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In my past 10 years with Saskatchewan Health Research Foundation (SHRF), I’ve seen top research talent from across the globe, come to Saskatchewan, and stay in Saskatchewan, because they find a welcoming community of interdisciplinary collaborators, world-class infrastructure, and a province that prides itself on a long history of leading health innovations.

The way health research is done has changed over the years. All stakeholders need to work together, partner and collaborate in meaningful ways to get the highest impact from our research investments. No longer can scientists work in silos. Discoveries are strengthened by the knowledge and input of not only other scientists, but the end users, such as industry, policy makers, clinicians and even patients. With these new players in the game comes the need and opportunity to communicate and transfer knowledge into application in ways that are more creative and effective.

This magazine highlights the stories of what is accomplished when people work together to find solutions to relevant challenges for the people of Saskatchewan and beyond. Like Drs. Brian Eames (pg. 19) and Christopher Phenix (pg. 16) who are making use of unique infrastructure, such as the synchrotron and cyclotron, to develop innovative new techniques and compounds that can be applied to better diagnosis and treatment of diseases such as osteoarthritis and Parkinson’s disease.

The story of SHRF would not be complete without recognizing the collective impact that is possible when we work together with our many partners such as the Lung Association of Saskatchewan (pg. 22), Alzheimer’s Society of Saskatchewan (pg. 38) and the Heart and Stroke Foundation (pg. 44). Collaborating with the Saskatoon City Hospital Foundation and the MS Society of Canada led to the inaugural Saskatchewan Research Chair in Multiple Sclerosis Clinical Research (pg. 7).

Our institutional partners at the University of Saskatchewan (pg. 13), University of Regina (pg. 33) and Saskatchewan Polytechnic (pg. 41), as well as the health regions, provide a home base for the innovative minds that are facing a new era of health research and a transformed health system. Working together, we will find ways to continue to support and build up research capacity for lasting impacts.

As the province faces continued change and transformation of our health landscape, I’m honoured for this opportunity to lead SHRF. Though change can be difficult, it presents opportunities to do things differently; the chance to re-align our priorities, focus our efforts and push the boundaries of our work to continue Saskatchewan’s legacy of health innovations.  

- Patrick Odnokon

Photo Credit: Stealth Media
Meet the Researcher

Leah Ferguson

What is your background and general area of research?
My undergraduate degree at the U of S was in psychology. I fell in love with the discipline and eventually realized that you could use psychology elsewhere, in my case kinesiology. So, I did a masters degree in the exercise psychology area and a PhD in the sports psychology realm, both through the College of Kinesiology.

When I started in my current role as a faculty member almost four years ago, I knew my research focus would include sports psychology and working with young women to co-create positive sport experiences. Being Métis myself and living in Saskatchewan, for me it was almost a no brainer to gravitate towards Indigenous health research. It’s been great. I have these two parallel tracks of research: one is non-Indigenous, “mainstream” sport, and one is Indigenous health – as a broad label.

Very globally speaking, my research area is sport, health, and exercise psychology, which really gets at a lot of the work I do with athletes and exercisers, but that psychology part really emphasizes that wellness and well-being aspect that I bring to whatever study I might be involved in.

Where do you conduct your research?
I do my research wherever the participants need it to happen. That can include things like online surveys, or it could be going out to sports teams and inviting athletes to take part in a focus group or sharing circle. You have to find a place that works for the people you want to engage with, whether it’s a meeting room, a coffee shop, or some of my research has been out in Indigenous or rural communities.

What are some key things you’ve learned from your research?
Always be a critical consumer of information, even of your own findings. Even when you think you have some findings or a theory that we cling to – is it relevant? Is it something we should be using to drive our research?

That’s really helped me with my sports psychology work with non-Indigenous and Indigenous athletes. A theory applied to Euro-Canadians that is in the literature and is “good” research, might not be relevant for a group of Indigenous athletes. Well-being may be unique to their experiences, and that should be respectfully explored.

What do you hope for the future of your research area?
Looking at sports psychology from an Indigenous or cultural lens, I really hope there’s just, point blank, more done in the area. Especially with women athletes and their experiences and what we can be doing to develop programs and to mentor young women athletes; helping them reach their potential. So I hope that body of research expands and I hope that I get to be a part of it. My SHRF Establishment grant has been helping me start in that area of working with Indigenous women athletes.

The other side of things that I hope to see grow in the sports psychology realm really grew from my PhD research and is focused on the idea of having self-compassion in sport. The pressures that can be placed on athletes can be paramount and they can face countless challenging and difficult experiences that can take away from a lot of the benefits of sport. So I really hope self-compassion and sport research takes off, and again I want to be a part of it.

To see an extended version of this interview and meet other SHRF-funded researchers, visit shrf.ca/Blog.
Anton left Ukraine two years ago in hopes of finding a good life in Saskatchewan, but the reality is a shattered dream.

In his first low-wage farming job on a temporary work permit, Anton’s employer refused to pay him overtime because “he could always find someone else to work for him.” Anton also hasn’t received proper tax slips, so his chances for migrating permanently to Canada are slim.

Anton – not his real name – is one of more than 30 migrant workers interviewed over the past year by a research team led by Drs. Michael Schwandt and Lori Hanson, University of Saskatchewan (U of S) community health and epidemiology professors, to learn about worker health needs and housing and working conditions.

More than half of Saskatchewan’s 11,000 temporary foreign workers live and work in Saskatoon and Regina. The workers hold low-paying jobs in agriculture, construction and the hospitality industry, often working as cooks, waiters and cleaners. Some have paid thousands of dollars to recruiters in their home countries to migrate temporarily.

“Most Canadians don’t know under what circumstances these workers come to Canada, the sacrifices they make or whether they have equal access to health care,” said Schwandt. “We want to raise public awareness about this and start filling gaps in regulations.”

Preliminary results indicate that while there are government inspections of workplaces and housing, the growing number of migrant workers and understaffing at inspection agencies means that it’s impossible for even a quarter of employers to be audited. The current reliance on worker complaints may not be adequately protecting the health and safety of migrant workers, the researchers say.

“We found that workers are often afraid of interacting with authorities to make complaints about their workplace or to report injuries or health issues for fear of being deported,” said Schwandt.

“While migrant workers are entitled to health care, they have difficulty accessing services due to language barriers or lack of knowledge about the system.”

The team collaborates with U of S research coordinator Farha Akhtar and University of Regina labour experts Andrew Stevens and Sean Tucker. The researchers consulted with the Workers’ Compensation Board and organizations supporting migrants such as the Canadian Council for Refugees, Migrante Canada, and United Food and Commercial Workers (UFCW) Canada, one of the largest unions in the country. They also worked with settlement agencies Global Gathering Place and Open Door Society, as well as faith-based organizations such as KAIROS.

“Because we collaborated with these organizations, migrants felt safe opening up about their experience in Canada,” said Schwandt.

The team says the SHRF grant has been crucial in shedding light on migrant workers’ lives in Saskatchewan and expect to share their final results by the end of 2017.

“We hope our research will shed light on unfair policies, encouraging the government to strengthen policies supporting migrants’ rights and work with organizations for migrants to enhance health programs,” said Hanson.

Federica Giannelli is a graduate student intern in the U of S research profile and impact unit.

Photo Credit: David Stobbe
Funding research that matters to Saskatchewan people is at the core of what SHRF strives to do. With Saskatchewan having one of the highest rates of multiple sclerosis (MS) in the world, there’s no question that there is an intense need for MS research that will lead to better diagnosis, better treatments and, ultimately, a cure.

On January 26, 2017, SHRF was pleased to be a part of announcing the inaugural Saskatchewan Research Chair in MS Clinical Research, supported also by Saskatoon City Hospital Foundation (SCHF), MS Society of Canada, University of Saskatchewan and Saskatoon Health Region. To lead this unique research program renowned MS researcher Dr. Michael Levin was recruited.

“I’ve dedicated most of my adult life to exploring the causes of MS and the care of people with MS and I am grateful and humbled to be named the inaugural chair,” said Levin, a neurologist and professor who came from the College of Medicine at the University of Tennessee Health Science Center.

Levin first visited Saskatoon in October 2015. “That’s when I really got excited,” he says, noting two reasons. “First, endowed chairs in neurology are uncommon; endowed chairs in MS are even less common. This was the opportunity of a lifetime.”

The ability to work with patients and continue lab work was an added attraction. This is crucial to the philosophy of his chosen vocation. “We’re physician-scientists; we see patients but also do the science. In the States, competitive funding has seen more people like me becoming one or the other; it’s hard to be both. Here it seems like physician-scientists are encouraged.”

Levin will work in the lab, will have graduate and medical students, fellows and residents rotating through, and will also see patients one day a week.

“I am so glad to see patients here. I’ve always maintained that it’s MS patients who are going to help us the most with discovering the breakthrough.”

He has high praise for the team at the clinic, including physicians Drs. Katherine Knox and Ilia Poliakov, director of the MS Clinic since late 2016. Being in the lab with Dr. Val Verge, other investigators and staff is also important, Levin says. “I want to collaborate with other researchers. The [ Cameco MS Neuroscience Research Center’s] open space design is ideal. The lab
group and MS Clinic team means this position is starting strong; there’s a tremendous amount of infrastructure which I hope to help organize as chair.”

With this in place, he can quickly get to the task at hand – MS research. “I’m interested in several things. The first will deal with how we all make antibodies that protect us from things like viruses and bacteria. MS patients are unique – not only are they making these antibodies, they’re also making antibodies to parts of their brains.”

“We found that a certain kind of antibody gets into the brain and begins to stick to neurons and also to a protein called A1. Not only do MS patients make antibodies to A1, but, if you take those antibodies from a patient and put them in a mouse, the mouse becomes sicker and gets spastic. That may help us understand part of the mechanism of MS, how patients get spastic, and how we can not only treat the disease but also treat the spasticity.”

