

research update

New Frontiers The next generation of Terry Fox Foundation cancer research

DR. KRISTIN BAETZ

High-tech meets basic biology in promising new work by Foundation-funded researcher

Genomic research is fast becoming what many consider the source of the next medical breakthrough. Its appeal is simple: If we know exactly what makes a human being, we will know exactly what to fix when something – like cancer – goes wrong.

“Ultimately, this research means better, more personalized cancer treatments,” says one of Canada’s up and coming genomic scientists Dr. Kristin Baetz, a Terry Fox Foundation researcher at the University of Ottawa.

Genomics, the study of our complete genetic blueprint – or genome – really got its start 50 years ago with the discovery of DNA. But it’s today’s technology that has launched the field forward in explaining how our DNA determines the diseases we succumb to.

Today, powerful tools allow researchers to sort through thousands of genes and the proteins they produce with outstanding speed, detail and accuracy. Unlike traditional biology experiments that focus on one gene at a time, these tools can reveal the biological functions and interactions of all the cells and genes that make up a whole organism in one experiment.

In Dr. Baetz’s lab, genomic tools allow her to screen the 6,000 genes that make up a type of yeast to pinpoint the molecular pathways that, when disrupted, lead to losses or gains of chromosomes – a genetic feature of most cancer cells. Because these pathways are nearly identical in yeast and humans, Dr. Baetz’s work on yeast provides a simpler, faster and more effective way to gain insight into cancer development in people.

“With these tools, we’re learning where we should be focusing our research efforts in terms of new drugs and specific targets for those drugs, and even how to predict what treatments will work best for each patient,” says Dr. Baetz.

Proof that such research will make an impact already exists. Anti-cancer therapies based on genomic research are already available to cancer patients in Canada. Gleevec, a drug for chronic myeloid leukemia, and Herceptin for breast cancer are both treatments that work by targeting only those cancer cells with a specific change in their genes.

Yet there are still a lot of unknowns about how cancer’s genetic basis differs between all 200 forms of the disease. Figuring out what makes drugs like Gleevec work for some patients and not others is therefore at the heart of the research being carried out by this generation of cancer researchers.

“It’s an exciting era for the Foundation, as researchers are not only answering critical questions about cancer, they are starting to ask new questions about the disease we couldn’t even have conceived of 20 years ago,” says Dr. Michael Wosnick, executive director of the National Cancer Institute of Canada (NCIC). “In this way, all the research funded by the Foundation through the NCIC, from basic biology through to genomics, is advancing along with today’s technology and bringing us even closer to fulfilling Terry’s dream.”

The Terry Fox Foundation’s mission is to maintain the principles of Terry Fox while raising money for cancer research through the annual Terry Fox Run, memoriam donations and planned gifts.



A single dream. A world of hope.
The Terry Fox Foundation

\$20 million in funding for research in Terry's name

Thanks to the efforts of its dedicated volunteers, The Terry Fox Foundation, through the National Cancer Institute of Canada (NCIC), is funding \$20 million in research across the country in 2006/2007. These funds support a broad spectrum of excellent cancer research in Canada, including studies on how viruses can be used to kill cancer, new ways of detecting cancer earlier and research that is improving our understanding of the disease.

“We believe that research is the key to fulfilling Terry's dream of beating cancer,” says Darrell Fox, national director of the Foundation and Terry's brother. “The innovative, excellent research we fund has already given us so much to feel hopeful about and I'm equally as excited about what this generation of Terry Fox researchers will accomplish in my lifetime.”

Among the new research grants awarded through the NCIC in 2006:

Vancouver

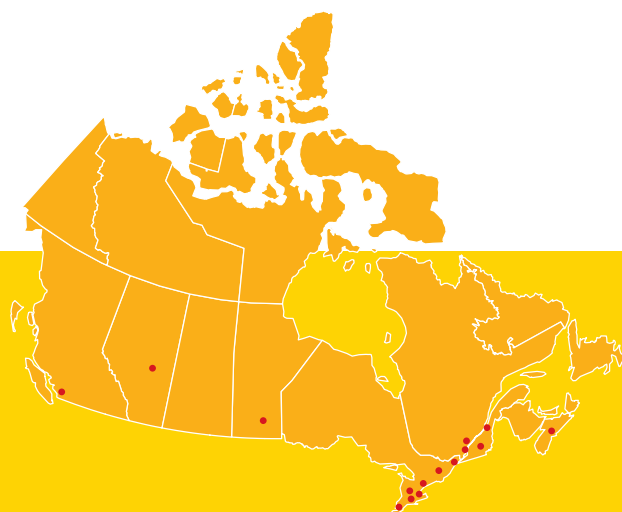
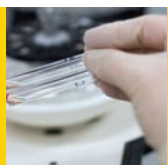
Putting the breaks on prostate cancer. Dr. Paul Rennie is leading a team of researchers to find better ways to slow or stop the growth of prostate cancer. The team is specifically developing and testing a new generation of anti-cancer drugs that can outsmart a prostate tumour's ability to eventually become resistant to conventional hormone treatment. With some of these promising drugs headed for clinical trials, Dr. Rennie is already reaching his goal of helping men with prostate cancer live longer, healthier lives.

