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.

Drs. Bell, Lichty 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/bSJa-uvSzos

TFRI-funded researchers lead world-first viral therapy trial

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 Lichty (McMaster University) and Dr. John Bell (The Ottawa Hospital, University of Ottawa), and their respective research teams and colleagues. Drs. Bell, Lichty 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.
British Columbia

**2015 Terry Fox New Investigators**

**DR. MARTIN HIRST**

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 cancerous 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 the epigenetics lab 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.

**Where:** University of British Columbia, BC Cancer Agency  
**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  
**Funding Partner:** BC Cancer Foundation ($225,000)

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**2015 Terry Fox New Investigators**

**DR. SONIA CÉLLOT**

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 Célott’s work.

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

“This is clearly an area we are doing well in,” says Dr. Célott, 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 us.”

An emerging and fascinating concept is that some epigenetic regulators are critical to sustain leukemic cells, says Dr. Célott, 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. Célott. 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. Célott. “Identifying one 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. Célott, noting that a better understanding of their biology could lead to increased transplantation success.

Dr. Keith Humphries, BC Cancer Agency, is mentoring Dr. Célott for the duration of her three-year award. “Sonia’s insight and 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. Célott 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.”

**Where:** Université de Montréal  
**Project Title:** Finding new biomarkers in prostate cancer  
**Mentoring Program:** The Terry Fox New Frontiers Program Project Grant in Core Pathogenic Pathways in Human Leukemia  
**Funding Partner:** The Coalition Foundation ($112,500)  
**Funding Partner:** Fondation CHU Sainte-Jeanne ($62,500) and La Fondation du Centre de Cancérologie Charles-Brunneau ($50,000)

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**British Columbia**

**2015 Terry Fox New Investigators**

**DR. RYAN MORIN**

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 patients’ 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,” says Dr. Gascoyne.

“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!”

**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  
**Funding Partner:** BC Cancer Foundation ($225,000)

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**Quebec**

**DR. JOHN STAGG**

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 therapies 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 cancers,” he says. “We’re developing therapeutics that block the CD73 molecule, and hope to bring these immunotherapies to treat cancer,” he says.

“It’s an aggressive cancer, but the very high ability to transform the cells,” says Dr. Cellot. "It’s truly deserving of support from the TFRI 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, says 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 forward. We’re excited to see what the future holds!”

**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)  
**Funding Partner:** Dr. Fred Saad, PD  
**Funding Partner:** Fonds de Recherche du Québec-Santé (FRQS) ($165,000)

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**2015 Terry Fox New Investigators**

Dr. Keith Humphries, PI  
**Funding Partner:** Recherche du Québec-Santé  
**Funding Partner:** Fonds de Recherche du Québec-Santé  
**Funding Partner:** L’Université de Montréal, L’Institut universitaire de cancérologie du Québec-Santé  
**Funding Partner:** La Fondation du Centre de Cancérologie Charles-Brunneau  
**Funding Partner:** Société Charle-Bruneau ($50,000)  
**Funding Partner:** Réseau de cancérologie du Centre hospitalier de l’Université de Montréal ($112,500)  
**Funding Partner:** Fondation du Centre de Cancérologie Saint-Jeanne-D’Arc ($62,500)  
**Funding Partner:** L’Institut universitaire de cancérologie du Québec-Santé ($100,000)  
**Funding Partner:** Fonds de Recherche du Québec-Santé  
**Funding Partner:** Recherche du Québec-Santé  
**Funding Partner:** L’Université de Montréal, L’Institut universitaire de cancérologie du Québec-Santé  
**Funding Partner:** La Fondation du Centre de Cancérologie Charles-Brunneau  
**Funding Partner:** Société Charle-Bruneau ($50,000)  
**Funding Partner:** Réseau de cancérologie du Centre hospitalier de l’Université de Montréal ($112,500)  
**Funding Partner:** Fondation du Centre de Cancérologie Saint-Jeanne-D’Arc ($62,500)  
**Funding Partner:** L’Institut universitaire de cancérologie du Québec-Santé ($100,000)  
**Funding Partner:** Fonds de Recherche du Québec-Santé  
**Funding Partner:** L’Université de Montréal, L’Institut universitaire de cancérologie du Québec-Santé
Dr. Brian Wilhelms'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 tumor," says Dr. Wilhelms, who is the assistant professor at L'Université de Montréal's Institute for Research in Immunology and Cancer. Using both RNA and DNA sequencing, Dr. Wilhelms's lab has identified 24 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 therapies," says Dr. Wilhelms. "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. Wilhelms 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. Wilhelms, 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

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.

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

When Terry Fox died of osteosarcoma, says Dr. Bridle, this approach to treatment wasn’t even promising researcher."

This treatment is a win-win situation," he says. "This treatment is a win-win situation," 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!"

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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.

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

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Do you have a Terry Fox story to share?
Email us: info@tfri.ca