“The second thing I’d like to study is mutations. Every human has two kinds in their DNA – mutations that we’re born with and mutations that we acquire in a lifetime. Much of the research to now has been on inherited mutations. I’m more interested in the acquired mutations. We can study this simply by taking blood samples from patients – we know what the human genome looks like we know what the DNA sequence looks like, and we know what the inherited mutations are in MS patients. So we can see if MS patients are acquiring mutations from the environment and if that plays a role in the triggering of MS.”

Clinically, Levin wants to study how patients access the MS clinic at Saskatoon City Hospital, determining first where they are in the province.

“Next, I’d like to know where the doctors caring for MS patients are located. Then, we can examine how we provide care for patients – are they willing to drive three hours or do they want something local; or a hybrid of say, annual visits, with local follow-ups or telemedicine?”

- Dr. Levin

As chair, he says, “first and foremost, the expectation is that we develop a reputation for research and research excellence. I want to put Saskatoon and Saskatchewan on the MS map nationally and internationally. I’m pretty confident we can do that.”

To read more about Dr. Levin’s background and his new position, see SCHF’s special MS supplement in their Summer 2017 issue of Well Aware.
Children’s epileptic seizures can be very hard to control. For some children who have an Epileptic Encephalopathy Syndrome, despite using multiple anti-seizure medications, seizures often remain uncontrolled. Children with these epilepsy syndromes may suffer through over 100 seizures a day, they struggle with basic life skills and can regress developmentally because of it. Available treatments can have limited benefit but significant side effects.

Some parents seeking any measure of relief for their children, have turned to CBD, a compound found in marijuana extract that has no known psychoactive effects.
Huntsman refractory epileptic encephalopathy. Additional members of the research grant team include Drs. Jose Tellez-Zenteno, Richard Tang-Wai, Andrew Lyon and Jane Alcorn.

According to data from the Pediatric Epilepsy Program of Saskatchewan and the Jim Pattison Children’s Hospital Foundation, epilepsy is the third most common brain disorder and affects about 1% of all children. The program currently sees over 1,200 patient visits a year with about 200 of those patients dealing with new onset seizures. A percentage of these children suffer from epileptic encephalopathies that are characterized by frequent and difficult to control seizures as well as cognitive and neurological impairment.

“Our study,” explains Huntsman, “will assess the safety and tolerability of a Health Canada approved high CBD - low THC product in children with difficult to control epileptic encephalopathy. Children enrolled in the study will be given increasing doses of the high CBD - low THC product while being closely monitored for potential side effects and interactions with their current anti-seizure medications.”

This research will be an important part of filling a void on evidence related to cannabinoid use in children with these forms of severe epilepsy.

“Physicians are a conservative group,” states Huntsman. “Until we have well-designed research, we are hesitant to accept ideas into mainstream treatment. Evidence on dose and what CBD/THC levels work or don’t work can inform our empirical knowledge for prescribing.”

Despite not being well understood, social media exploded with anecdotal evidence about the impact of cannabidiol on seizures in treatment-resistant epilepsy. Partially due to this growing discussion, in December 2015, the Canadian Paediatric Society (CPS) issued a statement warning parents against using medical marijuana to treat their children’s health conditions. According to the CPS, while cannabis is increasingly being used to treat certain kids’ illnesses, “evidence is lacking about the overall effect on children.”

“Although several studies have shown the benefit of cannabis products in children with severe epilepsy, there are still a lot of unanswered questions,” cautions Dr. Richard Huntsman. Huntsman, a pediatric neurologist, is principal investigator from the College of Medicine at the University of Saskatchewan (U of S), who, with a team of co-investigators, is studying the effects of cannabidiol in children with severe refractory epileptic encephalopathy. Additional members of the research grant team include Drs. Jose Tellez-Zenteno, Richard Tang-Wai, Andrew Lyon and Jane Alcorn.

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The researchers hope that the experience gained in doing this study will put them in a position to pursue a large scale clinical trial using cannabis oil in kids with refractory epilepsy. It is through large scale studies that the team will be able to assess the efficacy of cannabis oil in reducing children’s seizures and improving their quality of life.

Huntsman says it will take children seven months to complete the study. This study will assess the safety and tolerability of a cannabidiol-enriched cannabis herbal extract in a small group of children with refractory epileptic encephalopathy. The children will be monitored by a team of experts in pediatric neurology, pharmacology, clinical biochemical analysis, psychology and biostatistics. He and his team then hope to have data available for presentation in the next year to year and a half. Five research sites across Canada, each recruiting six patients, have been established at the University of British Columbia, University of Alberta, University of Saskatchewan, University of Manitoba and Université de Montréal.

Alcorn, co-researcher on this study from the College of Pharmacy and Nutrition at the U of S, can’t diminish the critical importance of the team’s interdisciplinary structure. “Locally, our team consists of clinicians (pediatric and adult neurology, clinical biochemistry and pediatric pharmacy) as well as basic scientists with expertise in pharmacokinetics and cannabinoid receptor pharmacology. Nationally, we have been able to recruit internationally recognized experts in pediatric epilepsy research as site investigators.”

Both Huntsman and Alcorn believe they have the best possible team to run this study and expand to develop future research projects locally and in collaboration with other sites nationally. And that’s been no small feat. It’s taken four years to get to this point which included Health Canada approvals to use a controlled substance, ethical and legal considerations, 25 versions of the research protocol, securing additional funding and specific patient recruitment. Seeing the research finally underway brings some satisfaction.

Huntsman and Alcorn, agree a key element of the research question is around optimal dosage.

“Dose measurement is done quite empirically right now and I would suggest dosages are far from optimal,” explains Alcorn. “Dose optimization is important in the appropriate usage of medical marijuana. Unless we support scientific research to ensure we have optimized dosages in the different indications that medical marijuana might have benefit, we will never fully realize the potential of this important therapeutic.” The research will tackle the question of optimized dosage regimens through therapeutic monitoring: measuring blood levels of cannabinoids following different dosage regimens and then relating these levels to clinical response.

Both researchers explain this is critical due to many factors including: the children involved are on multiple medications and drug interactions need to be clearly monitored; the ability to metabolize and receive impact from therapeutic substances sometimes changes through childhood; there’s a need to evaluate impact on all subtypes of epilepsy; and ultimately no one has yet established a dosage regimen based upon safety and tolerability in children.

Safety and tolerability are both key to research, reinforces Huntsman.
This research project has also helped form CRIS: Cannabinoid Research Initiative of Saskatchewan. Huntsman and Alcorn are members of the group and are joined by an interdisciplinary team that includes:

Drs. Robert Laprairie, College of Pharmacy and Nutrition; Andrew Lyon, Pathology and Laboratory Medicine; and Darrell Mousseau, Department of Psychiatry, all from the University of Saskatchewan; Blair Seifert, Clinical Coordinator, Pediatric Pharmacy Services, Saskatoon Health Region; and Richard Tang-Wai, Division of Pediatric Neurology, University of Alberta.

This interdisciplinary research group aims to obtain scientific evidence about the application of cannabinoids and cannabis derivatives to humans and animals, for health, disease and disorders. Given that marijuana has over 140 different cannabinoids which are potentially neurologically active, there will be no lack of research questions to explore. Based at the University of Saskatchewan the group is now exploring activities and research opportunities that include analytical evaluations, human clinical studies, biomedical studies, veterinary studies, knowledge translation, and studies of cannabinoids and society.

Ultimately, says Huntsman and Alcorn, quality of life improvement in the areas of irritability, sleep and interactivity are just as important as seizure control. But what are the variations in CBD/THC that impact these? Is there a good therapeutic level for CBD/THC? Those remain two big unanswered questions for the team and for children suffering from epileptic encephalopathy.
As health care in Saskatchewan is changing, so too is the health research done at the University of Saskatchewan (UofS) to better address the needs of a growing province.

“With a broad array of health research programs and facilities unrivalled at any other Canadian university, UofS researchers are developing solutions to the health care needs of today and doing foundational science that lays the groundwork for the innovations of tomorrow,” says Darcy Marciniuk, Associate Vice-President Research – Health.

The university’s unique research cluster includes the colleges of medicine, veterinary medicine, nursing, dentistry, kinesiology, and pharmacy and nutrition, as well as schools of public health, physical therapy and public policy. VIDO-InterVac (Vaccine and Infectious Disease Organization - International Vaccine Centre), the Canadian Centre for Health and Safety in Agriculture, and the Saskatchewan Population Health and Evaluation Research Unit also play key roles.

The university has Canada’s only synchrotron – the Canadian Light Source (CLS), with biomedical beamlines – a new cyclotron and associated radiopharmaceutical production facilities, and Royal University Hospital (RUH) imaging facilities.

“We have huge opportunities here from having all these resources on campus,” says Lois Berry, Interim Vice-Provost Health. “We are just beginning to realize how big those opportunities are and really starting to capitalize on them.”

The university boasts a proud history of innovative health care research that includes setting the global gold standard for cancer treatment with its innovative cobalt-60 technology in 1951. A new generation of nuclear scientists such as Eric Price and Kate Dadachova is carrying on the tradition, using the cyclotron and CLS to develop “smart” drugs and novel nuclear therapies for cancer patients.
Making Strides

The U of S is a leader in One Health research, an integrative approach which recognizes that animal, human and ecosystem health are inextricably linked. With VIDO-InterVac, the U of S is well-equipped to study infectious diseases shared by animals and humans.

U of S health researchers are making strides in many areas important to the province and beyond. Saskatchewan has the world’s highest rate of multiple sclerosis. Neurologist Michael Levin, who in March assumed the inaugural U of S chair in MS clinical research, plans to make “significant advances in MS by providing world-class care and cutting-edge research.”

