciliation and other aspects of care whose continuation needs to be ensured. The tool was published in October 2009, and Dr. Bell has already received indications of interest from many jurisdictions. In addition, as a result of Dr. Bell's and other's research, unintentional medication discontinuation is now a focus of Safer Healthcare Now!, an initiative to improve quality of care through medication reconciliation (formalized processes to ensure continuity of care). Medication reconciliation processes are now an accreditation requirement by Accreditation Canada for hospitals and long-term care facilities. Canada is also leading the medication reconciliation portion of an international quality of care initiative being led by the World Health Organization. Dr. Bell is involved in that work, as well as being a member of the medication reconciliation group of Safer Healthcare Now!

8.1C First Published

CIHR Health Research Results, 2006-07; updated 2009

8.2 Improving the delivery of health care in rural areas

Evidence in action

8.2A Overview

Delivering health services to scattered rural and remote populations is an ongoing challenge. Manitoba's *The Need to Know* Team, a collaboration of the Manitoba Centre for Health Policy, Manitoba's 10 rural and northern

regional health authorities and Manitoba Health, conducts research relevant to these communities and works with regional health authorities to implement its findings.

8.2B Impact

Based on the research conducted by the Need to Know team, regional health authorities in rural and northern Manitoba have developed primary health-care centres and nursing homes, cervical cancer screening programs and regional injury prevention programs, as well as proposed changes to mental health services. The research also led to the development of a regional indicators atlas that is being used extensively in strategic planning..Arlene Wilgosh, former Manitoba Deputy Minister of Health says that over the years, the research reports have “influenced our decisions around resources.” She cites 2004’s mental health report and 2008’s What Works? evaluation of programs and policies as particularly helpful. “They showed what the evidence is and how you can apply it,” she says.

8.2C First Published

Evidence in action, acting on evidence: The CIHR Institute of Health Services and Policy Research Knowledge Translation Casebook, 2006

8.3 Helping patients steer their way through the health-care system *Tool provides guidance to patients with chronic diseases*

8.3A Overview

Many bone and joint conditions are chronic diseases, requiring a lifelong commitment from patients to managing their health and ongoing interaction with an often-confusing health-care system. **Dr. Peter Tugwell** of the **University of Ottawa**, working with the Cochrane Collaboration, documented the types of skills patients need to effectively manage their conditions, including using health information to make decisions, communicating with others, clarifying values and priorities and negotiating their roles as patients. He developed the Effective Consumer Scale (EC-17) to measure how effective people are at dealing with their chronic condition and making decisions about their health care.

8.3B Impact

The EC-17 has been validated in Canada and Australia and groups in Argentina, Ireland, Norway, Sweden and Romania are also validating the scale in other languages.

8.3C First Published

CIHR Health Research Results, 2005-06; updated 2009

8.4 Setting wait times benchmarks

Research provides evidence for policy decisions

8.4A Overview

In response to widespread public concern over wait times, CIHR, in partnership with Canada's provincial/territorial ministers of health, funded research into wait times in three priority treatment areas: sight restoration, joint replacement and cancer.

8.4B Impact

The research informed the first set of wait times benchmarks set by provincial/territorial ministers of health in December 2005.

8.4C First Published

CIHR Institute of Health Services and Policy Research, *Annual Report 2005-06*

8.5 Mapping drug use in Canada

Atlas provides tool for policy makers

8.5A Overview

Prescription drug spending is the fastest-growing category of health-care spending in Canada, expected to account for 17.4% of health-care spending in 2008, up from 15% a decade ago. Provincial and territorial health officials have struggled to contend with the complex problem of controlling spiralling drug costs. Now, **Dr. Steve Morgan** of the **University of British Columbia** has provided an accurate picture of how drugs are being used across Canada. The Canadian Rx Atlas highlights differences in drug use in

different parts of the country and breaks down the factors that drive drug spending.

8.5B Impact

The Atlas, currently in its second edition, is routinely used by researchers, professional associations, governments and media for information about drug expenditures in Canada. Earlier in 2009, western premiers cited the atlas in announcing their plans to pursue joint drug purchasing policies in the future.

8.5C First Published

CIHR Health Research Results, 2005-06; updated 2009

8.6 Promoting patient safety *The Canadian Adverse Events Study*

8.6A Overview

In 2004, the first national study of patient safety in Canadian hospitals estimated that 7.5% of Canadian patients – or 185,000 of the almost 2.5 million medical and surgical admissions in Canada in 2000 – experienced an adverse event as a result of their care. This includes unintended injury or complication resulting in death, disability or prolonged hospital stay. The study, led by **Drs. Ross Baker** of the **University of Toronto** and **Peter Norton** of the **University of Calgary**, found that the majority of adverse events resulted in temporary disability or prolonged hospital stay, while 5% of patients who experienced adverse events were judged to have a permanent disability as a result. Adverse events were associated with death in 1.6% of patients. Close to 37% of adverse events in the study could have been prevented.

8.6B Impact

As a result of the Canadian Adverse Events Study and of activities conducted throughout the duration of the study, policy initiatives and education programs to enhance patient safety and minimize adverse events were developed by many professional organizations, including the Canadian Medical Association and the Canadian Healthcare Association. The Canadian Council on Health Services Accreditation created a Patient Safety Advisory Group that includes Drs. Baker and Norton as members and that has helped to develop a set of patient safety goals and required organizational practices that were implemented in accreditation surveys beginning in 2006.

8.6C First Published

CIHR Institute of Health Services and Policy Research, *Annual Report 2004-05*; CIHR news release, May 24, 2004

8.7 Safe prescribing made simple

Computerized system reduces prescription drug errors

8.7A Overview

Anywhere from 5-23% of hospital admissions are due to drug-related illnesses. And, in many cases, errors occur because patients have different prescribing physicians and different dispensing pharmacies, leaving it up to patients themselves to manage their medications. **Dr. Robyn Tamblyn** of **McGill University** has developed an electronic prescribing and drug management system that gives Quebec physicians instant, computer-based access to a patient's drug, disease and allergy history and alerts them to potential prescribing problems. MOXXI, short for the Medical Office of the 21st Century, reduces the potential for human error by having physicians select drugs from an automated list and indicate the problem the drug is supposed to treat.

8.7B Impact

More than 200 physicians, nearly 80 pharmacies and, as of January 1, 2009, more than 68,000 patients in Quebec are participating in MOXXI, now in its third phase.

