

2014 - 2015 Thunder Bay Regional Research Institute  
Report to the Community and a Year in Review

Bringing

# Discovery to Life

Thunder Bay Regional  
Research Institute

In partnership with  
Thunder Bay Regional Health Sciences Centre  
*Affiliated with Lakehead University*



Networked  
Robots the  
Future of  
PET Probe  
Research

Wool Felt Project  
Helping Increase  
Screening of Cervical  
Cancer Among  
Aboriginal Women

Cyclotron  
Poised  
to Boost  
Regional  
Economy



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Thunder Bay Regional Research Institute

In partnership with  
Thunder Bay Regional Health Sciences Centre  
Affiliated with Lakehead University

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On the cover:  
Having a cyclotron just minutes, rather than hours, away is good news for both patients and health care research in Northwestern Ontario, providing a more ready and reliable access to medical isotopes, particularly important for patients waiting for PET-CT scans. Pictured above with the cyclotron are TBRRI scientist Dr. Chris Phenix (left), and Dr. Nicole Laferriere (right), Chief of Oncology, Systemic Therapy Quality Lead, RCC Northwest.



Thunder Bay Regional Research Institute – an independent, not-for-profit corporation – is the research arm of the Thunder Bay Regional Health Sciences Centre. Our scientists work closely with clinicians, medical professionals, and academic and industry partners to improve health care through excellence in

patient-centred research. Research is advanced through discovery and development of new imaging-based technologies and processes that are brought to patients through clinical trials. With successful trial validation, discoveries proceed to commercialization for the benefit of patients everywhere.



NEXT WAVE 2012-2016  
PATIENT

MISSION:

To discover, translate through clinical trials, and bring to market advances in the prevention, diagnosis and treatment of disease

VISION:

Internationally recognized for patient-centred research focused on medical imaging

VALUES:

Patient-centredness  
Integrity  
Excellence  
Respect

OBJECTIVES 2012-2016

GOAL 1:

Impact through Excellence in Imaging

GOAL 2:

Enabling of Research Strategic to TBRHSC

GOAL 3:

Economic Growth and Sustainability

Improving Patient Care Through Research

*“Sometimes, as a patient lying in a hospital bed getting treatment, research is the furthest thing from our minds. But it is so important and so true that the research going on here really does translate to the bedside. Besides clinical trials, which is the obvious kind of patient-directed research, researchers here are developing new techniques of diagnosing and treating conditions like COPD, heart and stroke, cancer, Alzheimer’s, and other diseases that most affect people in Northwestern Ontario.”*

– Keith Taylor, a Patient and Family Advisor (PFA) at TBRHSC and Co-Chair of the Patient and Family Advisory Council

The ideal hospital is one that combines excellent clinical care, teaching, and research. That sounds obvious, but it does not happen by accident. Creating teaching and research programs is no small thing – especially when the average doctor or health professional already has a busy day. Although research existed in Thunder Bay before the launch of the Thunder Bay Regional Research Institute (TBRRI), the creation of the institute has helped the research community blossom, and has helped formalize and focus much of that research. Regionally, TBRRI has contributed to a health care evolution. Not too long ago, health care in Northwestern

Ontario meant bringing programs from other parts of the province or the country. Today, more than ever, we are developing and adapting our own brand of health care. That couldn’t happen without our strong research program. Thanks to the TBRRI, clinical trials are also growing. That’s important not just for the studies themselves, but for the patients here. Although you cannot call clinical trials “treatments” due to their experimental nature, clinical trials can provide an alternative when a clear and proven treatment option is not available. By integrating research with care, we are providing better patient care today as well as for tomorrow.

Clinical Trials Bring Patient Benefits

In 2014, there were more than 50 clinical trials taking place including 20 that were accepting new participants. For many, the decision to participate in a clinical study is based on the hope that it will provide some medical benefit. However, there are other benefits to participating. Some say it is knowing that research today will help others tomorrow – potentially their children and grandchildren. Many say it’s the additional attention they receive from a team of experienced nurses and health care professionals reviewing their progress. What is most exciting is that we are on the verge of creating our own clinical trials to test homegrown devices such as XLV Diagnostics’ digital X-ray unit, positron-emission mammography (PEM), and new ways to diagnose and monitor treatment of lung diseases using hyperpolarized gas and MRI imaging. Currently, TBRRI is part of a multi-organizational team that has developed a device to help stroke survivors regain hand function – the team launched its own clinical trial in spring 2015. It is clinical trials such as these that will benefit patients in Northwestern Ontario and around the world.



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Former Associate Dean of Research and Graduate Studies for the Faculty of Medicine at Memorial University and senior member of the Canadian Institutes of Health Research.

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**Dr. Moira McPherson** Provost and Vice-President (Academic), Lakehead University.  
Former Deputy Provost and held a faculty position in the School of Kinesiology

**Clint Harris** Publisher and General Manager, Thunder Bay Chronicle-Journal

*Thank you to the following who also served on the board in 2014-2015:*

**Dr. Roxanne Deslauriers** Former acting CEO, TBTRI

**Dr. Stewart Kennedy**  
**Dr. Roger Strasser**

Past Members:

**Dr. Michael Wood** (former CEO)  
**Michael Power** (former CEO)

**Dr. Rui Wang**

**Dr. Brian Stevenson**

**Lyn McLeod**

**Dr. Wayne Schnarr**

**Dr. Fred Gilbert**

**Dr. Gordon Porter**

**Ron Saddington**

**Michael Gourley**

**Dr. Rod Hanley**

Integrated Research Pushing Us Forward



Research shouldn't happen in a bubble. Not patient-focused research, in any case. Although there is definitely a place for what we call "pure"

research, the Thunder Bay Regional Research Institute (TBTRI) has always focused on bench-to-bedside programs that identify a problem or shortcoming in current patient care methods, and then find a solution.

This year, we took that philosophy a step further by changing our leadership structure. In November 2014, I announced that Andrée Robichaud, President and CEO of the Thunder Bay Regional Health Sciences Centre (TBRHSC), had agreed to become acting CEO of the TBTRI as well. This important realignment came about for several reasons. For one, Dr. John Rowlands' recent retirement meant that we needed to find a new Scientific Director moving forward. There is no one more capable for this position than Dr. Roxanne Deslauriers, whose commitment to the TBTRI and Thunder Bay was obvious when she stepped up as interim CEO. We are glad to have her join us full time.