Using the synchrotron, neurologist Mike Kelly’s research is improving stroke treatment interventions and patient care. Other research leaders include:

- Respirologist Don Cockcroft’s techniques for assessing and managing asthma are used worldwide.
- Neurosurgeon Ivar Mendez is making a huge impact in the use of remote presence robotics in patient care and has teamed up with a Harvard-affiliated research centre in Boston to explore the use of a patient’s own stem cells to repair the brain.
- Immunopathologist John Gordon’s research on allergic and other inflammatory diseases shows great promise in mitigating asthma and common food allergies such as to peanuts.
- Neurologists Ali and Alex Rajput’s research on Parkinson’s disease and movement disorders has been internationally acclaimed.

The newly established Saskatchewan Centre for Patient-Oriented Research (SCPOR) based at the U of S is helping to coalesce the resources of the health care system, post-secondary institutions and government agencies, with input from patients and families, to provide more effective care, particularly for Indigenous health.

The mantra today is interdisciplinary research. That collaborative approach is evident in the design and use of the new Health Sciences Building, where laboratory space is assigned on the basis of research focus, not solely on the basis of a specific college or discipline. Researchers and students in an array of disciplines work in open-concept lab environments.

An example is the newly formed team that is studying the use of cannabidiol to treat children with medically intractable epilepsy and associated cognitive decline. The team includes physicians Dr. Richard Huntsman and Dr. Richard Tang-Wai, as well as Andrew Lyon, Darrell Mousseau, Blair Seifert and Jane Alcorn from the colleges of medicine, pharmacy and nutrition, and veterinary medicine.

A key focus of the university’s health research strategy is to engage the community in addressing the health challenges of people’s daily lives.

A good example is the Children’s Healthy Heart Camp in Saskatchewan (CHAMPS), a community-driven summer program at the U of S.

CHAMPS is the result of efforts by cardiac nurse Lynne Telfer, who pushed for it after learning upon the birth of her son with a heart condition that children didn’t have a cardiac rehab program. The program began with a multidisciplinary team research grant awarded to Marta Erlandson and Corey Tomczak in kinesiology, along with pediatric cardiologists at the College of Medicine and a psychologist from the University of Regina.

“There’s nothing like it in Canada,” said Crystal Maslin, whose 2½-year-old son has complex heart defects. “It’s amazing, and cutting new ground.”
Other examples of health research projects that cut across disciplines include:

• An interdisciplinary team is looking at why humans and dogs both respond to the same treatment for lymphoma cancer, and why both develop drug resistance. The team includes molecular geneticist Troy Harkness, biochemist and endocrinologist Terra Arnason, veterinary medical oncologist Val MacDonald, small animal internal medicine specialist Casey Gaunt and bioinformatics researcher Tony Kusalik.

• An interdisciplinary group is proposing a novel molecular imaging project to design and develop probes and radiotherapeutics, improve crops and agricultural practices and develop new molecular tools and therapies to improve diagnosis and treatment of animal and human diseases. The team includes Eric Price and Chris Phenix (chemistry), Kate Dadachova and Kishor Wasan (pharmacy and nutrition), Jaswant Singh (veterinary medicine), Paul Babyn and Humphrey Fonge (medical imaging) and Leon Kochian (Global Institute for Food Security).

• Joel Lanovaz, an associate professor in kinesiology, and Cathy Arnold, a faculty member in the school of physical therapy, are researching ways to reduce falls or mitigate injuries from falls among elderly citizens – injuries which cost Canada's health care system an estimated $2 billion annually. The Fall Arrest Strategy Training (FAST) program has been integrated into the Saskatoon Health Region’s Staying on Your Feet fall prevention program, and subsequently taught at venues such as care homes and assisted living facilities.

“You are going to see different research coming out of the U of S as we move forward – more powerful research, with more powerful teams that are truly engaged with communities when it’s relevant,” says Berry.
Diagnosing early Parkinson’s disease is a challenging process that relies largely on the clinical skills of neurologists who are familiar with the symptoms in other patients they have treated. There is no biological test that can confirm early Parkinson’s – often, it is diagnosed late into its progression.

Researchers now know, however, that early in Parkinson’s onset, levels in the brain of a protein called Glucocerebrosidase (GCase) begin to drop significantly. The only way researchers have learned that, however, is by analyzing tissue samples from the brains of people with Parkinson’s disease who have died, or through experiments using human cells in tissue culture.

At the University of Saskatchewan (U of S), Dr. Christopher Phenix, an assistant professor of chemistry, has designed compounds that could be adapted into radioactive tracers that could attach to GCase in people.

His goal is to allow researchers and clinicians to use Positron Emission Tomography (PET) to scan images of the brains of living people and study their levels of GCase, which his tracer and chemical compound will make visible on an imaging scan.

“What we’re trying to do is develop a PET method where we can actually peer into the brain of a living person and study GCase activity or levels in real time,” Phenix says.

Not only would PET scans that reveal levels of GCase serve as a diagnostic aid for Parkinson’s disease, they could also be invaluable in measuring the effectiveness of drugs designed to increase the activity of the same protein. Phenix’s compounds could produce a non-invasive test to see if the drugs are working, and could also help select patients with low GCase as good candidates for drug trials.

Being able to understand the underlying molecular mechanisms of Parkinson’s disease and how it progresses before most of the dopamine-producing brain cells have died, will also be critical once other researchers develop a therapy to stop the disease’s advancement. Indeed, several pharmaceutical companies have active GCase targeted drugs, some of which are already being tested in patients and are collaborating with the Phenix lab.
Phenix grew up in south-east Saskatchewan in a small town called Arcola. After working in Vancouver for three years and Thunder Bay, Ontario for six years, the growth of opportunities in his home province brought him back to the prairies.

“I came home primarily because I was excited about how much enthusiasm and investment have been made in Saskatchewan’s nuclear medicine research program, including the creation of the Saskatchewan Centre for Cyclotron Sciences located at the U of S and the recruitment of many world-class researchers,” says Phenix.

Not only was Phenix impressed with the direction nuclear medicine was taking in the province, he was enticed by the number of collaborations possible with other researchers in areas such as veterinary medicine, human health sciences, agriculture, medicine, biology and chemistry.

“Saskatchewan really does have fantastic opportunities as a province,” comments Phenix. “Great researchers, great students and great organizations to help support us. We are very close to making Saskatchewan world-renown for PET imaging research”

Advancing the Collective Impact on Parkinson’s Disease

Innovative research does not happen in a silo. Phenix recognizes that to see advances in the diagnosis and treatment of Parkinson’s disease, you need collaborations that involve other scientists, students and trainees, and technicians that have skills in cell biology, chemistry, radiochemistry, animal handling and PET imaging.

These collaborations are made possible for researchers like Phenix, because of funding received from provincial funders like SHRF and organizations such as Parkinson Canada.

Phenix is supported by SHRF’s Establishment grant program which helps researchers new to Saskatchewan build their research program in the province and achieve the productivity necessary to be successful in obtaining further funding at the highly competitive national level.

Phenix was also successful in obtaining a pilot project grant from Parkinson Canada through its Research Program, which encourages Canadian researchers to test original theories, which may not have been investigated otherwise. These projects also enable scientists to leverage additional funding resources once their concepts are proven. The Parkinson Canada Research Program also provides funding for graduate student awards, new investigators and for clinical and basic science fellowships. The possibility that a new idea could lead to a significant finding makes pilot project grants vital.

“If you were to get a grant in isolation, would it be helpful? Yes, it would be helpful. But you really can’t operate at your full capacity without having the support from multiple organizations,” says Phenix.

For Phenix, this research is also personal. His grandmother Lucille Sosiak had Parkinson’s disease. “It’s a pretty devastating disease, so when you have a personal connection to it, it really helps you stay focused on your research and your goal to help people with Parkinson’s disease,” Phenix says.

The above article is written with contributions from Parkinson Canada. For more information about the Parkinson Canada Research Program, visit Parkinson.ca.
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A biomedical researcher, a mechanical engineer, and a sculptor walk into the synchrotron...

No, that’s not the beginning of a comedy routine. That’s just Dr. Brian Eames and his various collaborators arriving to work at the state-of-the-art Canadian Light Source.

When Eames came to the University of Saskatchewan (U of S), he was charged with expanding the capacity of the existing zebrafish lab. What he didn’t expect were the collaborations and the possibilities that would open up for him once he tapped into a strong research community and the unique infrastructure on the U of S campus.

Raised in Cleveland, Ohio, Eames attended the University of North Carolina at Chapel Hill. He first got his feet wet in research back in Cleveland with a summer job working in a lab getting stem cells to make bone in a dish at Case Western Reserve University. Back at school, he did a project for his undergrad in virology. Following his undergrad and working for a year in a lab at Stanford University, virology was where he presumed his path would take him when he got into graduate school at the University of California in San Francisco (UCSF). But instead, his interest in embryos and evolution led him back to skeletal cell research and he was full circle to where he started five years before.

“The skeletal system seemed fruitful to analyze,” says Eames. “I figured that any genomic understanding of evolutionary changes to skeletal anatomy would require knowledge of the genes that drive cells to make skeletal tissues in the first place.”

After graduate studies at UCSF and post-graduate work in Oregon learning to work with zebrafish, a job opportunity brought Eames to the U of S. SHRF funding followed when Eames was successful in the 2012-13 Establishment grant competition. With his SHRF funding in place, Eames began to explore defects associated with osteoarthritis that degrade the cartilage protecting the bones, leaving them exposed and susceptible to damage. He did this in two ways: through the use of zebrafish embryos and with the cutting-edge imaging capabilities available at the synchrotron.

