



"I've said to people before that I'm going to do my very best to make it, I'm not going to give up. But I might not make it...if I don't, the Marathon of Hope better continue." [Day 90]

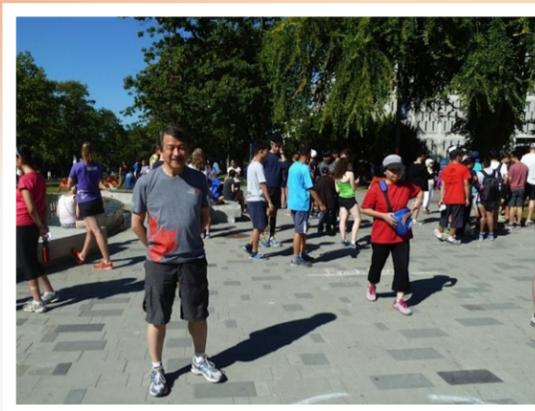
An invitation to all Terry Fox funded researchers

Join our Terry Fox Run Challenge to celebrate Terry's 35th Marathon of Hope on Sunday, September 20, 2015.

- Team up for Terry – Increase your visibility as a funded researcher!
- Create your own team challenge & challenge other teams!
- Dress in costume!
- Support Terry's CAUSE on your campus

SIGN UP your project team today!

Register at www.terryfox.org/Run/Runteam_new_.html.



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The Terry Fox Research Institute
L'Institut de recherche Terry Fox

research news

Summer 2015

TFRI-funded researchers lead world-first viral therapy trial



Key Investigators (left to right): David Stojdl, Brian Lichy and John Bell are long-time funded Terry Fox researchers.

Terry Fox-funded researchers are key members of a Canadian team to have launched the world's first clinical trial of a new therapy that uses a combination of two viruses to attack and kill cancer cells, and stimulate an anti-cancer immune response. Previous research by this team and others worldwide suggests that this approach could be very powerful, and could have fewer side effects than conventional chemotherapy and radiation, although it will take years to rigorously test through this trial and others.

The therapy was jointly discovered and is being developed by Dr. David Stojdl (Children's Hospital of Eastern Ontario, University of Ottawa), Dr. Brian Lichy (McMaster University) and Dr. John Bell (The Ottawa Hospital, University of Ottawa), and their respective research teams and colleagues. Drs. Bell, Lichy and Stojdl are principal investigators on the Terry Fox Program Project Canadian Oncolytic Virus Consortium (COVCo), which has been key to developing the anti-cancer viruses.

The clinical trial, which is funded by the Ontario Institute for Cancer Research and co-ordinated by the NCIC Clinical Trials Group, is expected to enroll up to 79 patients at four hospitals across Canada. Up to 24 patients will receive one of the viruses and the rest will receive both, two weeks apart. The two viruses being tested in this clinical trial are called MG1MA3 and AdMA3. MG1MA3 is derived from a virus called Maraba, which was first isolated from Brazilian sandflies, while AdMA3 is derived from a common cold virus called Adenovirus.

Christina Monker, 75, a former nurse from Rockland, Ontario, is one of the first patients treated in the trial. She was diagnosed with cancer in 2012 and, despite six weeks of radiation therapy and more than 30 rounds of chemotherapy, the cancer spread to both her lungs.

"The nausea of chemotherapy was worse than I ever could have imagined, but with the viral therapy I just felt like I had the flu for a couple of days, and the symptoms were easily managed. It is too soon to know if I may have benefited from this therapy, but I'm very glad to contribute to this important research that could improve care for others."



– Christina Monker

Drs. Bell, Lichy and Stojdl began investigating viral therapies for cancer 15 years ago and have been funded by The Terry Fox Foundation since 2004.

View a video of Dr. Bell discussing oncolytic viruses at www.youtube.com/watch?v=bSJa-uvSz0s

New partnerships enable a record number of New Investigator Awards

TFRI is pleased to announce the recipients of its 2015 New Investigator awards. You can learn about them in this issue! (pages 2 to 4). These new partnerships enabled TFRI this year to double the number of awards made to six from three in previous years.

Four investigators are pursuing new ways to detect leukemia and lymphoma in children and adults; one is embarking on a clinical trial to treat osteosarcoma in dogs (yes dogs; and yes it is the same form of cancer Terry had!) and one is studying ways in which immunotherapy might improve treatment for men with prostate cancer.