This realignment also better reflects our philosophy as a research institute. One of our mandates is to enable research strategic to the Health Sciences Centre – indeed, TBTRI is the research arm of the TBRHSC. In that context, and given the trend in Canada towards integrated research, it makes sense.

Realignment brings other advantages. For one, our partnerships with TBRHSC and the Thunder Bay

Regional Health Sciences Foundation become stronger. It will also help those “collisions” we’ve been encouraging between TBTRI researchers and TBRHSC clinicians that are so vital to patient-focused research, and catalyze clinician interest in research.

Ultimately, realignment will help us build on our successes and meet future challenges. The installation of the new cyclotron is a symbol of that success, a watershed moment for both TBTRI and TBRHSC. It is also a symbol of our strengthening collaborations. The Thunder Bay Regional Health Sciences Foundation provided \$2.6 million in funding from its Exceptional Cancer Care Campaign including \$1 million from the Paterson Challenge.

I would like to take a moment to thank Andrée Robichaud, who announced her resignation in February 2015, for her dedication to TBTRI. Although her official tenure as CEO at TBTRI was short, she has been a huge supporter of research from the start. Andrée's passion and leadership will be missed. On behalf of everyone at TBTRI, we wish her the best on the next step of her journey.

In closing, it's been another successful year for TBTRI despite some challenges. It often takes years to see the fruits of research. I am happy to say that we are starting to see the results now, as you'll read in this report. We are well-positioned moving forward.

*gary Polonsky*

**Dr. Gary Polonsky**

Chair, TBTRI

Research That Supports our Regional Needs



It is simple: if we want the Thunder Bay Regional Health Sciences Centre (TBRHSC) to be an academic health sciences centre – and we do – we

need a strong research program. I think that's especially true in a region such as Northwestern Ontario where unique circumstances including geographical barriers, disease incidence, cultural and language differences, and relative isolation create unique challenges to providing excellent health care.

The Thunder Bay Regional Research Institute (TBTRI) addresses these issues directly. For example, scientists are developing new screening and treatment methods for cervical cancer, some of which specifically address the cultural differences of Aboriginal women as well as the relative isolation of many First Nations. Another project is finding ways of using imaging to better diagnose and monitor lung diseases such as asthma, COPD, and lung cancer – all of which are more prevalent in Northwestern Ontario than elsewhere in the province. There are several projects targeting cancer in particular, which also has a higher incidence here, finding new approaches to tomorrow's care. Other research aims to provide distance rehab for stroke survivors.

These are just a few examples of how scientists at TBTRI support the population of Northwestern Ontario, finding solutions to the health challenges that affect us most. This approach helps align and focus our research efforts. But perhaps more importantly, if we do not invest our own time and resources to solve the health challenges we face every day, then who will?

This sentiment is symbolized in the new cyclotron, which will become operational later in 2015. It is a joint venture between the TBTRI and the TBRHSC, funded thanks to the vision

of several partners including the Thunder Bay Regional Health Sciences Foundation and the municipal, provincial, and federal governments. This advanced piece of equipment used to make radioisotopes represents a large step forward in both patient care and research. The cyclotron will make our organizations stronger, more self-reliant, and a leader in Canada in many respects. It will also afford many economic benefits, as you'll read in this report.

Thunder Bay is one of the best places in the world to carry out medical research – we call it a living lab environment. We operate in a community large enough to support a research program, and yet our organizations are small enough and interconnected enough that researchers and clinicians routinely come in contact with each other to address unmet patient needs. Some of the best research ideas have been developed over lunch in the cafeteria when a clinician said to a researcher, “I want to do this – how can you help?” or a researcher said to a clinician, “I’m working on this – what benefit would that be to patient care?” It’s these types of discussions that help drive useful innovation, providing researchers with direction and clinicians with solutions, ultimately resulting in patient care benefits.

Earlier this year, I announced my resignation as CEO of both TBTRI and TBRHSC to pursue other opportunities. I am confident that TBTRI is in a strong position to move forward with its research mandate, and I am humbled by its progress to date. I wish everyone well moving forward to achieve our goal of a sustainable, patient-focused research program.

*AS Robichaud*

**Andrée G. Robichaud**

Acting CEO, Thunder Bay Regional Research Institute

TBTRI Scientists\*

- Naana Afua Jumah, MD, Ph.D., FRCSC**  
Obstetrician  
Gynaecologist,  
Thunder Bay  
Regional Health Sciences Centre  
Clinician Researcher, Thunder Bay Regional Research Institute

Assistant Professor, Northern Ontario School of Medicine

**Boguslaw Tomanek, Ph.D.**  
Associate Professor, Radiation Therapy Degree Program, Department of Oncology, University of Alberta

Multi-model molecular imaging and gradient-free MRI

Associated with TBTRI

*to June, 2014 - now located at University of Calgary and associated with TBTRI*

**Laura Curiel, Ph.D.**  
Adjunct Professor, Lakehead University

Clinical trials and development of guidance technology for non-invasive treatment of uterine fibroids, cervical cancer, and prostate cancer with high intensity focused ultrasound (HIFU)

**Alla Reznik, Ph.D.**  
Canada Research Chair and Associate Professor, Lakehead University

New materials, notably lead oxide and amorphous selenium, for x-ray and PET detectors in medical imaging

**Oleg Rubel, Ph.D.**  
Adjunct Professor, Lakehead University  
Investigation of material properties of selenium and development of new piezoelectric material for HIFU

*to December, 2014 - now located at McMaster University and associated with TBTRI*
- Ingeborg Zehbe, Ph.D.**  
Associate Professor, Northern Ontario School of Medicine

Screening for Human Papillomavirus infection as a biomarker for cervical cancer in Aboriginal populations

**Christopher Phenix, Ph.D.**  
Adjunct Professor, Lakehead University

Probes to image enzymatic biomarker activity and molecular imaging to investigate Herceptin resistance

**Mitchell Albert, Ph.D.**  
LU-TBTRI Research Chair and Professor, Lakehead University

Development of xenon MRI biosensor for diagnosis and treatment guidance for HER2-positive breast cancer and hyperpolarized 129Xe MRI brain imaging for stroke, and pulmonary imaging for asthma, COPD, and cystic fibrosis

**Lily Wu, Ph.D.**  
Professor, Lakehead University

Effectiveness of SMG-08 in treatment of hypertension and development of labelled methylglyoxl molecule as biomarker of diabetes

**Jane Lawrence-Dewar, Ph.D.**  
Adjunct Professor, Lakehead University

Use of fMRI to understand changes in neural networks following brain injury or disease

**Samuel Pichardo, Ph.D.**  
Adjunct Professor, Lakehead University

Clinical trials and development of guidance technology for non-invasive treatment of uterine fibroids, cervical cancer, and prostate cancer with high intensity focused ultrasound (HIFU), and ultrasound transducer technology

\*List contains concurrent academic status.