Before coming to the U of S, Eames had never heard of the synchrotron. With a few of his colleagues in the Department of Anatomy and Cell Biology, such as Dr. David Cooper, heavily involved in using the synchrotron, it was a great foot in the door for a researcher like Eames to get over the often intimidating complexities of not only the principles of how you use the technology, but the practicalities of actually doing it.
“It’s a big learning curve and often a hurdle that many researchers in Canada, let alone on the U of S campus, don’t get over to find new ways of using this incredible resource,” says Eames. “I’m a big ambassador for finding ways around that to use the synchrotron in ways no one ever has before.”

Funding like SHRF’s Establishment grant are critical, in Eames’ opinion, in helping researchers new to Saskatchewan get their feet under them and on a strong foundation so they can really start to move things forward. The truth behind research is that it takes a long time to get things set up and started. That’s why Eames stresses the importance of funding at those beginning stages.

“Funding agencies, like SHRF, help us get our training wheels on,” states Eames. With funding from SHRF, Eames was able to find and explore those needed collaborations, hire a lab tech who could keep the day-to-day operations of his lab going and find the right graduate students to work with.

With all of this in place, Eames and his team, in collaboration with Drs. Ingrid Pickering and Graham George of the geology department, were able to develop new imaging techniques at the synchrotron. They had this idea that cartilage’s function was related to its sulfation, or levels of sulfur, so they found a way to image sulfur in cartilage. “This was a new technique that no one had done before and we were able to show that it was relevant to the function of the tissue,” Eames describes.

The technique was used to image sulfur in cartilage of both zebrafish embryos and human osteoarthritis patients. The results of using this new technique showed that we lose this sulfur in osteoarthritic tissue. The team could see the kind of changes that were happening and could drill down to the mechanisms of these changes that were taking place. They hypothesized that the same mechanisms that are happening in a growing embryo are happening later in life.

“The same exact sets of genes that we can trace in embryonic development, and that are required for the development of bone and cartilage, are present in the osteoarthritic cells,” explains Eames. “We’ve seen that when you get a disease like osteoarthritis, you’re activating genetic programs that were supposed to shut down as an adult.”

On the evolution side of Eames’ work, he’s interested in learning how bone and cartilage evolve, which, in this day and age, means looking at all of the bone and cartilage genes from a variety of animals. Techniques developed in his evolution studies are resulting in huge data sets that are ripe for picking new hypotheses for the function of individual genes that might cause skeletal disease in humans.

This idea of cross-fertilization of ideas and techniques is something that Eames hopes for and encourages in his lab. He’s leading by example with interdisciplinary collaborations with scientists from varying disciplines such as engineering, chemistry, physics and computer science.

Eames’ collaboration with Dr. Daniel Chen, a mechanical engineer, has led to investigations of the potential of 3D bioprinted tissue engineering. Working with Dr. Franco Vizeacoumar from the Saskatchewan Cancer Agency and with Dr. Terra Arnason from the Department of Medicine, Eames’ zebrafish lab is being used to complement research in the areas of cancer and aging. He’s also working with computer scientists to generate new
algorithms to analyze extensive data sets produced by his work in comparative transcriptomics and molecular genetics.

“On the practical side, I love the idea that my science can help people to live more active and healthy lives – my findings can be applied as therapies for bone fractures, osteoporosis, osteoarthritis and many other serious contributors to inactivity in humans today,” says Eames. “On the esoteric side, I love the idea that my work can serve as a textbook example of the genomics of trait evolution.”

But where does the sculptor come into play with Eames’ work at the synchrotron? Eames doesn’t just believe in collaborating with other scientists. New media artist and sculptor Jean-Sébastian Gauthier worked with Eames to develop an interactive video art display using 3D images of the very same zebrafish used by Eames in his scientific work. Not only was Gauthier the first artist to use the Canadian Light Source for artistic purposes, but the two were awarded funding for the project by the Canada Council for the Arts.

“This type of scientific outreach through art is a prime example of how we are able to think outside the box in ways that are just not possible in other provinces,” comments Eames. “I’m excited to explore this sciart avenue more for communicating important scientific concepts to the public.”

Why Zebrafish?

- This classic, pet-store fish’s genes function the same way as human genes
- This hearty fish can be kept at a higher density than mice or other animals
- Fertilization of the eggs happens externally making it easier to study their development
The Lung Association of Saskatchewan (LAS) has a strong record of research support which builds upon our history beginning with the Saskatchewan Anti-Tuberculosis League (SATL).

From the 1920s through the 1940s, the Medical Superintendent of SATL, Dr. R. G. Ferguson, conducted internationally recognised research in tuberculosis. With the transition of SATL to LAS, a plan was put in place in 1968 to develop a research and teaching professorship in respirology at the University of Saskatchewan (U of S). An agreement was signed with the U of S and the first Ferguson Professor was recruited in 1975. LAS quickly expanded its research professorship funding to recruit three more clinician-scientists and a biomedical engineer. LAS not only provided research funding but also participated in occupational health surveillance research projects with the provision of X-ray vans and staff time.

The Division of Respiratory Medicine became the primary focus for LAS research support. LAS concentrated its support on the professorship program to recruit researchers who, in turn, were very successful in obtaining funding from provincial and national sources. The research funding created several clinician-scientist positions which produced benefits beyond research, including enhanced clinical care, a respirology specialist training program and enhanced respiratory-related education for medical students.
LAS also provided research grants for post-graduate students and fellows. In addition to improving the research productivity of the Respiratory Division, these grants helped to attract top-notch research fellows to Saskatchewan. Many of them remained in the province and continue to contribute to the development of a strong research centre as well as providing clinical services and teaching of medical students and residents.

In 1985, LAS became a founding contributor for what is now the Canadian Centre for Health and Safety in Agriculture. This centre had an initial focus on respiratory health of farmers and grain handlers, which continues to be a major component of its work.

Although the primary focus was based at the U of S in Saskatoon, LAS saw the need to develop a research presence in Regina and established a Southern Saskatchewan Research and Development Professorship in partnership with the Regina General Hospital.

With the emergence of the importance of Sleep Medicine in the respiratory health field, LAS created a Sleep Medicine professorship. This led both to the development of a strong research program in Sleep Medicine and the establishment of clinical sleep laboratories in Regina and Saskatoon.

In the late 1990s, it became apparent that there was a need for a pediatric respirologist to create a focus for research on children's lung health. LAS established a Pediatric Respirologist Professorship which resulted in the recruitment of the first pediatric respirologist in the province. LAS later partnered with Canadian Institutes of Health Research to co-fund a three-year research scientist position in pediatric respirology at the U of S.

The Division of Respirology, Critical Care and Sleep Medicine is now the strongest and most productive research unit in the College of Medicine. The research support provided by LAS for over 42 years is a major factor in its success, with the majority of the researchers either recruited and retained with LAS professorship funding or trained by the post-graduate program originally developed with LAS support.
“There’s an app for that.” This common phrase is heard daily as we struggle to remember passwords to multiple devices and hundreds of accounts, keep our schedules straight or get our daily dose of news. The Canadian Radio-television and Telecommunications Commission (CRTC) reported that almost three-quarters (73%) of Canadians aged 18 and over owned a smartphone in 2015.

A quick search of the word ‘health’ in the app store returns an endless scroll of possibilities to help you monitor your sleep, blood sugar, calorie intake and fitness level. With all this at our finger tips, how are health researchers taking advantage of these data gathering methods and commonly accessible technologies that have the potential to not only improve efficiencies in their research, but shed new light on our health?
A Seamless Fit

Do you remember what you ate yesterday? Last week? How about three weeks ago? Most likely your answer is no. This issue of accurately recalling what you’ve eaten when studying foodborne disease was something Dr. Cheryl Waldner from the Western College of Veterinary Medicine and her team of computer scientists, mathematicians, geographers and other health researchers decided to address using smartphone technology. Studies tracking the rate and source of foodborne outbreaks traditionally involve telephone interviews several days or even weeks after the onset of illness. Adding to the problem is that we don’t have an accurate understanding of what’s going on because foodborne illness often isn’t reported. Things like diarrhea or upset stomachs aren’t reported in the health system unless they are particularly bad or last for a long period of time.

“The choice to use smartphones in our study not only made it easy for people to track what they were eating, but they could easily report if they were not feeling well just with the click of a button,” explains Waldner. It’s this type of accurate information that will make it easier to know if progress is being made in addressing this health issue. Participants in the study were able to track what they ate, how they felt and answer questions about their knowledge of food safety and food choices.

“We were surprised at just how comfortable participants were with sharing their data and we were pleased with the level of commitment we had from participants throughout the 10 week study,” says Waldner. “To get that kind of engagement from participants, you need to have something that fits seamlessly into people’s daily routine. Smartphones seem to be fitting the bill quite nicely.”

Patient-Centred Focus

Making the transition from pediatric care to adult care for teens and young adults with chronic health issues can be a stressful situation for both the patient and their caregivers. Dr. Tracie Risling, a health informatics researcher with a pediatric nursing background from the University of Saskatchewan, and her team – which includes a physician, nurses and a computer scientist engaging with a strong patient group – are looking at a way to ease this transition with a patient-centred focus.

“I think if you search for a commonality among young adults and teenagers today, and you looked into the palm of their hand, you would find the common thread that we felt was there,” says Risling about the team’s decision to develop a smartphone app as a way to support adolescents with inflammatory bowel disease (IBD) through their transition of care.

“Any parent or caregiver who has raised a child with a chronic disease will find it challenging to let that young adult take over their own care,” says Risling who speaks from her own experience of raising a teen with IBD. A key feature of this mobile application will address this challenge with two-way messaging received by both the patient and the caregiver. Both will receive reminders that it’s time for the patient to fill a prescription or have regular bloodwork done. As the young adult completes these tasks on their own, these messages will be pushed more and more to the young adult, with the caregiver receiving notifications that these tasks have been completed.