8.7C First Published

Research profile, May 2007; updated 2009

8.8 Assisting emergency room decisions

Rules help treat injuries more consistently

8.8A Overview

Emergency room physicians regularly see injuries to feet, ankles, knees, necks and brains. Knowing what tests to order and when can be a challenge. **Dr. Ian Stiell** of the **Ottawa Hospital Research Institute** has made it easier. He has developed the Ottawa Ankle and Knee Rules and the Canadian C-Spine and CT Head Rules to provide guidance to physicians.

8.8B Impact

The use of decision rules saves money and time and improves patient flow. The rules have been validated by more than 20 other studies worldwide, translated into several other languages and adopted worldwide. A recent survey found that 89% of Canadian emergency room physicians use the guidelines. As well, the Rules have been mentioned several times on the prime-time TV series “ER”.

8.8C First Published

CIHR Health Research Results, 2003-04; updated 2009

9 Heart Disease

9.1 Protecting patients' hearts during surgery

Long-recommended drug may not be advisable

9.1A Overview

The world's largest randomized trial looking at whether beta-blocker drugs protect the heart during surgery came up with a surprising finding: these drugs, routinely prescribed for more than a decade for patients undergoing non-cardiac surgery, may help prevent heart attacks, but they also may increase the risk of death and major stroke. The study, led by **Drs. P.J. Devereaux** of **McMaster University** and **Homer Yang** of the **University of Ottawa**, found that of 1,000 patients receiving a beta-blocker drug, the drug will prevent 15 patients from having a heart attack, three from having angioplasty or coronary artery bypass surgery and seven from developing new atrial fibrillation (a heart rhythm disorder), but would cause eight patients to die, five to have a stroke, 53 to experience low blood pressure requiring treatment and 42 to experience a low heart rate requiring treatment.

9.1B Impact

This study provides research evidence about widely-used drugs. Its results will change how patients are cared for after surgery and bring physicians to question whether there are better alternatives.

9.1C First Published

CIHR Institute of Circulatory and Respiratory Health, newsletter, summer 2008

9.2 Surgery improves survival in patients with heart failure

Study provides much-needed evidence to support treatment choice

9.2A Overview

Bypass surgery? Angioplasty? Both are often recommended for patients with heart failure. Anxious patients understandably want to know whether either surgery is necessary. Now, **Dr. Ross Tsuyuki** of the **University of Alberta** has gathered the evidence to reassure patients that surgery is well worth it. He looked at Alberta heart failure patients to compare the outcomes

of bypass surgery, angioplasty or neither. He found that mortality rates among those who had either procedure were half those who had neither and chose, instead, management with medication and lifestyle changes.

9.2B Impact

Physicians have stronger evidence upon which to base treatment recommendations to their patients with heart failure. Patients can make treatment decisions with lessened anxiety about the right route to take.

9.2C First Published

Research profile, February 2007

9.3 Menopause delivers change in heart health *Is there a role for hormone replacement therapy?*

9.3A Overview

Hot flashes and mood swings get the attention – but the health effects of menopause go right to the heart. Menopause marks the end of the hormones that keep women’s hearts healthy. Hormone replacement therapy (HRT) can make up for the lack of natural hormones, but there is concern about its effects on health more broadly. **Dr. Sandra Davidge** of the **University of Alberta** has found that HRT can be effective if given at the onset of menopause. That’s because it can help prevent deterioration of blood vessels. However, later on, when blood vessels have already deteriorated, it’s not as beneficial.

9.3B Impact

Evidence of the harms and/or benefits of HRT are still being debated. Dr. Davidge’s work provides evidence of when HRT can be beneficial, providing guidance to menopausal women and their physicians.

9.3C First Published

Research profile, February 2008

9.4 Calculating the risks

Giving emergency physicians a better way to make decisions

9.4A Overview

When a person arrives at the emergency department complaining of chest pain, physicians spring into action, aided by guidelines that tell them what to look for, what tests to perform, what treatments to try and whether to admit or discharge. But when a person shows up with complications from acute heart failure, such as difficulty breathing, the steps to take are less clear and admission to hospital is largely a judgment call. Patients tend to respond quickly to treatment and admitting all of them is not an option, given that 40,000 such patients show up at Ontario emergency departments alone each year. **Dr. Douglas Lee** of the **Institute for Clinical Evaluative Sciences** is creating a set of decision guidelines to assist emergency physicians.

9.4B Impact

The guidelines have the potential to save hundreds of lives and millions of health-care dollars each year.

9.4C First Published

Research profile, February 2009

9.5 Following up success

A simple phone call can improve outcomes

9.5A Overview

Congestive heart failure patients often need extra attention. Their hearts have difficulty pumping blood, leaving them short of breath or dizzy. Their ankles swell. And, unsure of what to do, they often end up in their doctor's office or at the emergency department. **Dr. Alan Katz** of the **University of Manitoba** developed a project to follow up with these patients with a phone call on a regular basis to support them in taking steps to improve their health, such as watching fluids, taking medications and exercising as much as they could. Those receiving phone support experienced significant weight loss, felt better and made fewer visits to their family physicians or emergency departments.

9.5B Impact

The program resulted in better health for patients and less pressure for overworked primary care physicians. Manitoba health authorities want to expand the program and extend it to other chronic diseases.

9.5C First Published

Research profile, February 2009

9.6 Pacemaker choice can save health-care system millions *No difference in effectiveness*

9.6A Overview

In 1950, Canadian electrical engineer John Hopps designed and built the first external pacemaker. Pacemakers are now widely used to regulate heartbeat, with different models available. Dr. Stuart Connolly of McMaster University looked at some of these models and concluded that dual-chamber pacemakers are no more effective than the single-chamber version of the devices, but cost about \$2,500 more. More than 40% of the 10,000 pacemakers implanted in Canada in year are dual-chamber.

9.6B Impact

Switching to single-chamber pacemakers could save the health-care system up to \$10 million per year. While Dr. Connolly has not attempted to measure the degree to which this has happened, he believes that the research slowed the growth of dual-chamber pacemakers. The recommendation to use single-chamber pacemakers has appeared in guidelines.

9.6C First Published

CIHR Health Research Results, 2003-04; updated 2009

9.7 Rebuilding damaged hearts

Development of functional nanostructures can promote regeneration of healthy heart tissue

9.7A Overview

Angioplasty – inflating blocked veins or arteries – and stents to maintain the wider passageway have greatly reduced deaths due to heart disease. **Dr. Maryam Tabrizian of McGill University** is working to improve the procedure, working at the sub-microscopic level to develop functional nanostructures that can be used to deliver medications directly to where they are needed. The nanostructures can adhere to the surface of stents or be delivered by catheter directly to the surface of the arterial wall.