## Goal 1: Impact through Excellence in Imaging



Dr. Chris Phenix and his team will work with a high-tech robot called Elixys from SOFIE Bioscience that is programmed to safely and consistently prepare positron emission tomography (PET) probes. The networked system will allow probes to be exchanged with other partners quickly – including probes Dr. Phenix develops here.

# Networked Robots the Future of PET Probe Research

Gemcitabine is a type of chemotherapy agent used to fight certain cancers. Oncologists know that it will work better in some patients than others, but what they can't do is accurately predict which patients will benefit. That could change thanks to a new international clinical study that Dr. Chris Phenix and his team have joined.

The study hinges on a high-tech robot called Elixys that is programmed to safely and consistently prepare positron emission tomography (PET) probes fit for human studies. These probes allow scientists to observe the metabolism within a tumour. We know that gemcitabine is most effective in patients who have high tumour levels of a protein called dCK. To test for this protein, a probe called  $^{18}\text{F}$ -FAC is injected into the patient. When dCK is present in high enough concentrations, the tumour will "light up" during a PET scan – which could be a positive indication for gemcitabine therapy. The clinical trial will confirm if this is actually the case.

The main advantage of using Elixys to make probes is consistency. The Elixys platform, developed by SOFIE Biosciences (co-founder Michael Phelps helped develop PET), mixes standardized reagents with the isotope fluorine-18 ( $^{18}\text{F}$ ) using a protocol or "recipe" shared among several sites in North America. The  $^{18}\text{F}$  isotope used to prepare  $^{18}\text{F}$ -FAC will be produced in Thunder Bay's new cyclotron.

Traditionally, even established PET probes take months to prepare at a new site due to differences in reagents, batch size, and other factors. "Using the robot, we can probably make a probe in an afternoon, compared to the old days when it might take six months to do manually," Dr. Phenix said. " $^{18}\text{F}$  radiochemistry is notoriously tricky because we are using very small quantities of material."

It's also safer for the radiochemist since the robot is remotely controlled.

The collaboration behind the study has even greater implications.

"If we develop a new research probe and it looks like it's working, I can send it to sites that also have the Elixys robot for them to try it as well," Dr. Phenix said. "That's important because if we are using PET imaging to screen for certain cancer sub-types, Thunder Bay would not have a big enough population to support a full clinical trial. So we need other sites to evaluate these future tracers."

TBRRI is SOFIE Biosciences' first Canadian partner, joining the company's network of US research hospitals. That means TBRRI will be able to implement new imaging probes and methods from these network partners, providing cutting-edge health care to Northwestern Ontario earlier than otherwise possible. Likewise, advances developed here will already have a pre-built network of clinical trial partners – and eventually buyers if proven effective.

"The technology now allows these protocols to be exchanged quite quickly."

## New Cervical Cancer Treatments in Development

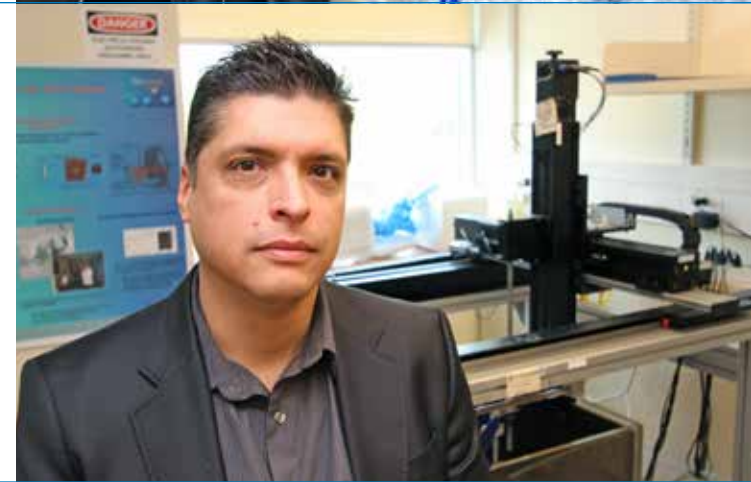
Dr. Ingeborg Zehbe and her PhD student Melissa Togtema are developing two new cervical cancer treatments. One attacks a cancer-causing protein found in HPV – which would make it the first antibody therapy in the world for cervical cancer – while the other prevents the cancer-causing protein from being made in host cells. Both approaches are designed to target cancer cells directly while leaving healthy cells intact. These innovative and personalized cancer therapies would be less invasive and harmful than surgery or chemotherapy, and may also be used to treat or diagnose other HPV-related cancers. Clinical trials could begin in as few as five years.

<http://www.healthsciencesfoundation.ca/article/homegrown-scientist-key-to-groundbreaking-cancer-care-research-7843.asp>



## Collaboration with SickKids to Treat Neuroblastoma with HIFU

Dr. Samuel Pichardo is collaborating with Dr. Ted Gerstle, chief of oncology surgery at SickKids, to adapt magnetic resonance-guided high-intensity focused ultrasound (MRgHIFU) to remove neuroblastoma tumours that occur in the kidney. The project, a preclinical validation funded by Solving Kids' Cancer, investigates this method as a non-invasive alternative to surgery, chemotherapy, and other difficult treatments. Dr. Pichardo is co-supervising students and staff to adapt techniques previously developed to treat head and neck tumours. A separate imaging-only clinical trial to test several monitoring techniques is in the planning stages, and will take place in Thunder Bay.



## Alternative Mammography "Sees Through" Denser Tissue

Dr. Alla Reznik and her team continue research into a mammography alternative that will be more effective for women with high-density breast tissue. Using traditional mammography, tumours can "hide" in the scan because dense tissue and tumours both appear white. Positron-emission mammography (PEM) is a molecular imaging method that uses a radioactive glucose tracer. The tumour absorbs this tracer, clearly identifying tumours regardless of breast density. It is also more portable than traditional mammography and does not require breast compression, making it a painless alternative. A prototype is in development and clinical trials are planned for 2016.