“Even though I’m a big believer in the promise of technology, technology for technology’s sake, or technology that patients aren’t responding to, is no good,” stresses Risling. That’s why this mobile application is being developed and tested in a way that puts patients clearly at the centre and in control. With this patient-centred, user-driven focus, researchers can find the answers they’re looking for and patients can benefit from better health outcomes.

More Data in Less Time

How do you capture the intricacies of human movement? Answer: more easily with the use of smartphone sensor technology. Dr. John Barden from the Faculty of Kinesiology and Health Studies at the
University of Regina has been studying the patterns of human movement for the past 30 years. His areas of focus include looking at high performance athletes and investigating the gait variability of those with mobility issues.

Barden used to rely on motion capture cameras to gather his data. “This technology was good, but not great in all situations,” explains Barden. “It was a lot of equipment to set up and it was time consuming to digitize. In the end, it took a lot of work and effort for a limited amount of data.”

Thinking there had to be a better way, Barden looked to validate gait using the sensors in smartphones. With these sensors, his team is able to capture a larger quantity of data in a shorter amount of time. The cost and effort is also greatly decreased because they no longer need to purchase a lot of specialized equipment. Participants are given access to an application that has been built to meet the needs of the research. They attach their smartphone near their lower back area and they go for a continuous walk for 5-6 minutes. Participants are able to see some of their outputs on the screen, and the researchers then have access to their data to study the nuances of their gait.

Barden and his team are currently using this method to investigate the relationship between gait variability and fall risk for people with multiple sclerosis (MS). However, Barden sees great potential for clinical use of this technology. “While there's still some research lacking to support the clinical application of this technology, the potential is huge for better monitoring and earlier diagnosis for people with mobility problems.”

Better Accessibility

Saskatchewan’s vast rural landscape poses a problem for those struggling to access treatments for cognitive impairment. That’s why Dr. Jennifer St.Onge, from the Regina Qu’Appelle Health Region (RQHR), and a team of neurologists from the RQHR and researchers from the University of Regina and University of Toronto, are investigating the effectiveness and accessibility of a computerized 3D multiple object tracking program originally designed for use with elite athletes.

Cognitive impairments, such as problems with attention or memory, occur in about 45-60 per cent of people with MS and negatively impact activities of daily life, such as navigating in crowds and traffic, social activities and employment. The 3D multiple object tracking task was designed specifically to improve attention and processing speed, which are the main problems in people with MS.

One clear benefit of this technology over others is that training these skills in 3D versus 2D is more realistic to what people deal with in real life. The training is also
customized to the person’s individual level. It uses an adaptive workload to build on the user’s performance so that regardless of what level people start at, as they get the trials correct, it increases in difficulty and if they get it wrong, it gets easier. This type of training is particularly effective for people with MS. Importantly, the program is accessible; all you need is a pair of 3D goggles and a laptop or tablet and it takes just 20 minutes a few times a week.

If this program is shown to be effective, as well as being highly accessible, this could open up a whole new way to deliver treatment for cognitive impairments to people with MS in Saskatchewan.

“Having good attention and fast processing speed is important for things like driving, working and social interactions,” explains St. Onge. “We’re hoping that by improving some of these base cognitive skills we can help people get back their independence, their confidence and really increase their quality of life.”

Citizen Scientists

We all know that physical activity is good for us. So why are so many of us inactive? Dr. Tarun Katapally from the Johnson Shoyama Graduate School of Public Policy is enlisting the help of Citizen Scientists to shed some light on how policies and programs influence active living in communities.

The study includes participants answering surveys, providing pictures and audio files describing their perception of their environment, reporting on their physical activity and providing critical objective data through GPS-enabled accelerometers and other sensors. Sounds like a lot doesn’t it? But it all happens through a one-stop tool for mixed method research – a smartphone.

“We’ve improved the way we collect data,” says Katapally. “Smartphones are a very versatile tool, and at the same time, they also give participants a voice.”

Katapally credits smartphones as a key component to the engagement and public buy-in for the study. “With Citizen Scientists, you don’t do research on them, you do research with them; they have a stake in the research.”

Smartphones as a tool brings together multiple data collection methods and implements old methods in a new way. They also provide context, such as where, when and with whom you accumulated physical activity. “Without this context,” explains Katapally, “it’s very hard to inform policy.”

Katapally also recognizes that smartphones don’t take the work out of research. “Though the technology is very advanced, our analytical tools and our understanding of the analytics is not so advanced. That’s where we need to do some of the work and we are working at that now.”
Real-Time Reporting

Doctors have blood pressure cuffs and ECGs to get a reading on your heart; optometrists have tonometers (the machine that puffs in your eye) to measure the pressure inside your eye; dentists have mirrors, probes and X-ray machines to examine tooth decay. But how do psychiatrists produce an objective reading for your mood? Dr. Lloyd Balbuena from the Department of Psychiatry at the U of S will use recent SHRF funding to evaluate and propose smartphone technology as a valuable tool for mood and lifestyle monitoring.

Balbuena’s area of psychiatric research focuses on the social and personal predictors of suicide. Suicide is a major cause of preventable death, yet the lack of linked health and mortality data in Canada is a problem for suicide research. Balbuena and his team will look at data from the UK and Norway, and also compare a group of Saskatchewan patient-reported experiences rating mood and suicidal thoughts with smartphone-reported sleep, physical activity and sunlight exposure data.

Smartphones can provide researchers with objective, real-time reporting of a person’s mood or suicidal thoughts that would otherwise not be available with older methods of self-reporting and measurement, for example with a diary. “If you have this data about people’s behaviours, you could then modify those habits for better self-management and doctors can implement a more evidence-based treatment plan,” says Balbuena.

“The knowledge acquired through this research has practical importance,” continues Balbuena. “All medical specialties outside of psychiatry rely on instruments that produce readings. Perhaps smartphones can fill this role for psychiatry.”
Med.Hack(+) plays a crucial role in filling the void between professional disciplines. The ultimate goal is to seed teams and ideas which could, with further development and support, become new healthcare start-up companies in Saskatchewan. To fulfill this goal, Med.Hack(+) brings together students, healthcare professionals, technology builders and business leaders and hosts an annual weekend hackathon.

We are changing healthcare by bringing ideas and makers together.

Hackathon:
An event where participants team up to find a creative solution to a problem over a short period of time.

For more information about Med.Hack(+) or to see the results of the latest hackathon, visit medhack.ca or follow us on Facebook and Twitter.
Clean air. Something we often take for granted – especially in this land of living skies. But inside livestock barns, air quality can be a challenge. Take chickens for example. Place a few hundred chickens in a ventilated barn and air quality becomes compromised with dust, bioaerosol, ammonia, and other gases and odors. For the average poultry worker and the average chicken, exposure to all these airborne contaminants can compromise health.

“Airborne dust removal would improve air quality and provide considerable benefit to workers and birds in both the short and long terms,” says Dr. Lifeng Zhang, the principal investigator undertaking a pilot study using electrostatic space charging to remove dust from the air of poultry houses.

Along with his co-investigators Drs. Shelley Kirychuk, Huiqing Guo, Myra Martel and Christina Nelson, Zhang has been awarded a Collaborative Innovation Development grant to fund a one-year bench scale study at the University of Saskatchewan.

Poultry facilities require workers to spend long hours in an atmosphere containing high levels of dust, endotoxin, gases and odors. According to Zhang, studies conducted among Saskatchewan poultry workers show they frequently suffer from respiratory issues and chronic bronchitis when compared to other agricultural workers.

“Our project will test how well an electrostatic precipitator can clear the air,” adds Zhang. The best analogy is to think about static electricity. In winter when it’s dry if you touch a metal object you get a static shock. Or you pull a sweater on over your head and you hear and see static crackling and your hair sticks out. That’s the foundation of the science: particles carry either a positive or negative charge and these particles are attracted to the opposite pole.

“An electrostatic precipitator – using these basics of science – cleans up dust laden air. After air-borne particles get charged, they will be collected to collecting plates. At that point the particulate matter can be removed, treated and disposed of safely,” explains Zhang.

This grant will allow the research team to set up a mini barn using both simulated and actual dust from a poultry barn. Zhang and his team expect to have a good understanding on the efficacy of the process upon completion.

If all goes well, the bench-scale study will advance to a larger pilot project. Interest has already been received from funding agencies to advance this study to a pilot and commercial scale testing. But like all research, commercial application will take time. With funding, Zhang forecasts it could take from 3-5 years to move the research forward from this bench-scale trial to the completion of a commercial scale study.

The long-term goal remains two-fold: identify and recommend suitable exposure limits for reducing negative effects on exposed workers in the poultry industry; and creating a commercially-viable technology to meeting those targets.

Despite his team’s focus on poultry, cleaner air for all workers and animals in confined facilities is a potential outcome.

Healthier poultry and healthier people. Zhang and his co-investigators may just be cleaning the air for everyone.
A diagnosis of pancreatic cancer has been a virtual death sentence for patients, with an average survival length of just four to six months for those whose tumours cannot be surgically removed.

A relatively new tumour-destroying technology called irreversible electroporation (IRE) – also known as a NanoKnife – offers the first promise in four decades of improving outcomes for people with pancreatic cancer, the fourth leading cause of cancer deaths in North America.

While IRE can extend the life of a patient, it’s not a cure because the surgical procedure doesn’t eradicate all cancer cells in a tumour and some cells metastasize beyond the original cancer site.