Ottawa

Turning a tame virus into a powerful cancer fighter. Dr. David Stojdl is investigating whether a virus already showing promise in animal studies of ovarian, lung and skin cancers can also be used to treat brain cancer. The tame virus, which only causes mild flu-like symptoms in humans, has a powerful ability to seek out and destroy cancer cells while leaving a patient's healthy cells untouched. If successful, Dr. Stojdl's research with this virus could lead to clinical trials within the next five years and a major advance for brain cancer patients.

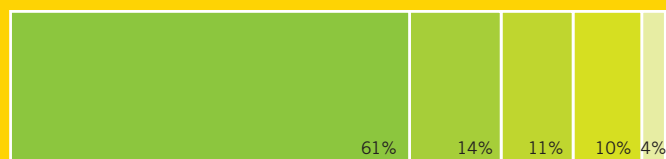
Montreal

Targeting better breast cancer treatment. Dr. Morag Park's new team grant is aimed at preventing the spread of breast cancer to other parts of the body, the most common cause of death from this disease. By identifying the molecular steps involved when a breast cancer cell moves from one location to invade nearby tissues or organs, her team of researchers is developing much-needed research models for faster testing of drugs to block these biological changes. Ultimately, the work of this team will help identify which new targeted breast cancer treatments hold the most promise for women so they may be tested in clinical trials.



Canadian cancer research funding

This year, The Terry Fox Foundation is funding \$20 million in Canadian cancer research through the following special programs:



- Program project (team) grants: \$12.2 million
- New investigator research grants: \$2.8 million
- Regular research grants: \$2.2 million
- Post-doctoral fellowship awards: \$2.1 million
- Research studentships: \$721,000

Funding shown as percentages of total in 2006/2007

What your money helped fund

Successful research takes a lot of resources, including special equipment, computers and trained personnel.

Among the costs of Dr. Nielsen's research that his three-year, \$330,000 Terry Fox Foundation grant helps to pay for:

- \$1,000 – computer software for data management, image analysis and statistics
- \$3,000 – glassware, including flasks, test tubes and funnels
- \$9,000 – one centrifuge (a machine used to separate substances of different densities, such as extracting DNA from cells)
- \$14,000 – one microscope
- \$100,000 – various enzymes, reagents and antibodies for analyzing the cancer cells
- \$200,000 – three years of funding for one research assistant and one graduate student to work under Dr. Nielsen's supervision in conducting experiments and analyzing data

Research impact What Terry's legacy means to Dr. Torsten Nielsen



Meet Vancouver's Dr. Torsten Nielsen, part of a new wave of Foundation-funded researchers bridging the gap between discoveries made in the lab and treatments for today's cancer patients.

Dr. Nielsen is searching for new and better drug treatments for sarcomas, cancers that grow in tissues such as muscles, bones, joints and nerves.

Using genomic screening tools, he first looked at all of the 40,000 genes in sarcoma tumours to pick out only the handful that appear active in causing these cancers.

Now, using an exciting new tool called a "tissue microarray," Dr. Nielsen is examining hundreds of tissue samples from sarcoma patients to confirm which of the suspected cancer-causing genes are actually active in each tumour, and therefore promising targets for anti-cancer drugs.

Ultimately, positive results would provide valuable information about which drugs should be tested in sarcoma clinical trials, a major advance for patients.

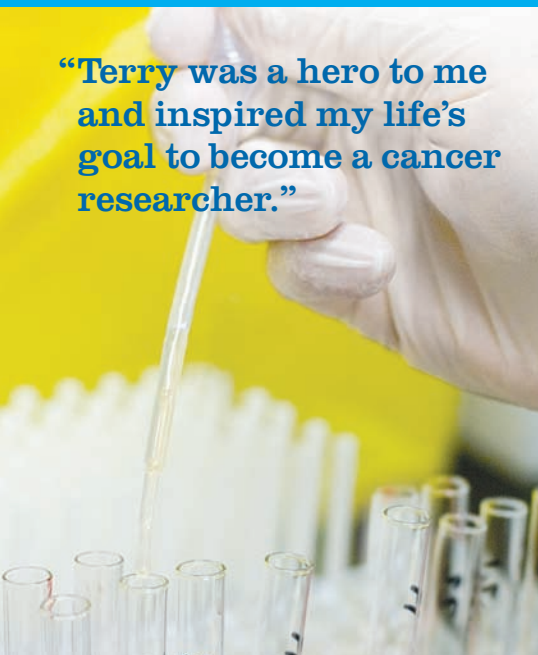
"I grew up in Vancouver, and I was 11 years old when Terry did his run. He was a hero to me and inspired my life's goal to become a cancer researcher and help make sick people better," says Dr. Nielsen.