9.7B Impact

A coated stent proved successful in animal models. The next step is to find a partner (a stent manufacturer) willing to adapt its stent to test in humans. Delivering the medication directly through the catheter has not been as successful, but Dr. Tabrizian and her team continue to develop ways to overcome the difficulties, including developing a probe, using quantum dots, and imaging techniques to follow the medication on its path to the arteries.

9.7C First Published

CIHR Health Research Results, 2006-07; *Regenerative Medicine and Nanomedicine – Investing Today in the Promise of Tomorrow*, second edition, 2009; updated 2009

9.8 Simple solutions for a healthier heart

Surgery may not be the answer

9.8A Overview

Angioplasty is a popular procedure for unblocking blocked arteries – so popular that, in 2003-04, physicians performed 167 of them per 100,000 Canadians over the age of 20. But in a seven-year study of patients with blocked coronary arteries, **Drs. Koon Teo and William Boden of McMaster University** have found that angioplasty is no more effective than medication and lifestyle changes such as stopping smoking, exercising and eating better when it comes to preventing heart attacks and strokes. The Clinical Outcomes Utilizing Revascularization and Aggressive DruG Evaluation (COURAGE) studied more than 2,000 patients at 50 hospitals in the United States and Canada.

9.8B Impact

The finding has had a significant impact on practice, with reports of decreased volumes in cardiac catheterization (the procedure used in angioplasty) in many hospitals. The findings in many cases have confirmed usual practice, with cardiologists reporting that they appreciate having the data to support their practice.

9.8C First Published

CIHR Health Research Results, 2006-07; CIHR Institute of Circulatory and Respiratory Health, newsletter, summer 2007; updated 2009

9.9 Do cranberries help keep arteries healthy? *Compound may prevent hardening*

9.9A Overview

Hardening of the arteries, or atherosclerosis, occurs when the muscle cells lining arteries change the way they grow and behave, leading to the formation of plaques that can restrict blood flow, which can result in hypertension, heart attack or stroke. **Dr. Robert Hurta** of the **University of Prince Edward Island** is studying whether eating cranberries can help prevent atherosclerosis. He believes that “bioactive” compounds found in cranberries can prevent or slow the development of atherosclerosis by modulating the underlying molecular processes that contribute to disease onset and progression.

9.9B Impact

Findings from the study suggest that including cranberries in your diet can protect against cardiovascular disease and possibly against liver damage as well.

9.9C First Published

CIHR Health Research Results, 2006-07; updated 2009

9.10 Save time, save lives

Edmonton advance starts treatment when the paramedic arrives

9.10A Overview

Heart attacks can cause major damage to the heart in just a few hours. Typically, there is a two-to-three hour delay between the onset of symptoms and a patient's arrival at the hospital – time that can make a huge difference in outcomes. **Dr. Paul Armstrong** of the **University of Alberta** looked to Europe for inspiration to ensure that heart attack patients receive speedy care – even before they arrive at the emergency department. Basing his plan on a system that has existed in France for many years, Dr. Armstrong developed a way to train paramedics to carry out a 12-lead electrocardiogram (ECGs) of the heart and transmit the results to a cardiologist on call. With earlier diagnosis, paramedics can administer clot-busting drugs to restore normal heart function in patients who experience the most deadly type of heart attack, acute ST elevation myocardial infarction, or STEMI.

9.10B Impact

Armstrong's innovation has shaved about one hour off the normal treatment time, with some patients being treated within an hour of symptom onset, thus being spared any permanent muscle damage to the heart.

9.10C First Published

CIHR-CMAJ Top Canadian Achievements in Health Research Award, 2009

9.11 The heart – it's more than just a brawny muscle

Solving the heart's mysteries

9.11A Overview

The heart is a tireless workhorse, pumping thousands of litres of blood through your body every day of your life. For many years, this was thought to be its only function. But **Dr. Adolfo de Bold** of the **University of Ottawa Heart Institute** has discovered that the heart does so much more. He found storage granules located in heart muscle cells looked very similar to the granules that produce insulin in the pancreas. Through his research, he found that these granules release a hormone called Atrial Natriuretic Factor (ANF) that controlled water and salt levels in the body. When the heart muscle is stressed, it releases ANF, which then tells the kidneys to filter out salts and reduce the amount of fluid the overworked heart has to pump. The

discovery of ANF revealed a new function for the heart muscle, a function that physicians could use to increase or decrease the load on the heart, reducing hypertension and helping the heart compensate after heart failure. Physicians can also measure ANF levels to assess heart health.

9.11B Impact

The discovery of the heart's endocrine function offers physicians a new way to reduce the load on stressed hearts and a test to diagnose heart failure and assess treatment efficacy.

9.11C First Published

CIHR-CMAJ Top Canadian Achievements in Health Research Awards, 2009

9.12 How do you mend a broken heart?

Do it fast!

9.12A Overview

STEMI heart attacks – short for ST-segment elevation myocardial infarction – are the most serious kind of heart attack. Quick action is essential to prevent damage. Now, patients in eastern Ontario are getting that quick action, thanks to a program developed by **Dr. Michel Le May** of the **University of Ottawa Heart Institute**. The program trains paramedics to conduct an electrocardiogram and, if the test shows evidence of a STEMI, to reroute the ambulance directly to the Heart Institute, where optimal care is delivered as quickly as possible.

9.12B Impact

An evaluation of the program published in the *New England Journal of Medicine* found that it reduced chances of dying of a heart attack by 50%: fewer than 5% of Heart Institute patients treated through the protocol died, compared to 10% of those who received conventional treatment of clot-busting drugs and monitoring. The protocol also cut emergency room congestion, reducing paramedic traffic volume by about 40% and reducing wait times for all patients. The program, which began as a pilot program in 2001, has treated 2,000 patients so far and been a model for similar programs in other urban areas, including Kingston, Hamilton, Quebec City and Vancouver. The program has now been extended to 16 hospitals in the eastern Ontario (Champlain) Local Health Integration Network, so that patients as far away as Barrie's Bay, 183 kilometres away, benefit from the

protocol, with slight adaptations, including a stop for clot-busting drugs before being transported by helicopter to the Heart Institute.