A team of University of Saskatchewan scientists led by Jim Xiang, professor in oncology and pathology and senior research scientist at the Saskatchewan Cancer Agency, is investigating ways to harness the body’s own natural tumour-fighting system to destroy all the cancer cells that escape the NanoKnife procedure.

Xiang, along with pancreatic cancer surgeon Michael Moser, bioengineer Chris Zhang and pathologist Rajni Chibbar, are using a $50,000 grant from the Saskatchewan Health Research Foundation (SHRF) to develop an optimal NanoKnife procedure by stimulating the body’s own anti-tumour cellular immune response to reduce tumour growth or even cure the cancer.

“Our team’s research is positioning Saskatchewan to become the leader in pancreatic cancer treatment in Canada and to make strides in the treatment of all other late-stage cancers,” said Xiang.

Saskatoon is one of only two Canadian centres to treat patients using IRE technology.

The NanoKnife involves killing tumour cells by placing tiny electrical probes into tumours through their membrane and sending bursts of current in excess of 1,000 volts to tumour cells. This punches numerous holes in the cell membrane, leading to cell death.

Unlike traditional ultrasound, laser and radiofrequency ablation (RFA) technologies, IRE produces no heat, doesn’t “melt” the cells it kills, and causes little collateral damage to nearby blood vessels and other tissues.

As Xiang explains, major components in the immune system’s fight against cancer are CD8+ cytotoxic T-lymphocytes (CTLs) – white blood cells he calls “the cancer fighters” – that are activated when they encounter cancer antigens. Dendritic cells, which “digest” dead tumour cells, are the most potent antigen-presenting cells that stimulate the CTL immunogenic reaction.

The non-melted but dying cancer cells resulting from IRE treatment can thus become targets that the immune system seeks and destroys, preventing the spread of cancer after the NanoKnife treatment.

By using mouse tumours engineered to express specific tumour antigens, the team is assessing tumour-specific CTL responses and anti-tumour immunity induced by NanoKnife surgery alone or in combination with the use of local immune adjuvants (drugs) that greatly enhance the CTL response.

“The engineered tumour models enable highly accurate testing of CTL responses for the first time,” Xiang said.

“Our goal is to find a way to get a better T cell response which may reduce tumour recurrence or inhibit the long-distance metastasis after RFA therapy,” said Xiang. “Clinically, you don’t know where the tumour cells go. These T cells will find and attack them.”

Without more public investment, it’s difficult to compete against other IRE centres that receive millions of dollars in support, Xiang said.

“It’s an exciting story. Our technique is unique. We have the basis, the experience, the protocol and the animal tumour model. No matter if it’s pancreatic cancer, colon cancer or kidney cancer, we want to help the clinicians. We can do it.”

Sarath Peiris is assistant director, Research Profile and Impact, in the Office of the VP Research, U of S.
Saskatchewan has the highest rates of HIV and Hepatitis C in Canada. Though the reasons for this are varied and complicated, one of SHRF’s Collaborative Innovation Development (CID) grant research teams have found a creative solution to address this complex health issue.

Indigenous people are disproportionately affected by Hepatitis C. Despite this fact, the challenges of accessing care are much higher because specialists are mainly focused in urban centres. Dr. Stuart Skinner, an infectious disease specialist, realized a few years ago that the way we deliver health care, particularly for Indigenous people, doesn’t meet their needs.

“Ultimately, the only thing we can change is our own actions. I was interested in how I could change my approach to delivering health care, particularly to those living on reserve.”

says Dr. Stuart Skinner

That was the beginning of delivering care in a new way. In partnership with an Indigenous community in Saskatchewan the diverse team developed a program that was truly community-led and community-driven. The strength of the team is having community members involved who bring complementary skills, valuable contributions and a commitment to improving people’s health and care.

Nowadays, there are simple and straightforward curative therapies for Hepatitis C involving a pill a day for 8-12 weeks that have more than a 95% success rate. “To be able to access treatment, you need access to a specialist and you also need access to a special test called a Fibroscan, which measures liver fibrosis. This all happens at a specialized care centre,” explains Skinner.

Rather than having 20-30 people come from a community to be assessed and treated, which can potentially take up to three days of back-and-forth travel, require childcare and navigation of a complicated health care environment, the program has instead brought the clinic to the community.

“We can preform all the tests and assessments necessary to see if people qualify for the treatment in about 20 minutes and make a decision right there to have treatment available in their own community,” says Skinner. “This is all provided in a culturally sensitive and safe environment.”

In partnering with the community to deliver this care, it’s not only building local capacity, but also incorporating other programming related to Hepatitis C, such as mental health and addictions support. This community-led program is proving to be a better way to engage people in their care and improve access to care.

“What we’re doing is improving care. It’s not just about the research,” explains Skinner. “We know this program is working; it’s a great collaboration and we’re having really good outcomes. The research side of it is documenting and evaluating the unique delivery system model to influence change.”

Skinner comments, “to have success, we need everyone on board – from government to communities to health care providers – and we need to adapt outside of what has traditionally been our comfort zone and traditional model of health care.”
University of Regina: Health Research With Impact

Adapted from Health Research With Impact, written by Regina freelance writer, Deborah Sproat, appearing in the Spring/Summer 2017 edition of Discourse, the University of Regina’s research magazine.

University of Regina research initiatives focusing on older adults, Indigenous youth, mental health and active living exemplify research that connects researchers to the community and the community to researchers. Many of these projects have an impact from day one.

Much of the health research being done is helping to improve the lives of people across Saskatchewan and the country – with the potential for creating long-lasting and widespread social and economic benefits.

“Research answers questions, but inevitably also leads to more questions.”

“How do we scale that up? How do we make that the standard operating procedure, as opposed to just an interesting pilot project or an interesting experiment?” asks Saskatchewan Population Health and Evaluation Research Unit (SPHERU) associate director Tom McIntosh. “How do we take an interesting intervention to other levels, across regions, the province, other parts of the country?”

Shanthi Johnson is working to find a solution. Johnson, a professor in the Faculty of Kinesiology and Health Studies (KHS), has been working with older adults who are living on their own. She knows that implementing a simple exercise program has been effective in improving the functional capacity of frail older adults. But how can the program be expanded so that more older adults benefit?

“Once we see that it is beneficial, that’s not a good place to stop,” she says. “We need to find out how we can scale it up and make it more sustainable. That’s where we are at right now – seeing how it can be beneficial to more than just the participants.”

Another hard-to-answer question is economic impact. It is easy to see the potential impact of the research but more difficult to put a dollar figure on it. But some researchers are trying.

Measuring economic impact wasn’t part of Johnson’s project, but she knows the potential for savings is tremendous because falls, and the resulting fractures, cost the health care system a lot of money. She points to U.S. figures that show a fall and subsequent hospitalization can cost the system about $30,000. And beyond the economic benefit, she says, is the “human costs we are saving.”

Another researcher trying to assess economic impact is Thomas Hadjistavropoulos, Research Chair in Aging and Health. He has anecdotal evidence that a tool his team developed for assessing whether people with dementia are in pain – a checklist of non-verbal pain indicators – makes a difference. He has also worked with other researchers on studies that showed that use of the tool resulted in better pain management for patients and reduced stress for staff. Now, a University of Regina-led team is embarking on a cost analysis of pain in long-term care.

“Part of the problem we have is that nobody we know of has ever done a cost analysis of how much it costs the system to have untreated pain in long-term care,” Hadjistavropoulos says. Using data from the Saskatchewan Health Quality Council, they will compare costs for people who have continuing pain versus people whose pain is treated.
McIntosh believes researchers are becoming more and more interested in figuring out how the impact of their work can be measured and demonstrated. Another consideration, he says, is value for money.

“For me, economic questions should be focused on whether we can spend dollars in a more effective way and get better improvement in health outcomes than we’re getting now,” he says.

Meanwhile, researchers across campus are hard at work collecting the evidence that could lead to change. As a special advisor to the university’s integrated human health research cluster, McIntosh has a front-row seat to view the important and exciting health-focused research underway in both the social and biomedical areas.

“The diversity of research on this campus, and the resulting benefit to our community, is really remarkable,”

says Tom McIntosh

The following are a few University of Regina and SHRF-funded researchers and the projects they are working on.

Bonnie Jeffery, a SPHERU researcher and a professor in the Faculty of Social Work, is conducting a project that looks at factors that affect the ability of older adults in rural communities to “age in place.” SPHERU will also be working with three organizations on projects aimed at reducing the isolation of older adults living in rural Saskatchewan.

Shanthi Johnson, a professor in KHS devised a simple exercise program for frail older adults living on their own. Taught by home care staff, the exercises were based on regular physical activities such as standing from a seated position, walking from room to room, and reaching. Testing after six months showed a significant improvement in function and an increase in confidence.

Thomas Hadjistavropoulos and his team developed a tool for assessing whether people with severe dementia and limited ability to communicate are in pain — a checklist of non-verbal pain indicators — used widely in Saskatchewan, across Canada and internationally.
Community researcher Dustin Brass was one of a team of researchers who worked on the Indigenous Peoples’ Health Research Centre’s (IPHRC) project Acting Out! But in a Good Way, run in partnership with File Hills Qu’Appelle Tribal Council and Lac La Ronge Indian Band. The arts, especially drama, were used as a vehicle for youth to better understand themselves and explore the choices open to them. In recent years, the program has become a way to approach suicide ideation and help youth identify alternatives.

Education faculty members, and IPHRC research affiliates, JoLee Sasakamoose and Angela Snowshoe work closely with community in ongoing research focused on examining culturally responsive mental health services for First Nations youth. Their project has three parts: learning what place means to young people; studying Indigenous pedagogical methods, which often involves taking people on the land; and creation of a new counseling and healing space that reflects First Nations ways of knowing and being.