## Brazil's Best and Brightest Working on TBRRI HIFU Projects

In the summer of 2014, Dr. Laura Curiel mentored four students from Brazil who helped with various HIFU projects. These included testing a new imaging agent for prostate cancer biomarkers made of nanoparticles, calibrating a HIFU targeting system that will be able to work within the MRI's magnetic field, and developing electronics hardware that will allow the HIFU's transducers to use less energy. The students were attracted to Lakehead University and saw the opportunity to work in a highly reputable research lab as an added bonus, underlining the benefits of our partnerships.

<http://www.healthsciencesfoundation.ca/article/brazil%E2%80%99s-best-and-brightest-working-on-tbrri-hifu-projects-7619.asp>





Goal 2:  
Enabling of Research Strategic to TBRHSC



Theresa Morrisseau was one of the participants in an art project in which women created their own “HPV virus” balls from wool felt, which were then incorporated into the artwork seen here. In the words of one participant, the project allowed the women to “turn the ugliness into something beautiful”.

# Wool Felt Project Helping Increase Screening of Cervical Cancer Among Aboriginal Women

Increased HPV screening leads to lower rates of cervical cancer – there is no doubt about that. But how do you overcome barriers to improve screening such as culture and distance?

For years, Dr. Ingeborg Zehbe has been investigating solutions. Women living in First Nations in Ontario are two times more likely to develop cervical cancer than the overall population. Researchers believe lower screening and follow-up rates are influenced by several factors including cultural and geographical barriers.

Several years ago, Dr. Zehbe and her team offered an HPV self-test that women could take at home – one that overcomes the geographical and cultural barriers. The next step was to find better ways of raising awareness about cervical cancer, HPV, and the benefits of screening among First

Nations women. The Anishinaabek Cervical Cancer Screening Study (ACCSS) partnered with 11 First Nations to determine the best approaches for engaging women.

“We felt we really had to build the relationships [with First Nations] very carefully,” Dr. Zehbe told CBC Thunder Bay in July 2014. “I contacted the chiefs... but then I realized that I also have to go to the women.”

Community-Based Research Assistants (CBRAs) went to each First Nation involved in the study not only to encourage women to join, but to provide the women with support and information, and reduce the stigma attached to HPV as a sexually transmitted disease.

Last year, Dr. Zehbe collaborated with Dr. Pauline Sameshima, Associate Professor at Lakehead University

and Canada Research Chair in Arts Integrated Studies, to develop an art project that would engage and educate women. Participants crafted their own HPV virus from wool felt as they discussed the disease. This approach not only engaged the women in a meaningful way, it allowed them to metaphorically take the virus into their own hands, empowering them.

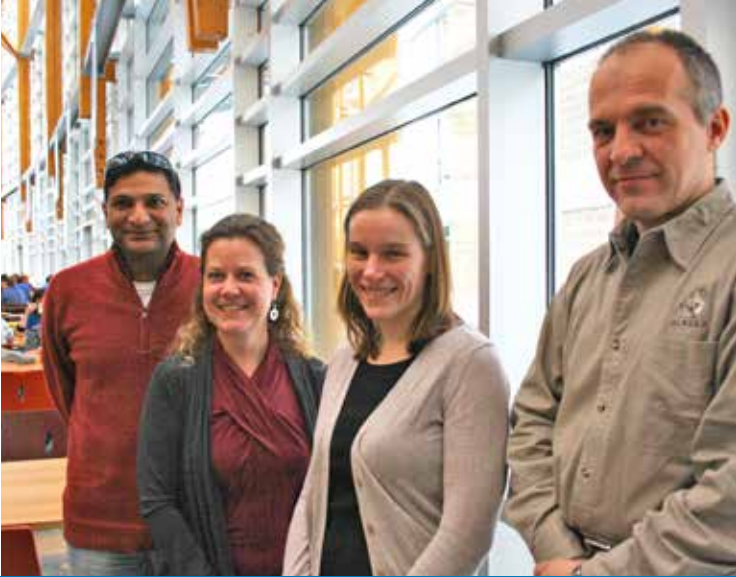
“The artwork participants make as they’re learning about a particular topic are all visual reminders of how we see the world,” Dr. Sameshima said.

Researchers have also found that study participants are talking with other women in their community, which will help further reduce stigma and hopefully increase screening rates.

Dr. Zehbe’s ultimate goal is to reduce cervical cancer among Aboriginal women.

## Stroke Rehab in the Palm of Your Hand

A multi-organizational team of researchers including Dr. Jane Lawrence-Dewar is investigating new ways to help stroke survivors regain more hand function. Kirsti Reinikka, a physiotherapist with St. Joseph’s Care Group; Vineet Johnson, a physiotherapist and neuroscientist at Lakehead University; Daniel Vasiliu, an independent engineer; and Dr. Lawrence-Dewar launched a clinical trial in 2015 to test a handheld exercise device they are developing. Dr. Lawrence-Dewar’s role is to map brain activity using functional magnetic resonance imaging (fMRI) before and after a hand training program to help determine the effectiveness of the device.



## Psychosocial Research Provides Strong Patient & Family Supports

Since Dr. Scott Sellick joined Regional Cancer Centre Northwest in 1988, he has spearheaded or partnered on many provincial and national psychosocial research projects including CancerChatCanada and Mike and Bonnie Lang’s Survive and Thrive Adventure Therapy Expeditions, designed to help early adult cancer survivors reflect, refocus, and rebuild their lives. Dr. Sellick has also worked with Dr. Patricia Smith, Associate Professor at the Northern Ontario School of Medicine, investigating smoking cessation clinician guidelines and symptoms-level guidelines for assisting patients who want to quit smoking. In 2015, Dr. Sellick was appointed Chair of the TBRHSC’s Research Ethics Board. [survivethrive.org](http://survivethrive.org)