9.12C First Published

CIHR-CMAJ Top Canadian Achievements in Health Research Awards, 2009; updated 2009

9.13 The fluid hypothesis

Just walk it off – a simple solution to sleep apnea

9.13A Overview

Obstructive sleep apnea (OSA) robs 10-15% of the adult population of North America of their sleep and puts them in danger of heart disease. **Dr. Douglas Bradley** of the **University of Toronto** has found that OSA is linked to fluid retention in the legs brought on by a sedentary lifestyle. His discovery has found both a cause of and a treatment for OSA. He found that the severity of OSA was closely linked to the amount of fluid that shifted from the legs to the neck while lying down during sleep. The amount of this fluid shift was, in turn, directly related to the amount of time patients spent sitting during the day. Preventing fluid retention could be a viable treatment of OSA and could be as simple as walking around regularly during the day. Right now, the best available treatment for OSA has been something called CPAP – continuous positive airway pressure. Applied through a nasal mask, CPAP functions like a reverse vacuum cleaner, pumping air into the throat and keeping it from collapsing.

9.13B Impact

The prescription for treating sleep apnea may be as simple as taking a walk – and could save patients from having to use CPAP every night.

9.13C First Published

Research profile, February 2009

9.14 Getting to the root of poor sleep

Sleep apnea has immediate and long-term harms

9.14A Overview

People with sleep apnea have short pauses in their breathing while they sleep – often dozens, or even hundreds, of times a night. In the short term, people with sleep apnea feel the effects of poor sleep. In the longer term, it can lead to heart attacks, stroke and high blood pressure. There are treatments, ranging from lifestyle changes to surgery, but first, sleep apnea has to be diagnosed. **Dr. John Remmers** of the **University of Calgary** is the co-inventor of the Remmers Sleep Recorder, a tool that can be used at home, without attendants or technicians, to diagnose sleep apnea. Dr. Remmers founded SagaTech Electronics to manufacture and market the device.

9.14B Impact

The development of the Sleep Recorder has resulted in the revision of guidelines in the United States and Canada for testing patients suspected of having sleep apnea to include the use of a valid portable monitor as a means of testing. In Calgary, some 50-60 home recorders are used each night, changing patterns of practice, so that primary care physicians can order the low-cost tests, the results of which are then interpreted by a sleep specialist.

9.14C First Published

CIHR Health Research Results, 2003-04; updated 2009

9.15 Detecting impending heart disease

Test more effective than measuring cholesterol

9.15A Overview

Generally, testing blood cholesterol has been a common way of flagging impending heart disease. But another blood test may provide a better way. According to research by **Dr. Benoit Lamarche** of **Laval University**, people with high levels of C-reactive protein (CRP) in their blood are at increased risk of heart disease. Further research has since revealed that treating people with normal blood cholesterol but elevated CRP levels significantly reduced the risk of first heart attack. Dr. Lamarche has also determined that high concentrations of CRP associated with abdominal obesity and metabolic syndrome is largely due to increased production of CRP by the liver, rather than a reduced ability of the body to “clear” CRP.

9.15B Impact

Partly based on these important findings, the most recent Canadian guidelines for the diagnosis and treatment of cholesterol now suggest using CRP to better evaluate a patient's risk for heart disease.

9.15C First Published

CIHR Health Research Results, 2003-04; updated 2009

9.16 Ensuring life-saving drugs in the emergency room *Overcrowding big part of the problem*

9.16A Overview

Heart attack victims can be helped with potentially life-saving drugs – but only if they're administered within 30 minutes of their arrival in the emergency room. However, fewer than half actually receive the drugs, according to research by **Dr. Jack Tu** and the **Canadian Cardiovascular Outcomes Research Team (CCORT)**. Overcrowding could be part of the reason for the drugs not being administered. Better organization of emergency rooms, routine monitoring of treatment times and a triage system that deals with chest pain patients immediately could help reach the 30-minute treatment goal.

9.16B Impact

Many hospitals in Ontario have used this research to re-organize their emergency rooms and improve their treatment times. Among the changes made were initiatives to improve “door-to-needle” times and changing policies to allow emergency room physicians to make the decision to administer the drugs directly, as opposed to transferring the patient to the intensive care unit or cardiac care unit or consulting the cardiology department. The research has also had an impact on provincial planning. “Over the last several years the Ministry has increased the amount of publically available data on performance for every hospital in the province. It ranges from access data to safety data to other things. CCORT has provided both evidence, and given confidence to, policy direction,” says Adelsteinn Brown, Assistant Deputy Minister of the Health System Strategy Division at the Ontario Ministry of Health and Long-Term Care .

9.16C First Published

CIHR Health Research Results, 2004-05; updated 2010

10 Infectious Diseases

10.1 Assessing readiness to adhere to treatment

Tool identifies patients who need more support

10.1A Overview

Antiretroviral therapy for HIV/AIDS saves the lives of people infected with HIV – but its complicated requirements and sometimes-severe side effects mean that many who undergo this therapy may not stick with the treatment. **Dr. Josie Geller** of the **BC Centre for Excellence in HIV/AIDS** has developed a tool to measure patients' readiness to adhere to treatment.

10.1B Impact

The Antiretroviral Readiness and Motivation Scale (ARMS) could help physicians and other caregivers better predict which patients will adjust quickly to treatment and take steps to help those who will face more challenges in adhering to the regimen.

10.1C First Published

CIHR Institute of Infection and Immunity, *Research Finding Solutions to HIV/AIDS*, 2006

10.2 Helping women who are powerless to say no

Microbicide puts HIV protection in women's hands

10.2A Overview

Laval University's Dr. Michel G. Bergeron and his team have developed a microbicide called the Invisible Condom® (IC) that gives women the ability to protect themselves against HIV even if their partner won't use a condom.

10.2B Impact

The IC has been shown to be safe, well-tolerated and acceptable to women in trials in Quebec and Cameroon. A phase III clinical trial is planned to test its effectiveness in preventing HIV infection. If successful, the IC could prevent millions of cases of HIV and other sexually transmitted diseases.

10.2C First Published

CIHR Institute of Infection and Immunity, *Research Finding Solutions to HIV/AIDS*, 2006; updated 2009

10.3 Avoiding a common infection

Candidiasis often found in people with HIV; interferes with food consumption

10.3A Overview

Candidiasis of the mouth and esophagus is a fungal infection commonly found in people infected with HIV. The infection can limit food consumption, leading to weight loss, which in turn leads to worsened general health and well-being. The infection is often resistant to conventional anti-fungal treatments. **Dr. Louis de Repentigny** of the **University of Montreal** has identified defects in immune cells that can cause candidiasis.

10.3B Impact

Dr. de Repentigny has his team have demonstrated that defects in two different kinds of immune cells – CD4+ T cells and dendritic cells – are responsible for susceptibility to candidiasis in people with HIV. Further analysis is underway and will provide a framework for devising new immune-based strategies to control the infection.