Each researcher will receive a total of \$450,000 over the next three years (2015-2018) to pursue their research endeavours at their home institutions under the mentorship of TFRI principal investigators leading large translational and discovery projects at partner institutions across the country. The total investment is \$2.7 million. TFRI thanks its new partners in British Columbia and Quebec for their support.



Save the date for TFRI's 7th ASM:

May 12-14, 2016
Vancouver, BC

2015 Terry Fox New Investigators

British Columbia

DR. MARTIN HIRST



Where: University of British Columbia, BC Cancer Agency
Project Title: Epigenetic basis of acute myeloid leukemia (AML)

Mentoring Program: The Terry Fox New Frontiers Program Project Grant in Core Pathogenic Pathways in Human Leukemia (Dr. Keith Humphries, PI)
Funding Partner: BC Cancer Foundation (\$225,000)

Vitamin C may be best known for its role in preventing the common cold, but Dr. Martin Hirst's research suggests it may also reverse abnormal and potentially cancer causing changes to the epigenome, which is involved in regulating the expression of genes.

"Abnormal changes to the epigenome are associated with cancers such as acute myeloid leukemia (AML)," says Dr. Hirst, head of epigenomics at the BC Cancer Agency. "We have discovered that vitamin C directly regulates the machinery that maintains a normal epigenome."

Dr. Hirst compares the genome to the hard drive and the epigenome to the software. The genome contains an organism's entire DNA instructions, and the epigenome refers to the chemical changes of proteins and DNA that controls the genome's activity.

His collaborative research suggests that vitamin C 'turns-up' the activity of an enzyme called TET that is recurrently 'turned-down' in AML through genetic mutation. Under specific circumstances, vitamin C may be able to reverse some of the abnormal epigenomic changes in AML and provide therapeutic benefit.

AML typically has a poor long-term prognosis, particularly in adults. Dr. Hirst hopes that his research could lead to better therapeutics for patients.

"One of the issues with current chemotherapeutics or treatments in general is harmful off-target effects," he says. "An increase in vitamin C shouldn't have these detrimental impacts."

BC Cancer Agency senior scientist Dr. Keith Humphries is Dr. Hirst's mentor for the duration of his three-year award.

"Martin has gained, local, national, and international recognition for his many contributions," says Dr. Humphries. "As the co-chair of the International Human Epigenome Consortium Scientific Steering Committee he is connected and respected by the epigenomics experts around the globe."

"It's extremely exciting, and I'm very honoured to be selected for this award," says Dr. Hirst. "This is a very exciting time...we are only just beginning to understand how the epigenome is altered in specific cancers and unlike genetic mutations, epigenetic changes are potentially reversible, thus providing new opportunities to treat cancer."

British Columbia

DR. RYAN MORIN



Where: Simon Fraser University, BC Cancer Agency
Project Title: Exploring clonal evolution in non-Hodgkin lymphomas using serial tumour sampling and liquid biopsies

Mentoring Program: The Terry Fox New Frontiers Program Project Grant in Molecular Correlates of Treatment Failure in Lymphoid Cancer (Dr. Randy Gascoyne, PI)
Funding Partner: BC Cancer Foundation (\$225,000)

Working at the BC Genome Sciences Centre a decade ago, Dr. Ryan Morin didn't intend to become a cancer researcher. Yet today, following the path he began as a graduate student, he is using his expertise in bioinformatics to determine how non-Hodgkin lymphomas (NHL) become resistant to drug treatments.

Non-Hodgkin lymphomas (NHL) are the fifth most common cancer affecting Canadians. Dr. Morin's ultimate goal is to identify new targets for more effective drugs to kill these tumours.

"Our first aim is to look at aggressive lymphomas and ask how they evolve over time," says Dr. Morin, now based at Simon Fraser University. "Then we want to determine where we might be able to target new drugs at tumour cells to kill them."

The team will also use "liquid biopsy" methods to detect genetic changes in

tumours without using traditional, invasive biopsy procedures. Liquid biopsies use a simple blood test to determine the level of tumour DNA in a patient's blood.

"Blood tests are not fun, but they are a lot easier than a biopsy," says Dr. Morin. "This is potentially a new way to monitor the progression of the disease overall to see whether the tumour is changing into a more aggressive form of cancer."

Dr. Randy Gascoyne at the BC Cancer Agency is mentoring Dr. Morin. "Ryan's interest in circulating-tumour DNA as a biomarker for monitoring NHL progression and evolution is timely and, in my opinion, very promising."

"This award is really important for the labs of people like myself, who are new players in a big pool of high-quality researchers," remarks Dr. Morin. "It really helps us get started, make headway, and get a research program going. It's really exciting!"