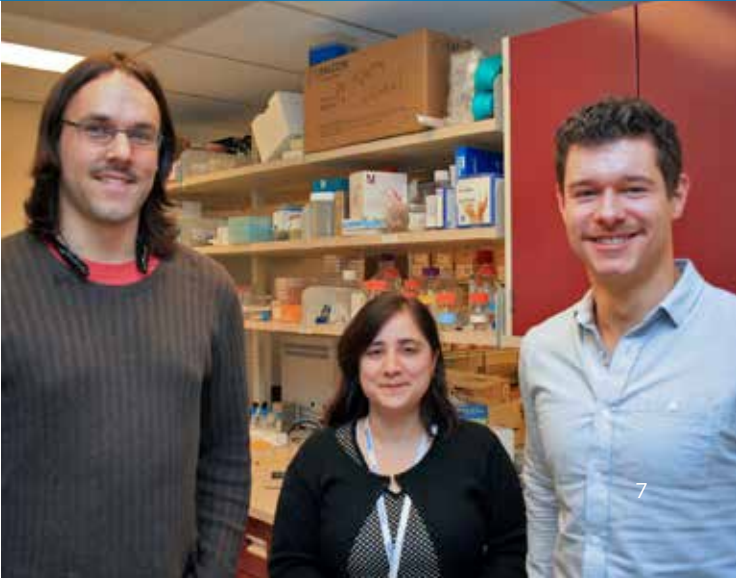
## Dr. Jumah’s Research Seeks to Improve the Care of Women with Substance Use

Opiate dependence affects approximately 30% of pregnancies in Northwestern Ontario. Methadone is the standard drug used for treating dependence during pregnancy. However, rural and remote communities in Northwestern Ontario including First Nations do not have the resources to provide methadone or the comprehensive care required to look after the mothers and their babies. Dr. Naana Jumah is working with communities, social service agencies, Lakehead University, and the Thunder Bay Drug Strategy to develop an integrated care strategy for pregnant and parenting women who are dependent on opioids.



## HIFU Guidance System Will Target Only Prostate Cancer Cells

Using high-intensity focused ultrasound (HIFU) to destroy prostate cancer cells could avoid possible side effects of surgery including incontinence and sexual dysfunction. However, there currently isn’t a way to target only cancer cells effectively and realize those benefits. Dr. Laura Curiel and her team are building a system that will use nanoparticles to reveal cancer cells on an MRI image. If successful, it will allow oncologists to destroy cancer cells using HIFU with pinpoint precision, preserving healthy tissue. As part of TBRRI’s ongoing outreach programs, Dr. Curiel outlined her progress during a presentation to the Prostate Cancer Canada Network – Thunder Bay in November.





Goal 3:  
Economic Growth and Sustainability

# Cyclotron Poised to Boost Regional Economy

“Today’s event marks the beginning of a new era for research and innovation in Northwestern Ontario. Establishing a cyclotron in Thunder Bay will further position the region as a global leader for applied research and development in biotechnology, while expanding the health sciences cluster by supporting jobs and growth throughout the area,” said the Honourable Greg Rickford, Canada’s Minister of Natural Resources and Minister for the Federal Economic Development Initiative for Northern Ontario, at the unveiling of the cyclotron in early 2015.



It’s hard not to get excited about our economic future when you see a 28-ton cyclotron being lowered through a hatch into a bunker below. When it arrived on February 10, 2015, the cyclotron was already a symbol of improved health care and increased research opportunities. It also represents a giant engine for Thunder Bay and the region’s knowledge-based economy – and greater sustainability for the TBRRI.

The project provided about 90 jobs during construction. At least 29 skilled jobs will be created once the cyclotron is fully operational. But that’s just the start. “Today’s event marks the beginning of a new era for research and innovation in Northwestern Ontario. Establishing a cyclotron in Thunder Bay will further position the region as a global leader for applied research and development in biotechnology, while expanding the health sciences cluster by supporting jobs and growth throughout the area,” said the Honourable Greg Rickford, Canada’s Minister of Natural Resources and Minister for the Federal Economic Development Initiative for Northern Ontario, at the unveiling of the cyclotron in early 2015. Getting our isotopes from across the parking lot rather than across the province will improve patient care and allows us to invest in ourselves. Chances are, we will become a supplier of FDG and technetium-99m to other health care facilities.

Research itself is a significant driver of economic growth. According to the Council of Academic Hospitals of Ontario (CAHO), each dollar the Ontario Ministry of Research and Innovation invests in research attracts an additional \$3 in funding on average. Already we are developing new partnerships including with SOFIE Biosciences, which will increase the availability of clinical trials, give us a conduit to expand our own clinical trials, and provide a marketplace for probes developed in the TBRRI lab.

This economic potential is a large part of the reason why our partners invested in the cyclotron. The province through the Northern Ontario Heritage Fund Corporation (NOHFC) provided \$5 million, FedNor \$4 million, the Thunder Bay Regional Health Sciences Foundation \$2.2 million, and the City of Thunder Bay \$1.5 million. (In 2015, the Health Sciences Foundation contributed an additional \$1 million thanks to money raised in the Paterson Foundation’s \$500,000 gift-matching challenge to help cover the cyclotron’s start-up costs.)

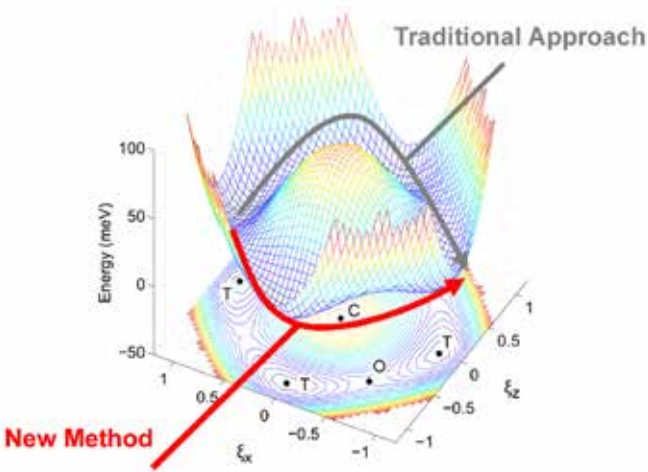
The cyclotron will help TBRRI grow as well. TBRRI will become more attractive to scientists who rely upon radioisotopes for their own research. Those scientists in turn attract students, including those from Lakehead University and the Northern Ontario School of Medicine (NOSM).

“TBRRI is committed to building a sustainable research program that advances excellence in imaging to provide patient-focused research for the residents of Northwestern Ontario,” said Dr. Roxanne Deslauriers.

Ultimately, that leads to a stronger economy as well as better health care for everyone in Northwestern Ontario.