10.3C First Published

CIHR Health Research Results 2005-06; updated 2009

10.4 Shots for everyone

Universal influenza vaccination shows benefits

10.4A Overview

In 2000, the Ontario government instituted the world's first large-scale universal influenza immunization program, offering free flu shots to all Ontarians aged six months or older. **Dr. Jeff Kwong** of the **University of Toronto** has studied the impact of this pioneering program. He found that, in the first year of the program, Ontario vaccination rate for people over the age of 12 doubled, from 18% to 36%, while the vaccination rate in the rest of Canada increased from 13% to 21%. Ontario's universal program has been less successful, however, than targeted programs in vaccinating

infants aged 6-23 months. The introduction of universal vaccination in Ontario was associated with relative reductions in influenza-associated mortality and health care use, as well as reduced antibiotic prescriptions for influenza, compared to targeted programs in other provinces.

10.4B Impact

Dr. Kwong's research suggests that universal vaccination may be an effective public health measure for reducing the annual burden of influenza.

10.4C First Published

Research profile, October 2007; updated 2009

10.5 Tracking influenza online

Google as an epidemiological tool? Yes, it's true

10.5A Overview

Where do you go when you want information? Many people “google” it – so many that the name of the search engine has become a widely accepted verb. **Dr. Gunther Eysenbach** of the **Centre for Global eHealth Innovation at the University Health Network** in Toronto decided to take advantage of this propensity. He bought an ad on Google that would appear whenever Canadian internet users typed in the keywords “flu” or “flu symptoms”. The ad linked to an educational site. As an advertiser, Dr. Eysenbach was able to monitor the number of people who clicked on his ad. He then compared his data to flu data from the Public Health Agency of Canada and found that his system not only gave an accurate picture of how many Canadians suffered from the flu that year, it also detected outbreaks faster than traditional monitoring methods.

10.5B Impact

While online tracking won't replace more direct monitoring anytime soon, it could help public health officials keep an eye on where the flu is making people sick.

10.5C First Published

Research profile, October 2007

10.6 Outsmarting a deadly parasite *Chemical shuts down malaria parasite*

10.6A Overview

Forty one per cent of the world's population lives in areas where malaria is transmitted, according to the Centers for Disease Control and Prevention, and each year, there are 350-500 million cases of malaria and more than one million deaths, many of them young children in sub-Saharan Africa. **Dr. Lakshmi Kotra** of the **Toronto General Research Institute** has discovered a chemical that shuts down the malaria parasite by blocking the activity of a key protein the parasite needs to reproduce and survive.

10.6B Impact

The compound has been shown to work against human malaria pathogen in a mouse model. Dr. Kotra has established an International Consortium on Novel Classes of Antimalarial Drugs, a partnership between academia and industry in Canada and India to pursue the development of this compound into a drug that is effective in humans.

10.6C First Published

CIHR Health Research Results, 2006-07; updated 2009

10.7 Delivering drugs to where they're needed *Applications include cancer treatment, vaccines*

10.7A Overview

Delivering the right drugs to the right place to have the desired effects is a challenging undertaking, but one that can deliver rewards in terms of preventing and treating disease. **Dr. Roy Duncan** of **Dalhousie University** is focusing on fusion-associated small transmembrane (FAST) proteins as a way to meet the challenge. He has developed a novel liposome delivery system based on these proteins that could deliver drugs, genes for gene therapy or vaccines.

10.7B Impact

Dr. Duncan founded Fusogenix Inc. in 2003 to commercialize this discovery. He has established that the fusogenic liposome system increases delivery of an anti-cancer peptide by more than 80-fold compared to non-fusogenic liposomes. The technology has been used by several research groups to promote cell-cell fusion, which has potential applications in fields such as

muscle cell development and nerve regeneration. Fusogenix is in the process of transferring its intellectual property to another Canadian biotech company for further development as a reagent to promote antigen delivery in vaccine formulation.

10.7C First Published

CIHR Health Research Results, 2003-04; updated 2009

10.8 Working toward a new antibiotic *Drug could treat pneumonia, meningitis*

10.8A Overview

Antibiotics have been around for more than half a century now, and have contributed toward the effective control of infections. But many antibiotics are not as effective as they used to be, in part because infectious bacteria have built up defences against them. **Dr. David Byers** of the **IWK Health Centre, Dalhousie University** has developed a novel antibiotic that acts by interfering with one of the key enzymes bacteria need to create endotoxin. Endotoxin is found in the outer membrane of certain types of bacteria. Dr. Byers used computer modelling to design and synthesize a molecule that can inhibit a key player in endotoxin synthesis. The new compound could be used to treat conditions such as pneumonia, gastrointestinal disease and meningitis.

10.8B Impact

Dr. Byers and his co-investigators have formed DeNovaMed, a small biotechnology company and have synthesized more than 250 novel compounds, many of which have been patented. While there has been no clinical testing to date, DeNovaMed is continuing to seek additional venture capital for further growth and commercialization efforts.

10.8C First Published

CIHR Health Research Results, 2005-06; updated 2009

10.9 Building a safer blood supply *Inexpensive test detects parasites*

10.9A Overview

In the wake of the tainted blood affair of the early 1990s, there has been a strong focus on the safety of the blood system in Canada. Currently, blood is not tested for parasites, however, as current detection methods are both expensive and complex. **Dr. Momar Ndao** of **McGill University** has developed an inexpensive, yet comprehensive blood test that will test for all major parasitic diseases and determine if the blood is safe.

10.9B Impact

Dr. Ndao and his team are currently validating their test using samples from a wide variety of geographic areas. They have received funding from CIHR to bring the test closer to commercialization and several companies have expressed interest in it.

10.9C First Published

CIHR Health Research Results, 2005-06; updated 2009

10.10 Circumcision can reduce HIV infection *Named medical breakthrough of the year by Time Magazine*

10.10A Overview

A randomized controlled trial partially funded by CIHR and carried out by **Dr. Stephen Moses** of the **University of Manitoba**, among others, has found that male circumcision is an effective measure for reducing HIV incidence in young men in Africa.

10.10B Impact

Time Magazine named this discovery the top medical breakthrough of 2007. Now, several countries in Africa, especially in southern Africa, are considering expanding the delivery of safe circumcision services. Some countries, like Swaziland, have already begun the process, while others are still in the planning stages. In May 2009, Botswana, with one of the world's highest HIV infection rates, launched a scheme to circumcise 460,000 men – 80% of eligible men – to curb the spread of HIV/AIDS.