2015 Terry Fox New Investigators

Quebec

DR. SONIA CELLOT



Where: Université de Montréal
Project Title: Deciphering the role of chromatin demethylases in high-risk pediatric acute myeloid leukemia
Mentoring Program: The Terry Fox New Frontiers Program Project Grant in Core Pathogenic Pathways in Human Leukemia (Dr. Keith Humphries, PI)
Funding Partners: The Cole Foundation (\$112,500), La Fondation CHU Sainte-Justine (\$62,500) and La Fondation du Centre de Cancérologie Charles-Bruneau (\$50,000)

Despite rapid advances in treatment for some forms of pediatric leukemia, only around 60 per cent of children diagnosed with acute myeloid leukemia (AML) survive - a grim statistic that is motivating TFRI researcher Dr. Sonia Cellot's work.

AML is the most deadly form of the disease, with cure rates significantly lower than some other forms of leukemia. Cellot's goal is to identify epigenetic regulators of leukemic stem cells to eventually help contribute to therapeutic drug design.

"This is clearly not an area we are doing well in," says Dr. Cellot, trained initially in pediatric hematology. "We don't have the cure rates as high as in other areas of leukemia, so this is a big focus for me."

An emerging and fascinating concept is that some epigenetic regulators are critical to sustain leukemic cells, says Dr. Cellot, but appear to be dispensable for normal hematopoietic stem cells (HSC) function.

"The idea would be to find something we could target to eradicate the leukemic stem cell while preserving the normal blood stem cell compartment," she says.

Stem cells are located in bone marrow and stay with people throughout their lives, says Dr. Cellot. The cells consequently have time to accumulate a number of

mutations, making them frequent targets of malignant transformation that can lead to full-blown leukemia.

"Especially in young children, the genetic defect which occurs is very potent and has a very high ability to transform the cells," says Dr. Cellot. "It's an aggressive cancer, but the important thing is to find a way to tackle it."

Bone marrow transplantation procedures used to cure certain types of cancer also rely on stem cells to resume blood production in patients, adds Dr. Cellot, noting that a better understanding of their biology could lead to increased transplantation success.

Dr. Keith Humphries, BC Cancer Agency, is mentoring Dr. Cellot for the duration of her three-year award. "Sonia's insightful perspective gathered from infant leukemia patients inspired her studies on the role of epigenetic regulators in HSC fate determination," he says. "She is, thus, in an ideal position to build bridges between her fundamental research program and improved therapies."

Dr. Cellot believes TFRI's New Investigator awards are a "lifesaver" for young cancer researchers across the country. "It's amazing that TFRI helps us young ones establish our labs," she says. "It's crucial if we want to continue this type of research in Canada."

Quebec

DR. JOHN STAGG



Where: Centre de Recherche du Centre Hospitalier de l'Université de Montréal
Project Title: The role of the CD73 adenosinergic pathway in prostate cancer
Mentoring Program: Canadian Prostate Cancer Biomarker Network (CPCBN) (Dr. Fred Saad, PI)
Funding Partner: Fonds de Recherche du Québec-Santé (FRQ-S) (\$165,000)

New investigator Dr. John Stagg's recent breakthrough in immunotherapy, or stimulating a patient's own immune system to destroy tumour cells, could lead to a "promising" new treatment for prostate cancer patients.

His team at L'Université de Montréal has discovered that a protein molecule called CD73 is involved in suppressing the immune system's ability to kill cancerous cells. Blocking CD73 with therapeutics may allow the immune system to more effectively kill tumour cells, says Dr. Stagg. His award permits him to test this theory.

"It's important to talk about the potential of immunotherapies to treat cancer," he says. "We are developing therapeutics that block the CD73 molecule, and hope to bring these therapeutics into a clinic trial for cancer patients within the next five years."

In 2014, 10 per cent of Canadian male cancer deaths were from prostate cancer. Around 65 men are diagnosed with the disease every day.

Dr. Fred Saad, L'Université de Montréal, who leads TFRI's Canadian Prostate

Cancer Biomarker Network (CPCBN), is Dr. Stagg's mentor for the duration of the three-year award.

"We're excited about the opportunity to work with John, a talented young leader in the field of cancer immunology," says Dr. Saad. "Despite being at an early stage in his career, his work is internationally recognized...and he is truly deserving of support from the TFRI New Investigator Award."

One of the most important aspects of the award, adds Dr. Stagg, is accessing the pan-Canadian prostate network. His team will be able to compare the molecules they have identified to more than 1,500 tissue samples from the CPBN project, donated by men with prostate cancer.