## New Patented Transducer Ready for Licensing

An interdisciplinary team of researchers led by TBRRI scientists Drs. Oleg Rubel, Laura Curiel, and Samuel Pichardo has successfully patented a new method of boosting HIFU by 18% using the same amount of electricity and a smaller unit. This will allow doctors to administer HIFU therapy more efficiently as well as target areas deeper in the body – critical for certain organs such as the brain and liver, and for obese patients. The team is currently exploring agreements with industry partners to develop the technology. Funding for testing of the new transducers to prove the theory was provided by MaRS Innovation.



## Local Donation Funds Cutting- Edge Lung Disease Research

The Villeneuve family created a special endowment fund in 2006 in memory of their husband and father to help find a cure for mesothelioma, a type of lung cancer mostly caused by asbestos. Dr. Mitchell Albert is using some of that funding for a research project that, if successful, will help diagnose and stage cancer and other lung diseases. The revolutionary technique uses a special gas and MRI to show parts of the lungs that are blocked. The method could also help monitor the effectiveness of treatments on patients.

<http://www.healthsciencesfoundation.ca/article/endowment-fund-supporting-lung-disease-research-in-memory-of-loved-one--7739.asp>



## Our Funding Partners are Our Strength

TBRRI is earning the respect not only of other research, education, and health care institutes, but of its funding partners as well. The TBRRI has worked hard to build trust with all its funding partners, forging strong and lasting partnerships with agencies and organizations including FedNor, the Northern Ontario Heritage Fund Corporation, the City of Thunder Bay, and community support through the Thunder Bay Regional Health Sciences Foundation’s Health Sciences Discovery Fund, as well as numerous provincial and federal research funding programs. They provide seed money for TBRRI projects that attract more scientists and students, and stimulates the local economy.



## Philips Funds Local Sonalleve Software Project

Dr. Samuel Pichardo, one of the world’s experts on Philips Health care’s Sonalleve MRgHIFU system, is working with Dr. Edwin Heijman in Eindhoven, The Netherlands to improve Sonalleve’s MRI thermometry software. Currently, the system cannot measure temperature within fat tissue accurately. Homegrown undergrad Steven Engler, who is on Dr. Pichardo’s team, is travelling to Eindhoven to help Dr. Heijman develop software to control a new interleaved scan method dynamically for safer, faster treatments. Philips is funding the project directly – a testament to the TBRRI’s ability to recruit the “best and brightest”.





# Closer-to-Home Research for Closer-to-Home Care

## A message from the Thunder Bay Regional Health Sciences Foundation

Research drives better patient care. In turn, local research drives better *local* patient care. That's why the Thunder Bay Regional Health Sciences Foundation invests so much in *local* research. By supporting the Thunder Bay Regional Research Institute, we help improve the level of health care in Northwestern Ontario right now and in the future through research breakthroughs, better equipment, and attracting the high-calibre health care professionals that make such a difference in our lives.

In spring 2015, we completed our Exceptional Cancer Care Campaign. Thanks to our generous donors and

dedicated volunteers, we raised over \$7 million to ensure we have the highest quality cancer care, committing \$2.6 million directly to cancer research. This includes donations made during the Paterson Foundation's gift-matching challenge, which raised over \$1 million to launch the cyclotron. Not only will the cyclotron provide patients with a reliable source of radioisotopes for nuclear imaging, it will help researchers find the newest diagnostic imaging and treatment monitoring methods – right here in Thunder Bay. We've supported other equipment purchases as well including the MicroPET scanner for pre-clinical research.

Additionally, local orthopaedic surgeons through the Health Sciences Foundation recently funded clinical research at the Thunder Bay Regional Health Sciences Centre to investigate ways of reducing the high number of amputations in the region.

Our focus is always on closer-to-home patient care. Supporting local research is yet another way of realizing that vision.



# The Impact of TBRRI's Research on Northwestern Ontario

## Healthier, Wealthier, Smarter



On July 30, 2014, Premier Kathleen Wynne (right) visited the Thunder Bay Regional Research Institute, where she announced that the government will help it expand its patient-centred health care research, helping to make Thunder Bay a centre for advanced medical research and to improve health care for people in the region.

# Funders and Partners

### Collaboration for success

TBRRI works hand-in-hand with crucial key partners including corporate member organizations, academic, health care, government, industry and research partners. Together we bring discovery to life and move molecular imaging and advanced diagnostic care forward. Bringing new advances to patients is our mutual mission.



Part of what makes the Thunder Bay Regional Health Sciences Centre (TBRHSC) special is that for a hospital of its size, there is an incredible amount of research and teaching happening. Last year, the TBRHSC reached the 37th spot on the list of the Top 40 Research Hospitals in Canada – something that never would have happened without the Thunder Bay Regional Research Institute (TBRRI) as its research arm.

But why is that important? What are the benefits of a thriving research program to the residents of Northwestern Ontario?

As a matter of fact, there are many benefits that fall under one of three headings: healthier, wealthier, and smarter. These recognize not only the long-term benefits of research to health care, but the complete impact of research on the region.