10.10C First Published

CIHR, *Touching Lives: Annual Report, 2006-07*

10.11 Attacking the root of the problem *Vaccine prevents E.coli in cattle*

10.11A Overview

In 2005, more than 1,000 Canadians became ill from “hamburger disease” – infection caused by *E.coli O157:H7*. The bacterium is carried by cows who don’t themselves become ill, but make anyone ill who eats their meat or drinks water contaminated by their manure (as happened in Walkerton, Ontario). **Dr. Brett Finlay** of the **University of British Columbia** developed a vaccine that dramatically reduces the number of the disease-causing bacteria cows carry. In tests, the vaccine showed a 92% reduction in colonization of *E. coli O157* in vaccinated cattle.

10.11B Impact

The vaccine has been commercialized by Ontario-based Bioniche Life Sciences. It was granted a conditional license in the United States in February 2008 and received full licensing approval in Canada in October 2008 and is available for unrestricted use by Canadian cattle producers and their veterinarians.

10.11C First Published

Researcher profile, July 2007; updated 2009.

11 Mental health and addictions

11.1 The answer to quitting smoking may lie in your liver

Research finds liver enzyme affects how easy it is to quit

11.1A Overview

People who have lower levels of a liver enzyme called CYP2A6 metabolize nicotine out of their system much more slowly. The faster nicotine is cleared out of your system, the more quickly you crave that next cigarette. As a result, people with low levels of the enzyme find it easier to quit smoking and even respond to smoking cessation medications differently. **Dr. Rachel Tyndale** of the **Centre for Addiction and Mental Health** says that the amount of this liver enzyme that your body produces is genetically determined and varies widely from person to person.

11.1B Impact

Identification of the enzyme is a major step forward in the battle against smoking. Using medication to inhibit the CYP2A6 enzyme could prove an effective way to help people stop smoking, while a test to determine enzyme levels could determine whether people would benefit most from nicotine- or non-nicotine-based therapies. Dr. Tyndale is now looking at drug candidates to block the enzyme, as well as tests to identify enzyme levels in different individuals, to better predict which smoking cessation medications they may respond to best.

11.1C First Published

Research profile, January 2008; updated 2009

11.2 Treating post-traumatic stress disorder

Exposure therapy most effective

11.2A Overview

Post-traumatic stress disorder (PTSD) occurs after exposure to a terrifying ordeal in which grave physical harm occurs or is threatened, such as violent personal assault, natural disasters or accidents or military combat. Treating PTSD is difficult, but **Dr. Gordon Asmundson** of the **University of Regina** has found that exposure therapy – where patients are exposed to prolonged and repeated images of trauma until the images no longer cause anxiety – may be more effective than other methods for treating the disorder.

11.2B Impact

Dr. Asmundson and his team continue their work on exposure therapy for PTSD, including delivery of treatment over the internet.

11.2C First Published

CIHR Health Research Results, 2003-04; updated 2009

11.3 Breaking the pathways of addiction

Discovery prevents brain from remembering pleasure of drugs

11.3A Overview

Addiction to drugs involves powerful forces in the brain. **Drs. Anthony Phillips** and **Yu Tian Wang** of the **University of British Columbia** have demonstrated how to prevent the brain from remembering previous pleasurable responses to stimulant drugs such as cocaine. They created a protein fragment (a peptide) that they used to block the chemical communications between brain cells that are necessary for recalling these memories.

11.3B Impact

Drs. Wang and Phillips continue to advance in their understanding of the basic biology of the function and mechanism of the peptide in animal models.

11.3C First Published

CIHR Health Research Results, 2005-06; updated 2009

11.4 Shared care is better care

Family doctors collaborating with mental health professionals provide better outcomes

11.4A Overview

People with mental illness get better care if their family doctors work in collaboration with mental health professionals instead of working alone, according to research by **Dr. James Irvine** of the **Saskatchewan Health Quality Council**. He found that patients who receive “shared care” suffer fewer symptoms and are more likely to recover or be in remission at follow up. Patients also say they prefer this type of treatment.

11.4B Impact

The project resulted in the release and dissemination of a report on shared mental health care that identified ways of improving mental health care among family physicians, mental health professionals, nurses and others. The report aided in the consideration of the inclusion of mental health care into an expanded primary health-care approach, with some health regions incorporating aspects of shared mental health care within their regional primary care plans.

11.4C First Published

CIHR Health Research Results, 2003-04; updated 2009

11.5 Recognizing risks to seniors' mental health

Guide helps to assess suicide risk, prevent suicide among seniors

11.5A Overview

In 2005, **Dr. Marnin Heisel** of the **University of Western Ontario** and **Dr. Sharon Moore** of the **University of Rochester** worked with the Canadian Coalition for Seniors' Mental Health (CCSMH) to create Canada's first-ever multidisciplinary, evidence-based Guidelines on the Assessment of Suicide Risk and Prevention of Suicide in seniors.

11.5B Impact

The guidelines have been endorsed by multiple organizations and are listed as part of the U.S. Suicide Prevention Resource Centre's Best Practices Registry. The guidelines have led to a brochure called "Suicide Risk and Prevention of Suicide in Older Adults", which is widely used by practitioners to assist them in assessing suicide risk, as well as to tools for use by family members in identifying when someone is at risk. Thousands of copies of the guidelines and associated tools have been distributed electronically and by hard copy.

11.5C First Published

Grey Matters, newsletter of the CIHR Institute of Aging, October 2008; updated 2009.

12 Neurodegenerative Diseases

12.1 Preventing blindness

Alzheimer's drug could work for glaucoma

12.1A Overview

Glaucoma is the second-leading cause of blindness in Caucasians in North America and the leading cause among African-Americans. In Canada, one per cent of people over 40 suffer from the disease. **Dr. Adriana Di Polo** of the **University of Montreal** looked at whether a drug approved in both Canada and the United States for treating Glaucoma could be used for treating Alzheimer's disease. She found that the drug is extremely effective at protecting neurons and function. The drug, marketed under the name Reminyl, was tested in an animal model in which glaucoma acts much as it does in humans.

12.1B Impact

Dr. Di Polo and her team have a patent on the use of Galantamine for glaucoma and other optic neuropathies. They are in conversation with companies who could help test the drug in humans. Since the drug is already approved for human use, physicians can prescribe it to their patients for glaucoma, known as "off-label" use.