"Things are evolving rapidly and there's more hope now than a year ago for cancer patients," says Dr. Stagg. "This award is a major step for us, and we are excited to see what the future holds!"

2015 Terry Fox New Investigators

Quebec

DR. BRIAN WILHELM



Where: Université de Montréal
Project Title: Transcriptional and epigenetic consequences of MII-AF9 translocations
Mentoring Program: The Terry Fox New Frontiers Program Project Grant in Core Pathogenic Pathways in Human Leukemia (Dr. Keith Humphries, PI)
Funding Partners: Fonds de Recherche du Québec-Santé (\$165,000), The Cole Foundation (\$30,000), L'Institut de Recherche en immunologie et oncologie (\$30,000)

Dr. Brian Wilhelm's lab is working on a "huge genetic puzzle" to determine which genes cause children to develop acute myeloid leukemia (AML).

"We've identified a small group of genes that are very specifically expressed in this kind of tumour. When we look at other healthy, normal blood cells we don't see these genes being expressed," says the assistant professor at L'Université de Montréal's Institute for Research in Immunology and Cancer.

Using both RNA and DNA sequencing, Dr Wilhelm's lab has identified 34 candidate genes specifically expressed in AML with translocations in the MLL gene. The New Investigator award from TFRI will allow the team to take the next step: validating which of these genes are actually required for children to develop this deadly form of leukemia.

Leukemias represent one-third of cancer diagnoses in Canadian children. While some forms of the disease respond well to treatment, the prognosis for AML is grim. Only half of patients will fully recover.

"Part of the goal is really to try and not just learn about this disease, but to find ways to develop novel treatments and therapeutics," says Dr. Wilhelm. "We have to think of new ways to specifically target the leukemia without causing the damaging secondary effects seen with standard chemotherapy."

Dr. Guy Sauvageau, L'Université de Montréal, recommended Dr. Wilhelm for the award. "Brian is a hard worker, perseverant and shows great judgment and maturity. He has the hallmarks of an outstanding researcher who has now uncovered a novel set of genes..."

This award will enable his lab to focus on extending their preliminary findings, says Dr. Wilhelm, expanding knowledge of the genetic underpinnings of this disease.

"If you talk to most researchers, what motivates them is the idea that you can improve the lives of people suffering with cancer," he says. "This award now gives us the resources to focus on advancing our project and to find ways to translate our work into novel clinical treatments. It's really phenomenal!"

Ontario

DR. BYRAM BRIDLE



Where: University of Guelph
Project Title: Evaluation of oncolytic immunotherapy in canine cancer trials: A stepping stone towards successful translation into human patients
Mentoring Program: The Terry Fox New Frontiers Program Project Grant in Canadian Oncolytic Virus Consortium (Dr. John Bell, PI)

Viral immunologist Dr. Byram Bridle has developed an innovative new way to treat osteosarcoma, the same type of bone cancer that took Terry Fox's life – and next year will start canine clinical trials at the University of Guelph's Animal Cancer Centre with new funds from TFRI.

"Dogs are like people – right now they have a very poor prognosis when diagnosed with bone cancer," says Dr. Bridle, noting that the Animal Cancer Centre sees one-to-three new cases of canine osteosarcoma every week. "Dogs develop osteosarcoma at rates 10 times higher than humans, and are just as much in need of alternative therapies as we are."

Despite aggressive treatments like limb amputation and chemotherapy, many patients with osteosarcoma die when the cancer spreads throughout the body. Dr. Bridle's research will combine two novel forms of cancer therapy -- immunotherapy and oncolytic viruses -- to "kickstart a patient's immune system to target and kill their own cancer with exquisite specificity."

Oncolytic viruses are harmless to humans and kill only cancer cells, while immunotherapy utilizes the power of the immune system to destroy tumours. The treatment will be simple and inexpensive, with two shots administered two weeks apart.

No harmful side effects are anticipated for the dogs, notes Dr. Bridle, and the vaccines will be tested to ensure both efficacy and safety. Forty-five dogs from the centre that meet the inclusion criteria for the study will be given the option to participate.

Dr. Bridle is also applying to the Canadian Food Inspection Agency (CFIA) for permission to begin the veterinary clinical trial.

Dr. John Bell, Ottawa Hospital Research Institute, is mentoring Dr. Bridle for the duration of his three-year award.

This research will "facilitate development of therapies that could transform the way cancer is treated in Canada," says Dr. Bell. "I certainly will, with pleasure, continue to personally provide mentorship to this promising researcher."