### Healthier

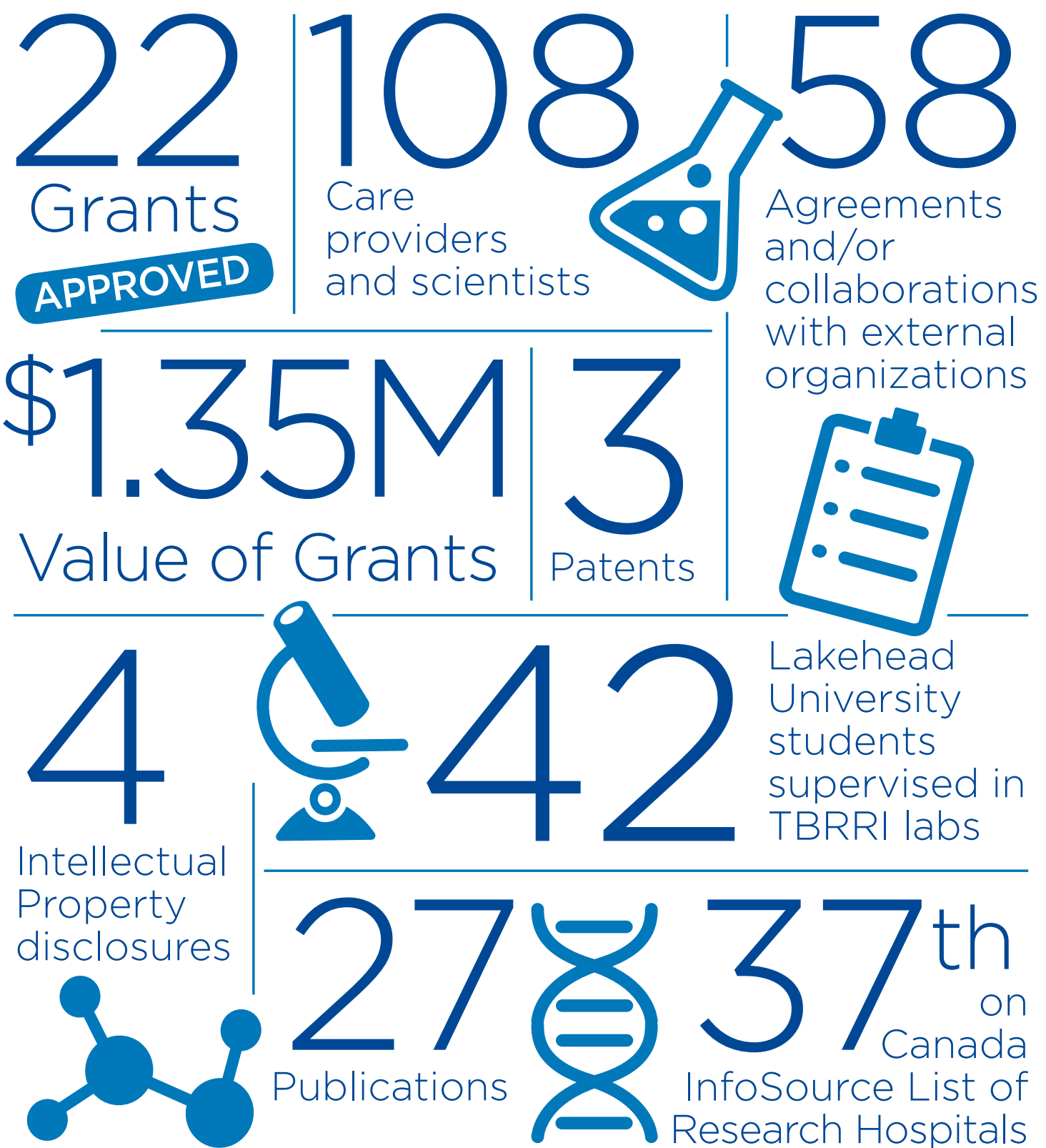
Time and again we've seen how research improves the health of the region it serves today as well as tomorrow. Here in Northwestern Ontario we have tangible evidence of that in terms of the equipment we have (a second MRI unit, the PET-CT scanner, the new cyclotron) that we wouldn't have otherwise. We have attracted more clinical trials since TBRRI was founded, providing our patients with additional options.

### Wealthier

Every dollar invested in research is an economic driver for the community and region. We see that most obviously in terms of researchers and clinicians moving to the region to work, which automatically impacts our economy. With the intellectual property (IP) and medical devices now in development at TBRRI, our knowledge-based economy will continue to grow. We also see it in cost savings. Using HIFU to treat fibroids, for example, costs half that of surgery and a fraction in terms of indirect costs (one week of recovery time instead of six).

### Smarter

Physicians and other health care professionals tend to want to work where cutting-edge research is happening. By our most recent count, 95 health care professionals are actively engaged in research – people who love working with patients and who also want to find their own solutions to the health care issues they see every day. Creating our own research projects also allows us to solve our unique health care challenges, and then share our solutions with the rest of the world. TBRRI and the research we enable helps us discover better treatments, generate revenue for the economy, and attracts high-calibre health care providers for a healthier, wealthier, smarter Northwestern Ontario.



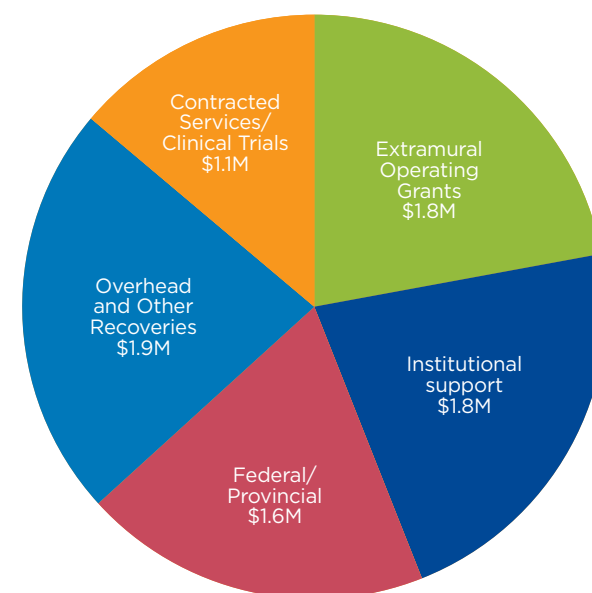
TBRRI Scientists and TBRHSC Physician Researchers