12.1C First Published

CIHR Health Research Results, 2005-06; updated 2009

12.2 Stopping Alzheimer's in its tracks

Diabetes compound proves effective in blocking beta amyloid

12.2A Overview

The loss of memory and other functioning in Alzheimer's disease is caused by the action of a protein called beta amyloid, which destroys brain cells. It is generally only possible to treat the symptoms of the disease. But a discovery by two researchers from the **University of Alberta** offers an opportunity to prevent or delay the progression of Alzheimer's disease by stopping the action of beta amyloid. **Drs. Jack Jhamandas** and **David MacTavish** have found that a compound developed to prevent destruction of insulin-producing cells in diabetes is also effective in blocking the

pathways through which beta amyloid destroys brain cells, improving the cells' chances of survival.

12.2B Impact

The work undertaken by Drs. Jhamandas and MacTavish suggests that the drug they were testing is effective in human tissue samples as well as in animal models. They continue their work in this area with continuing support from CIHR.

12.2C First Published

CIHR Health Research Results, 2004-05; updated 2009

12.3 A genetic clue to common form of dementia *Frontotemporal dementia strikes people under 65*

12.3A Overview

Frontotemporal dementia attacks the frontal and temporal parts of the brain that are responsible for a number of functions including reasoning, planning, perception and memory. It typically strikes people between the ages of 40 and 70. **Drs. Ian Mackenzie** and **Howard Feldman** of the **University of British Columbia** and the **Vancouver Coastal Health Research Institute** have discovered that a mutation in a gene called progranulin causes an inherited form of the disease – a finding that came as a surprise to them.

12.3B Impact

A treatment arising from this discovery is still elusive. However, the researchers are now able to measure progranulin protein levels in blood, which opens the door to more accurate diagnosis of sub-types of dementia and improvements in monitoring treatment response. There are also some candidate drugs that could restore progranulin expression.

12.3C First Published

CIHR Health Research Results, 2005-06; updated 2009

12.4 Enlisting immune system cells to eat plaque *Bone marrow stem cells help produce microglia*

12.4A Overview

Alzheimer's disease is characterized by the formation of plaques in the brain. A team led by **Dr. Serge Rivest** from **Laval University** has discovered a new way to fight the plaques. The team used bone marrow stem cells to produce immune cells known as microglia. These cells were able to digest the plaque created by Alzheimer's disease. People with the disease have microglia, but in their natural form, they are unable to eliminate the plaque. The research, conducted in mice, demonstrated increased numbers of microglia and stabilization of cognitive decline, indicating that targeting these immune cells could have potential for treating Alzheimer's disease.

12.4B Impact

Dr. Rivest and his team are looking for partners to test the finding in people with mild cognitive impairment, to gain clinical data to support the work.

12.4C First Published

CIHR Health Research Results, 2005-06; updated 2009

12.5 Uncovering the genetic roots of diseases *Translating findings into treatments*

12.5A Overview

In the years since the mapping of the human genome, research has held out tantalizing possibilities of understanding and treating genetic disorders. **Dr. Michael Hayden** of the **University of British Columbia** is best known for his groundbreaking research on Huntington disease that most recently has provided evidence of a potential novel treatment for this devastating neurodegenerative disease. He has also made important discoveries about the role genes play in coronary artery disease and adverse drug reactions. Dr. Hayden has co-founded three pharmaceutical companies to commercialize his discoveries. One, Aspreva Pharmaceuticals Inc., tests existing medications as potential treatments for people suffering from rare and overlooked diseases. In 2008, Dr. Hayden was named Canada's Health Researcher of the Year.

12.5B Impact

Dr. Hayden's research on Huntington's disease has led to the development of a predictive genetic test for the disease. Xenon Pharmaceuticals, Inc., one of the companies he has co-founded announced in June 2009 a strategic alliance with Merck & Co., Inc., to discover and develop novel candidates for treating heart disease. Other drug development products include ones for pain, obesity, iron overload and anemia.

12.5C First Published

CIHR Health Research Results, 2003-04; updated 2009

12.6 The genetic basis of Alzheimer's disease *Gene discovery leads to drug development*

12.6A Overview

Some types of Alzheimer's disease, particularly those that feature early onset of the disease, have their basis in genes. **Dr. Peter St. George-Hyslop** of the **University of Toronto** has discovered two genes that cause the early onset of Alzheimer's disease. The genes were found to be a component of an enzyme that generates amyloid beta peptide, the feature that makes up amyloid plaque, a principal feature of the disease. He has developed a drug to prevent the onset of the disease and halt its progress after it strikes.

12.6B Impact

The genes discovered by Dr. St. George-Hyslop have fundamentally changed how scientists think about the origins and development of Alzheimer's disease. And the enzyme found to contain the genes is now the target of a number of compounds to inhibit the enzyme, some of which are in human clinical trials. Among them is a compound developed by Dr. St. George-Hyslop and his team called scyllo inositol which has been shown to be successful at inhibiting Alzheimer's disease in a mouse model and is now in phase 2 clinical trials with a Canadian biotech company called Transition Therapeutics.

12.6C First Published

CIHR Health Research Results, 2003-04; updated 2009

12.7 A sweet solution to Alzheimer's disease *Sugar-like substance halts disease in mice*

12.7A Overview

A team of researchers from the **University of Toronto**, led by **Dr. JoAnne McLaurin** has identified a drug that can halt Alzheimer's disease in mice. The drug, a sugar-like substance known as scyllo-cyclohexanehexol, blocked the accumulation of amyloid beta, which, if unstopped, kills brain cells and triggers the formation of the plaques that are characteristic of Alzheimer's disease. Dr. McLaurin has received permission from Health Canada to proceed with human trials of this promising new drug.

12.7B Impact

Clinical trials of ELND005, as it is now known, are underway, run by Toronto-based Transition Therapeutics, Inc., in collaboration with Elan Pharmaceuticals. Phase I trials have been completed and Phase II trials are underway, slated to end in the second quarter of 2010. The U.S. Food and Drug Administration has given ELND005 fast-track designation to facilitate review of the drug.

12.7C First Published

CIHR Health Research Results, 2006-07; updated 2009

13 Obesity

13.1 Slowing down fat production to fight obesity *Discovery points way to potential new treatment*

13.1A Overview

Obesity is often about diet and physical activity levels. But in some cases, it's also about how bodies function at the most fundamental levels. **Dr. Katherine Cianflone** of **Laval University** has discovered that a receptor protein found on fat cells, called C5L2, may play a role in obesity. She has found that the protein binds ASP, a protein that is known to affect fat production and that is present in high levels in people who are obese.