In the Department of Psychology, the search for alternative ways of helping people has resulted in the creation of an online therapy unit that offers cognitive behaviour therapy programs for managing depression, anxiety and pain. Psychology professor and program head, Heather Hadjistavropoulos, says research trial results show online therapy is effective, as well as being accessible to people who are reluctant or unable to attend face-to-face therapy.

Associate professor Nick Carleton is studying the operational stress injuries suffered by public safety personnel, including correctional officers, dispatchers, firefighters, paramedics and police. The results will provide a baseline for assessing the impact of future change, and will help inform federal government efforts to create a national action plan to address posttraumatic stress disorder (PTSD) and other operational stress injuries.

Katya Herman, assistant professor in KHS, is investigating variations in physical activity and sedentary behaviour seasonally over the course of a year, as well as within a week. The goals are to determine whether consistency in physical activity is important to health outcomes and to shed light on physical activity guidelines that recommend 150 minutes of physical activity a week.

Working with athletes involved in high-level competitive sports, Patrick Neary, a KHS professor, is studying what happens in the physiology of the brain after a concussion, and as the brain recovers. This involves looking at variables such as oxygen levels in the brain, cerebral blood flow, heart rate and blood pressure.

To find out more about these and other research projects impacting the lives of people in Saskatchewan and beyond, check out the University of Regina’s Spring/Summer 2017 issue of Discourse magazine.
There are many structural factors that determine an individual’s well-being, such as social support, education and living conditions. For many Indigenous peoples, there is a long-standing relationship with physical environments (e.g. the land), the activities that take place within those environments and the meaning that comes from their experiences in those places, all of which are rooted in cultural ways of knowing and being and play a critical role for Indigenous peoples’ wholistic health.

That’s why it’s important that Indigenous peoples are empowered to not only reclaim places that have historical meaning to them, but to also deconstruct colonial ideas of what constitutes “a place” in the development of new physical environments, such as those found at educational institutions and mental health organizations.

Research funded through SHRF’s Collaborative Innovation Development grant led by Drs. Angela Snowshoe and JoLee Sasakamoose is looking at the role of place for Indigenous peoples’ mental wellness. By gathering understandings from Indigenous youth, traditional Elders and early career counsellors, they are exploring what elements, concepts and processes are needed to create an Indigenous healing place that allows Indigenous healing practices to be integrated into the counselling setting.

With funding and support from the Faculty of Education at the University of Regina (U of R), under the guidance of the Elders-in-Residence and through ceremony, the research team decolonized the pre-existing counselling training rooms at the U of R to rebuild a new Indigenous healing place that is grounded in cultural ways of knowing and being.

Informed by the research findings, the space was designed to facilitate relationships between humans and the physical and spiritual worlds by bringing natural elements inside, being equipped with proper ventilation for smudging, showcasing First Nations artwork, and incorporating Indigenous spiritual concepts, all of which helps to promote cultural connectedness for Indigenous peoples who come to the space for ceremony, educational training or healing.
The project is based on the premise that places are not neutral; rather, they are “alive” and impact relationships with your “self,” your family, your community and the world around you. Places that are built on colonial concepts tend to fragment the integral relationships between the four aspects of oneself (i.e. physical, mental, emotional and spiritual) and those with the more-than-human world, thereby further oppressing, suppressing and marginalizing Indigenous cultures. However, places like the new Natawihowikamik Healing Place at the U of R challenge colonialism by privileging Indigenous approaches to healing and thus help to strengthen those relationships and their role in promoting and maintaining holistic wellness.


The physical environment is just one facet of how decolonized places can increase positive health outcomes for Indigenous youth, families and communities. Snowshoe's research continues to explore support and establishment of those processes and outcomes that can be achieved when a place-based, wholistic approach to wellness is considered.
A growing number of people across Canada are affected by dementia. In Saskatchewan alone, 10 more people develop dementia every 24 hours. Such statistics highlight an important need for research that might uncover better ways to reduce risk and promote quality of life for people living with dementia. Recognizing this need, the Alzheimer Society of Canada recently helped to fund the Canadian Dementia Priority Setting Partnership (CDPSP). This partnership was tasked with identifying today’s top 10 dementia research priorities, and sharing them with the Canadian research community.

The year-long initial consultation process involved over 1200 participants which included a series of surveys and workshops that themed the information into 10 research priorities. The 10 research priorities encompass a broad range of interests from strategies to reduce stigma, to the impact of early treatment, to non-drug approaches that can assist with symptom management. The full list of may be found at www.alzheimersocietyblog.ca/top-10-research-priorities.

The Alzheimer Society of Canada’s national research program will use these results to help bring the voices of Canadians affected by dementia into the research agenda. By sharing the top 10 identified priorities with researchers and other research-funding organizations, the Alzheimer Society of Canada hopes to stimulate additional study in these areas to continue to influence the research agenda when it comes to dementia in Canada.

The Alzheimer Society of Saskatchewan is encouraged by the results of the CDPSP. The identified priorities align with our ongoing efforts to empower people to live well with dementia and highlight how future research efforts may further improve our programs and services.

Our First Link program is an example of applied research creating an effective strategy to meet the needs of people with dementia. First Link was developed to ensure that people affected by dementia receive the support they need. Past research by Mittelman et al determined that appropriate interventions, such as use of First Link, enable family caregivers to support the person with dementia at home significantly longer than caregivers who do not receive such interventions. Future research may provide additional information about how programming like First Link might be integrated into a larger patient-orientated system of care to improve the overall experience of people affected with dementia.

Another area of interest the CDPSP identified was the concept of dementia friendly communities. Supported by funding from the Government of Canada, the Alzheimer Society of Saskatchewan has recently embarked on a series of initiatives to promote dementia friendly communities with the aim of reducing the social isolation of seniors. Communities have demonstrated growing interest in becoming more dementia friendly, and this work also highlights the importance of collecting and analyzing data that investigates the impact of such initiatives on both the community and individual level. More information about our Dementia Friendly Communities initiative is available at www.DementiaFriendlySaskatchewan.ca.

The Alzheimer Society of Saskatchewan is committed to an evidence-based approach in our work and programming. We are excited by the potential the CDPSP has created to open new doors for dementia research, and for such efforts to inform our future work in ways that continue to empower people to live well with dementia.
DEMENTIA RESEARCH PRIORITIES

According to Canadians affected by dementia

1. **STIGMA**
   - What is the impact of stigmas associated with dementia and mental health issues on persons with dementia and their families? What are effective ways of reducing the stigma experienced by persons with dementia and their friends, family and caregivers/care partners?

2. **EMOTIONAL WELL-BEING**
   - What can be done to support emotional wellbeing, including maintaining a sense of dignity, for persons with dementia?

3. **IMPACT OF EARLY TREATMENT**
   - Among persons with dementia, what is the impact of early treatment on quality of life, disease progression and cognitive symptoms?

4. **HEALTH SYSTEM CAPACITY**
   - How can the health system build and sustain the capacity to meet the health and social care needs of persons with dementia and their friend or family caregivers/care partners?

5. **CAREGIVER SUPPORT**
   - What services, supports and therapies for friend or family caregivers/care partners of persons with dementia would improve or maintain health, wellbeing and quality of life for persons with dementia and their friends or family caregivers/care partners?

6. **ACCESS TO INFORMATION AND SERVICES POST-DIAGNOSIS**
   - After dementia is diagnosed, what would help persons with dementia and their friends, family and caregivers/care partners get the information, treatment, care and services they may need?

7. **CARE PROVIDER EDUCATION**
   - What dementia-related skills and knowledge should health and social care providers have? What are effective ways of providing them with these skills and this knowledge? How can the number of health and social care providers who have these skills and this knowledge be increased?

8. **DEMENTIA-FRIENDLY COMMUNITIES**
   - What enables the creation of dementia-friendly communities? What impact do dementia-friendly initiatives have on persons with dementia and their friends, families and caregivers/care partners?

9. **IMPLEMENTATION OF BEST PRACTICES FOR CARE**
   - What would ensure implementation and sustainability of best practices for dementia care within and across health care settings, including effective approaches to providing person-centred care?

10. **NON-DRUG APPROACHES TO MANAGING SYMPTOMS**
    - Among persons with dementia, what are the effects of non-pharmacological treatments compared to pharmacological treatments on behavioural and psychological symptoms of dementia? Can non-pharmacological treatments replace, reduce or be used in conjunction with pharmacological treatments for managing behavioural and psychological symptoms of dementia?
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Patient-oriented research is becoming the norm for health-related research, and for good reasons. It focuses on patient priorities and outcomes and includes patients as active collaborators throughout the research process.

“Patient-oriented research engages patients as partners and improves patient outcomes,” says Dr. Susan Blum, associate vice-president, Applied Research and Innovation. “This innovative, applied approach aims to improve Saskatchewan’s health care systems and practices.”

Saskatchewan Polytechnic has partnered with several organizations that support and promote patient-oriented research through the Saskatchewan Centre for Patient-Oriented Research (SCPOR). Sask Polytech and the Canadian Institutes of Health Research (CIHR) funds SCPOR along with nine partner organizations.

Several nursing faculty at Sask Polytech are providing leadership in advancing patient-oriented research and engaging in learning opportunities with SCPOR.

Dr. Madeline Press, faculty, Saskatchewan Collaborative Bachelor of Science in Nursing (SCBScN) program, is conducting research in the area of end-of-life care to improve the care of palliative patients. Her project focuses on community-based interprofessional end-of-life care for patients with chronic disease, dementia or frailty.

Pamela Farthing, faculty, SCBcN program, is leading a research project focused on identifying the best methods to support young adults with diabetes who are transitioning to adult care. Her project aims to decrease morbidity and mortality associated with the disease through consultation with patients, family members, and health care providers. The research project aims to generate a foundation from which innovative interventions will be created to decrease the financial burden of this disease on patients and the health care system.