Principal Investigator	Grant	Title	Amount (\$)	Term
Margaret Anthes (PI) Naana Jumah, Laura Curiel (Co-Is)	NOAMA Clinical Innovation Opportunities Fund	Improving Patient Care through Minimally Invasive MR-Guided Focused Ultrasound Procedures: Capacity Building and Development	\$33,555	1 year
Trevor Bon (PI) Alexandra Peel, Seda Rafilovich (Co-Is)	NOAMA Clinical Innovation Opportunities Fund	Disparities in Hospital and Discharge Outcomes for Older Adults with No Family Doctor	\$49,600	1 year
Kurt Droll (PI) David Puskas, Paolo Sanzo, Simon Lees (Co-Is)	NOAMA Clinical Innovation Opportunities Fund	The Effects of Exercise and Cycle Ergometry in Post-Exercise Total Knee Patients: A Randomized Controlled Trial	\$50,000	1 year
Naana Jumah	NOAMA Clinical Innovation Opportunities Fund	Northwestern Ontario Strategy for Opioid Dependence in Pregnancy	\$50,020	1 year
Yasser Labib (PI) David Puskas (Co-I)	NOAMA Clinical Innovation Opportunities Fund	Investigating the Rationale of Administration of Tranexamic Acid in Orthopaedic Surgery	\$50,006	2 years
Marios Roussos	NOAMA Clinical Innovation Opportunities Fund	Validating the Use of Non-Invasive Central Venous Pressure Measurement to Guide the Fluid Resuscitation of Patients with Severe Sepsis and Septic Shock in Resource Limited Settings	\$35,000	1 year
Naana Jumah	CIHR Planning & Dissemination Grant	Northwestern Ontario Management Strategies for Opioid Dependence in Pregnancy: Sharing Knowledge and Improving Care	\$8,500	1 year
Laura Curiel (PI) Naana Jumah, Margaret Anthes, Samuel Pichardo (Co-Is)	CIHR Planning & Dissemination Grant	Improving Research Activity on Novel Minimally Invasive Procedures for Cancer Treatment in Northwestern Ontario	\$10,000	1 year
David Palmer (PI from U of S) Chris Phenix (Co-I)	Sylvie Fedoruk Canadian Centre for Nuclear Innovation - Nuclear Medicine Grant	Chemical and Enzymatic Synthesis of Novel Medical Imaging Probes	\$10,000	2 years
Julian Little (PI from U of O) Ingeborg Zehbe (Co-I)	Mitacs Accelerate Internship - Brianne Wood	A Mixed-Methods Project Investigating HerSwab™ and Arts-Based Education as Integral Components of Culturally Acceptable Cervical Screening in Northwest Ontario First Nations Communities	\$90,000	3 years
Vineet Johnson (PI from LU) Jane Lawrence-Dewar (Co-I)	Thunder Bay Community Foundation - Dr. R.K. Dewar Medical Research Grant	Visuomotor Changes in the Cortex, Consequent to Hand Training Using a Hand Rehabilitation Device	\$15,500	1 year
William Anderson (PI) Lisa Beck (Co-I)	NOAMA Clinical Innovation Opportunities Fund	Evaluating the Implementation of a Cardiopulmonary Resuscitation and Advanced Life Sustaining Treatment Code Status Levels Policy	\$50,000	1 year
Arnold Kim (PI) Claudio Comisso (Co-I)	NOAMA Clinical Innovation Opportunities Fund	Leveraging a Shared, Context-Free Language Approach to Medical Documentation to Improve the Efficiency, Efficacy, and Measurability of Health Care Delivery and Learning within a Live Hospital-Based, Clinical Teaching Environment	\$50,000	1 year
David Puskas (PI) Caroline Fanti, Alex Vistorino (Co-Is)	NOAMA Clinical Innovation Opportunities Fund	Regional Delivery of Lower Back Pain (LBP) Treatment to Remote Communities	\$48,166	2 years
Margaret Sweet (PI) Ayman Hassan, Elaine Edwards, Sharon Jaspers, Caterina Krmill (Co-Is)	NOAMA Clinical Innovation Opportunities Fund	New Evidence-Based Toolkit for Triaging TIA and Non-Disabling Stroke in Northwestern Ontario	\$49,338	2 years
Jane Lawrence-Dewar (PI)	Mitacs Accelerate Internship - Shayna Parker	Is there an age-related change in the responsiveness of the mirror neuron systems involved in observational learning in humans?	\$30,000	1 year
Ingeborg Zehbe (PI)	CIHR Planning & Dissemination Grant	HPV Self-Sampling in the North	\$12,000	1 year
Samuel Pichardo (PI)	Philips Health care Internship	Interleaved Scanning for MR-HIFU	\$7,500	1 year
Claude Cullinan (PI)	NOAMA AHSC AFP Innovation Fund	A Smoking Cessation Program for Surgical Orthopaedic Patients: Stopping Smoking Before Surgery	\$49,996	2 years
Margaret Anthes (PI) Chris Phenix, Simon Lees, Douglas Boreham, Douglas Spitz (Co-Is)	NOAMA AHSC AFP Innovation Fund	Pre-Clinical Assessment of Novel Combination Cancer Therapies	\$100,000	2 years
Francis Hane (Postdoctoral Fellow of the Albert Lab)	BrightFocus Foundation Research Fellowship Award	Development of hyper-polarized 129Xe gas magnetic resonance imaging based Alzheimer's disease early detection molecular probe	\$100,000	2 years
Ingeborg Zehbe & Laura Curiel (Co-PIs) Naana Jumah, Chris Phenix, Jamshid Tanha (Co-Is)	CIHR Collaborative Health Research Project (NSERC Partnered)	High Intensity Focused Ultrasound & Newly Engineered Single Domain Antibodies for Non-Invasive Treatment of Human Papillomavirus-Related Cervical Cancer	\$453,740	3 years
		<b>TOTAL</b>	<b>\$1,352,921</b>	

## Financials

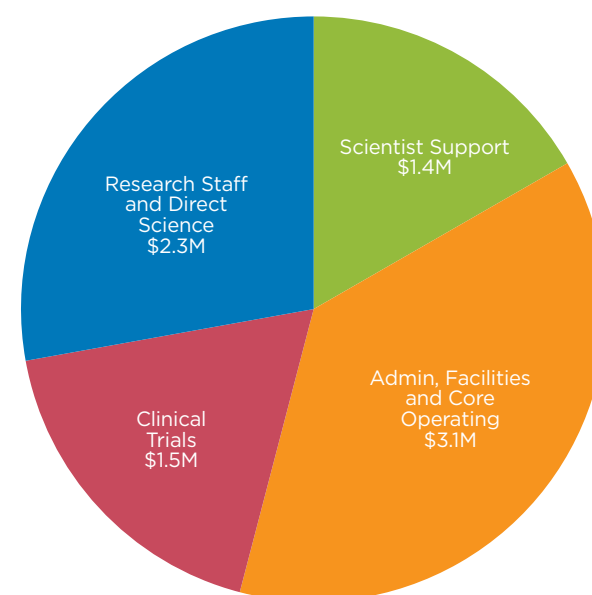
## Revenue Sources

Total = \$8.1M



## Expenses

Total = \$8.3M





# Patient-Centred Research

In contrast to research that aims first and foremost to add to the body of knowledge, research at TBRRI begins with a specific unmet patient need and progresses through discovery science to clinical trials, and ideally to commercialization. Our patient centric approach is designed to accelerate discoveries leading to impactful changes in the delivery of health care. All medical research organizations conduct patient centered research. However, for TBRRI, patient centered research is at the heart of everything that we do.

## Thunder Bay Regional Research Institute

In partnership with  
Thunder Bay Regional Health Sciences Centre  
*Affiliated with Lakehead University*