When Terry Fox died of osteosarcoma, adds Dr. Bridle, this approach to treatment wasn't even an option.

"This treatment is a win-win situation," he says. "If we're successful with the dogs, we will immediately have a veterinary application for the therapy and gain a lot of confidence moving forward into a human clinical trial. It just goes to show you how far we've come!"

NODE NEWS

The Prairies



Attendees gathered for a group shot at the 3rd Prairie Node Symposium in Winnipeg on June 9th.

Winnipeg was the home of this year's bi-annual TFRI Prairie Node Symposium, hosted by Prairie node leader Dr. Jim Davie. The June 9 event featured 15 presenters and drew about 90 people, mostly researchers and trainees from both Manitoba and Saskatchewan, to discuss cancer research under way at the University of Manitoba, Manitoba Institute of Cell Biology, University of Saskatchewan, and the Saskatchewan Cancer Agency as well as pan-Canadian research funded by TFRI. Dr. Victor Ling, TFRI scientific director and Dr. Sean Egan (metastatic breast cancer), Hospital for Sick Children, were among the keynote speakers. Symposium attendees gathered for a photograph at what marks the third symposium held since the node was formed in 2010.

British Columbia

TFRI's BC Node Regional Advisory Council (RAC) met for the second time with BC Ministers and MLAs on May 26, 2015 to present and profile the role of cancer research in improving cancer patient outcomes. The focus was real-life clinical genomics applied to hereditary gastric cancer and personalized therapy and the roles of TFRI and BC cancer research.

"A vigorous, interactive question period followed during which MLAs extended their understanding and support for genomics and cancer research with a vibrant BC presence," says BC RAC chair Dr. Simon Sutcliffe. Post-meeting, MLA evaluations endorsed the value of the forum and the MLAs' interest in being well-informed on behalf of their constituents/constituencies.

Terry Fox Foundation / Research Institute NEWS

The Terry Fox Foundation and TFRI have announced new faces and positions at their national and headquarters offices, based in British Columbia.



Heather Scott has joined TFF as director of development. Scott brings with her two decades of fundraising and not-for-profit management experience in the health, education and social service sectors. Most recently she was with Family Services of Greater Vancouver where she helped to re-ignite their fund development program. Prior to that with SHARE Family and Community Services, Scott led a small team that doubled the organization's annual fundraising revenue while significantly reducing their fundraising costs. She has her Certified Fundraising Executive credential (CFRE) and is a masters of public administration candidate with University of Victoria.

In mid-July, **Katherine Koyko** assumed the role of director of marketing and communications for the Foundation. After graduating from SFU with a Bachelor of Arts in psychology, Koyko immersed herself in the apparel industry spending notable time with global sports brands Descente Ski Apparel and Sugoi Performance Apparel. Since 2011, she has been the marketing manager for the Canadian Cancer Society, BC and Yukon, where she has streamlined marketing practices, enhanced assets and strengthened brand awareness in small and large communities.

This summer TFF relocated its national office to Burnaby, BC (on the campus of Simon Fraser University) from its former location in Chilliwack.



Russell Watkins is TFRI's new senior research programs manager, where he will have oversight for all of TFRI's funded research programs/projects. He holds a doctorate in molecular evolution from Simon Fraser University and has an extensive background in the management of large-scale research projects. Watkins has worked for Dalhousie University, the Centre for Molecular Medicine and Therapeutics at the University of British Columbia and, most recently, at the BC Cancer Agency Genome Sciences Centre.



Susan Lau is TFRI's research finance co-ordinator. She brings experience from the utilities and engineering industries and previously worked at the BC Cancer Agency, where she managed research funds. She handles all financial matters concerning our research programs.

Memories of St. John's, May 2015 (TFRI's 6th ASM)



TERRY FOX

Research Legacy

On the Road to Personalized Medicine

This project celebrates Terry's research legacy and the 35th Marathon of Hope anniversary with your stories of Terry's inspiration, research excellence and patient impact.

Be Inspired! Visit our Legacy Page Today!

TerryFoxResearchLegacy.ca

"It's once in a lifetime that you see something like this happen..."

"Terry inspired us all with the message that anyone can do something for this terrible disease."

"Terry Fox is one of my personal heroes...and if he were alive today I think he would be happy to see where things are moving."

Do you have a Terry Fox story to share?

Email us: info@tfri.ca

Thanks to our past- and present-funded researchers for sharing their stories and testimonials:

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