Another unique SCPOR project gives a voice to refugees and immigrants in Saskatchewan to help them overcome barriers to improve their mental health and well-being. This is not only beneficial to newcomers to Canada, but may also have a positive impact on Saskatchewan’s health system.

Dr. Sarah Kostiuk-Linford, faculty, SCBScN program, says, “The community identified that refugees experience several obstacles involving social connections, which, in return, can affect their mental health and well-being.” Kostiuk-Linford is working on this project to improve mental health of newcomers with Jayne Naylen Horbach, faculty, SCBScN program, two grad students and the Regina Open Door Society.

Dr. Netha Dyck, dean, School of Nursing and School of Health Sciences, commends the nursing faculty at Saskatchewan Polytechnic for their leadership in advancing patient-oriented research and responding to the needs of our patients and the health care system. “Our faculty are actively engaged in collaborative research and providing leadership in interdisciplinary collaboration with patients, families, colleagues, students and community partners,” says Dyck. “Designing an innovative research program that focuses on the patient’s perspective puts the patient first and fosters evidence-informed health care.”
Supporting the Next Generation of Researchers

Early career researchers can often face an uphill journey to prove the merit of their ideas and their ability to carry them out. Without relevant experience, you can’t secure funding, but without funding, it’s that much more difficult to gain the relevant experience and demonstrate your potential. Add in the highly competitive nature and low success rates of the national funding scene, and one might wonder how new researchers can get a leg up.

Enter funding programs like SHRF’s Research Fellowship. This program, and other postdoctoral funding programs like it, provide researchers with training to advance their careers and develop their skills to become a lead researcher. They do this by working with an experienced and active health researcher in the province, to the benefit of everyone involved.

One such example is Dr. Swati Mehta and her research supervisor Dr. Heather Hadjistavropoulos from the University of Regina who are working together in the area of Internet-delivered Cognitive Behaviour Therapy (ICBT).

“[Postdoctoral funding] is great for ICBT in general because you are getting a very highly qualified person with really strong background knowledge and skills to come work on the research,” explains Hadjistavropoulos. “It also allows for a more in-depth examination of a topic that I may not have time to pursue, and allows for us to bring our areas of expertise and interests together to do something new.”

The value of the postdoctoral fellowship when starting an academic career comes not only in the form of a mentor assisting with securing more publications, conference presentations, grant applications and project management skills, but all of those things help the fellow develop a solid foundation and provides the experience necessary to prove themselves and enhance their chances of being successful at the national funding level.

Hadjistavropoulos can attest to the importance of funding like this. “SHRF was involved in funding my earlier research on online therapy. That funding was really helpful in securing more funding at the national level, but also now we have ongoing funding from the Government of Saskatchewan as well as the Co-operators and Sun Life Assurance. It’s a really good example of how local funding can lead to other funding opportunities for researchers.”

Mehta’s project will deliver online cognitive behaviour therapy to individuals with spinal cord injuries across Canada through the Online Therapy Unit website. Mehta is excited about the potential outcomes of her research and hopes she finds that it helps people in this community as it has in others with chronic conditions that Hadjistavropoulos has studied before, such as cancer, cardiovascular disease and fibromyalgia.

“Heather is the leading expert in ICBT in Canada, so it’s a great opportunity for me to be here and see how she manages not only the research but also the clinical aspect of this program,” comments Mehta. “Just being able to be in the Online User Therapy Unit and work side-by-side with her clinical staff, gives me a chance to see her research in action and its clinical implementation in the community. Heather has done a great job in transferring research knowledge into practice.”

With Heather’s guidance, Mehta ranked at the top of her category in SHRF’s 2017-18 Research Fellowship competition and was successful in securing national funding from the Canadian Institutes of Health Research Fellowship program. Impressively, Mehta also received the Alice Wilson Award from the Royal Society of Canada, an award only given annually to three women with outstanding academic qualifications at the postdoctoral level. With this funding in place, Mehta is set to not only discover new ways to help people in Saskatchewan, but gain further experience and prove that with the proper support, postdoctoral fellows have the potential for lasting careers and even larger impacts.

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<td>Expected number of SK residents the unit will work with in 2017</td>
<td>Percentage of clients who come from rural SK</td>
<td>Average reduction in symptoms reported by clients</td>
<td>Percentage of clients who felt Online-CBT was worth their time</td>
<td>Age range of people who have used Online-CBT</td>
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SHRF | Research for Health
NAPHRO brings together the following provincially mandated agencies that fund health research:

- Saskatchewan Health Quality Council
- Alberta Innovates
- Michael Smith Foundation for Health Research
- New Brunswick Health Research Foundation
- Fondation de la recherche en santé du Nouveau-Brunswick
- Research Manitoba
- Quebec Research Foundation
- Ontario Research Foundation
- Applied Health Research Foundation

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A speedy breakfast doesn’t have to include sugary cereal or takeout sandwiches laden with fat and sodium. Try these 20 ideas for a healthy breakfast that’s ready in minutes.

Make ahead

• Refrigerate last night’s whole-wheat pasta or homemade pizza leftovers. In the morning just warm up and enjoy.
• Have a batch of whole-grain, low-fat muffins or breads ready in the freezer. In the morning, pair one up with a banana and yogurt.
• Cut up fruit the night before and refrigerate. Ta-da: A nutritious topping for yogurt or cereal.
• Make overnight oatmeal: Mix old fashioned rolled oats (½ cup/125 mL) with 1 cup/250 mL mixture of yogurt and milk or milk alternative. Optional add-ins: fresh or dried fruit, chia seeds, vanilla. Stir and refrigerate overnight.
• Make a few hard-cooked eggs and store in the refrigerator.
• Try make-ahead recipes for Mini breakfast burritos or Almond oat bars from Heart & Stroke (see sidebar). Browse more breakfast recipes at heartandstroke.ca/recipes.

Ready in five minutes or less

• Soft cooked egg on whole wheat toast with orange slices.
• Whole-grain pita pocket with peanut butter or alternative, and banana slices in plain yogurt.
• Whole-grain English muffin with melted cheese and apple slices.
• Scrambled eggs with red peppers and salsa wrapped in a tortilla.
• Cheese with whole-grain crackers and sliced tomatoes.
• Scrambled eggs, whole-grain toast, one cup of milk and sliced apples.
• Greek yogurt with whole-grain cereal and berries.
• Whole-grain toast with peanut butter or alternative, sliced apples, one cup of milk.
• Yogurt parfait with plain yogurt, ground flax seeds or muesli and fresh fruit.

When you have to grab something and run

• Fruit, whole-grain crackers and a piece of cheese.
• A homemade muffin from the freezer; cheese string and clementine.
• Hard cooked egg, whole grain mini bagel and an apple.
• Homemade cereal bar, plain yogurt cup and grapes.

If cereal is your thing

• Read the Nutrition Facts panel to find a healthier choice. Here’s what to look for:
  • The first ingredient should be whole grain.
  • Fibre per serving should be 4 g or more.
  • Sugar should be 6 g or less per serving; it can be higher if the cereal includes dried fruit.
  • Look for cereals that list sugar ingredients near the end of the ingredient list, meaning less added sugar.
Mini Breakfast Burritos
Recipe by Emily Richards, PHEc.

This hearty breakfast is great for a small family on the run. Mix it up and refrigerate the night before, so all you have to do is pop it in the microwave and fill your tortillas!

Makes: 3 servings
 Prep time 10 min / Cook time 2 min

Ingredients

• 1 cup (250 mL) cooked canned navy beans, drained and rinsed
• 1 egg
• 2 tbsp (30 mL) diced tomato or salsa
• Half small red or green bell pepper, diced
• 2 green onions, thinly sliced
• 1 tbsp (15 mL) chopped fresh coriander (optional)
• Hot pepper sauce, a dash
• 3 small, whole-grain tortillas (about 18 cm / 7 inches)

Directions

• In a dry nonstick skillet, using potato masher mash beans until fairly smooth. Stir in egg and salsa until combined. Microwave on high and cook for 1 minute.
• Stir in pepper, onions, coriander and hot pepper sauce. Microwave on high for about 1 minute or until hot.
• Stir to combine. Divide mixture in three, placing one portion in centre of each tortilla. Roll up to enjoy.

Nutritional info per serving (1 burrito)

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| Carbohydrates: 13 g | }

Recipe developed by Emily Richards, P.H. Ec.
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www.heartandstroke.ca/recipes
With over 150 guests in attendance, SHRF presented its 2016 Achievement Award to Dr. Daniel Chen, professor and researcher from the College of Engineering at the University of Saskatchewan (U of S), at the 13th annual Santé Awards Evening. Dr. Chen has garnered international recognition and respect in two fields of study for his breakthrough research discoveries, his ability to actively initiate effective interdisciplinary collaborations, and his accomplishment as a supervisor to a total of 45 graduate students and four postdoctoral fellows.

Since joining the U of S in 2003, Dr. Chen has created and led an interdisciplinary and international team of researchers, including the Tissue Engineering Research Group at the U of S, spanning both fields of engineering and health sciences. His pioneering work to develop advanced technologies for the challenging task of designing and fabricating artificial tissue/organ substitutes or scaffolds that can grow within patients has significant promise for ultimately providing a permanent solution to damaged tissues/organs.

To support his research, Dr. Chen has been a successful principal applicant on 25 peer-reviewed grants awarded to a total value of over $3.5 million. He has not only received recognition of his research excellence and achievement from his college and institution, but was awarded a 2015 Invitation Fellowship for Research in Japan from the Japan Society for the Promotion of Science, and in 2016 was named a Fellow of the American Society of Mechanical Engineers for his significant achievements in mechanical and multidisciplinary engineering.

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