13.1B Impact

Identifying compounds that can block C5L2 activity may help to slow fat production, helping to treat obesity in some people. Dr. Cianflone and her team are evaluating C5L2 to learn more about it, as well as evaluating antibodies that could block the receptor and reduce fat storage.

13.1C First Published

CIHR Health Research Results, 2003-04; updated 2009

14 Stroke

14.1 Targeting the right side of the brain

Helping stroke sufferers cope with communications disorders

14.1A Overview

New evidence over the past two decades has shown that communication disorders after stroke, including conveying emotion in speech, communicating appropriately in social situations, the capacity to be coherent and cohesive and the ability to treat words' meaning, can result from damage to the right brain. **Drs. Yves Joanette** and **Bernadette Ska** of Montreal have been working for nearly all of that time to understand the communication problems that follow damage to the right side of the brain. They have developed an evaluation tool, the Protocole Montréal d'Évaluation de la Communication (Protocole MEC) to assess communications ability in people who have suffered right brain damage in a stroke.

14.1B Impact

The Protocole MEC has been distributed to French-speaking clinicians in Quebec and to those in European French-speaking countries. Drs. Joanette and Ska have also developed a one-day continuing education workshop describing the latest scientific findings on communications disorders following right-brain damage and how to screen for, evaluate and deal with the disorders. The course has been given to more than 300 speech and language pathologists in Canada and France and the Protocole has been translated into Spanish, Portuguese, Italian and English. A 2007 survey found that 82% of 46 respondents had found that the Protocole or the course had a positive impact on their ability to evaluate communications disorders, 91% felt that their patients with these disorders following right brain damage were receiving better services and 80% felt that rehabilitation professionals in their workplaces were more sensitized to communications disorders after right brain damage due to stroke.

14.1C First Published

CIHR Institute of Circulatory and Respiratory Health, newsletter, summer 2008

14.2 “Time is brain”

Quick treatment can prevent disability from stroke

14.2A Overview

There’s a saying in stroke medicine that “time is brain” – the faster treatment can be initiated, the better the outcome. In fact, quick treatment with clot-busting drugs can return patients to pre-stroke health – but only 1.4% of people who suffer a blood-clot-induced stroke, the most common form, actually receive the drug they need, according to research by **Dr. Michael Hill** of the **University of Calgary**. Emergency physicians can be reluctant to administer clot-busting drugs for fear of inducing bleeding in the brain, but this study demonstrated that such bleeding occurs in only five per cent of cases.

14.2B Impact

Dr. Hill’s research is part of a larger body of stroke research highlighting the need to improve hospital performance when patients arrive with a suspected stroke. Treatment protocols have been developed to assist emergency rooms in recognizing, assessing and treating stroke and, as of 2009, stroke treatment will be measured by Accreditation Canada as part of the hospital accreditation process. Pilot testing in eight hospitals will take place in 2009 and the measurement process will be rolled out across Canada in 2010.

14.2C First Published

CIHR Health Research Results 2004-05; updated 2009

14.3 Exercising back to health post-stroke

Speeding up reflexes has multiple benefits

14.3A Overview

Stroke is a leading cause of disability among older adults. From her earlier research, **Dr. Janice Eng** of the **University of British Columbia** knew that people with stroke have much slower reflexes. So she set out to improve their reflexes, with a program that included stretching, weight-bearing exercises and walking – and, for part of the group, a series of challenging, quick-reflex exercises such as stepping quickly to one side or responding to a light push. After 10 weeks, the group that had these exercises added to their routine were about 30% faster than when they started, while the reflexes of remainder of the group were unchanged. In addition, the “agility” group, as they were known, made greater gains in muscle strength and

cardiovascular fitness and had a reduction in falls. They also maintained bone density, which the control group did not.

14.3B Impact

The Fitness and Mobility Exercise (FAME) program is currently operating in at least 50 sites in seven countries, including the United States and Canada, where it is up and running in several cities, including Vancouver and Toronto.

14.3C First Published

Researcher profile, June 2008

15 Workplace Health

15.1 Improving health and safety of health-care professionals

B.C. project saves millions

15.1A Overview

In the 1980s, the health-care sector accounted for more time-loss claim than any other industry in British Columbia. **Dr. Annalee Yassi** of the **University of British Columbia** worked with a team that included unions and employers to improve occupational health and safety for health-care workers in British Columbia. One project studied the effectiveness of an overhead lift system for reducing staff injuries and decreasing staff and patient risk and discomfort. It found a 40% reduction in total claims costs, an 82% reduction in life and transfer claims costs and an 83% reduction in lost hours due to lift and transfer injuries. Front-line workers reported less pain and discomfort and patients and their families expressed general satisfaction. Another study found that implementing the Prevention and Early Active Return-to-Work Safely (PEARS) program reduced the time taken to return to work after a musculoskeletal injury and reduced the average time-loss-per-person per year for registered nurses to 3.6 from 4.9 days, with an associated reduction in compensation payments of more than \$176,000, one-third less than the previous year.

15.1B Impact

The B.C. Ministry of Health and the Worker's Compensation Board allotted more than \$20 million to the widespread implementation of lifts throughout the province and signed an agreement to implement appropriate no-unsafe-lift policies. PEARS programs are now running in 11 sites across British Columbia, serving more than 37,000 health-care workers.

15.1C First Published

Evidence in action, acting on evidence: The CIHR Institute of Health Services and Policy Research Knowledge Translation Casebook, 2006

15.2 PLAD – more than a patterned fabric

Device helps people with back injuries return to work

15.2A Overview

Back injuries can keep someone off the job for more than two years. **Dr. Joan Stevenson** of **Queen’s University** and her PhD student at the time, **Mohammad Abdoli** (now a professor at **Ryerson University**) have developed the PLAD – Personal Lift Augmentation Device – to help people with back injuries return to work sooner. The PLAD, which workers wear on their backs and that is braced at the shoulders, hips and knees, works with back muscles to allow people to lift objects with less muscle force. The PLAD was pilot-tested by a small group of assembly-line workers at a major Ontario automotive assembly plant found that the PLAD reduced back muscle force requirements by 20%; 80% of the workers said they would wear the PLAD for similar work. The device is now slated for larger-scale testing by the company, both in the automotive and other industries.

15.2B Impact

The PLAD has been licensed to PeakWorks Inc., an Ontario company specializing in industrial safety products, which is seeking to get the PLAD onto the market as soon as possible.

15.2C First Published

CIHR Health Research Results, 2004-05; updated 2009