"After many long years of hard work, that childhood goal has become a reality for me, as I am now both a research scientist and a physician. I actually am part of the sarcoma treatment team in British Columbia who help people with the same kind of tumors that Terry had.

"I believe my work is making a difference for cancer patients and my Foundation grant is an essential part of that success. I can't thank the volunteers and donors enough for their efforts in raising the funds that make my research on this cancer possible."

Dr. Torsten Nielsen is a clinician and researcher at the Vancouver General Hospital, the BC Cancer Agency and the University of British Columbia.

"Terry was a hero to me and inspired my life's goal to become a cancer researcher."



Recognizing excellence

The Terry Fox Young Investigator Award

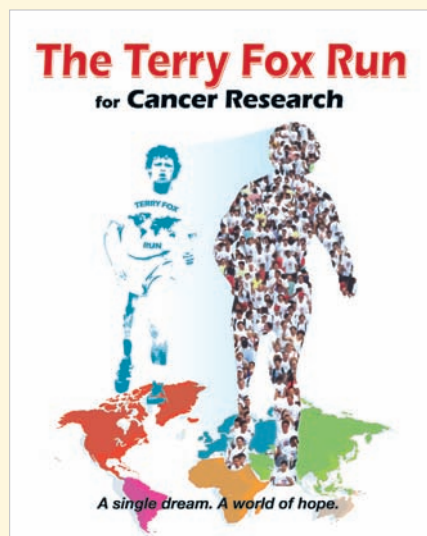


This prestigious award is given each year by the National Cancer Institute of Canada, on behalf of The Terry Fox Foundation, to a promising young investigator doing outstanding basic laboratory work in Canada. Funded by the Foundation, it comes with \$20,000 to support the recipient's research. **Dr. Timothy Hughes** is the 2005 recipient of the Terry Fox Young Investigator Award. Dr. Hughes has rapidly emerged as one of Canada's brightest young cancer researchers with an international reputation for innovation in molecular biology and genome science.

He is well known for pioneering the use of gene expression profiling, or "gene chip" technology, a powerful tool for studying the function of our genes and the pathways that control the behaviour of our cells. With gene chips, scientists can study the interactions between thousands of genes at once, all on a single piece of glass, or a "chip".

Dr. Hughes' work laid the foundation for applying this promising technology to cancer research. For example, he is using these technologies to examine the key activities of normal cells, such as control of cell division, that are missing in all cancer cells. He has also developed unique ways for researchers to see how anti-cancer drugs actually work against cancer cells at a molecular level, a promising tool for improving cancer therapies.

Dr. Hughes, whose diverse academic career includes degrees in both music and electrical engineering, is a professor at the University of Toronto.



Facts about cancer

Today, there are many reasons to be hopeful for a future without cancer. Thanks to research, improvements in diagnosis and treatment have meant that:

- According to the most current statistics, **59% of Canadians diagnosed with cancer will survive** compared to 20% in the 1940s
- Among women, incidence rates for breast cancer have stabilized and death rates have declined since 1993
- Among men, testicular cancer is considered effectively controlled and death rates from prostate cancer have dropped by almost 15% since 1991
- **Childhood cancer death rates have dropped more than 50%** since the 1950s
- Incidence and death rates have also dropped significantly for stomach cancer and Hodgkin's disease in both men and women in Canada

Highlights from the 2005 Terry Fox Run for Research

- **200,000 Canadians participated in close to 1,000 Terry Fox Run events** held across Canada on September 18, 2005
- Over 3 million students participated at 9,000 Canadian schools in the first annual National School Run Day on September 16, 2005
- 6,500 pairs of the Terry Fox limited edition shoe sold out in one week, raising close to \$500,000 for cancer research
- 1.6 million viewers tuned in to watch the new made-for-TV movie, *Terry*, on September 10, 2005
- 4,089 Terry Fox Runs were held in 56 countries outside of Canada
- In total, **\$36 million** was raised worldwide for cancer research in commemoration of the 25th anniversary of the *Marathon of Hope*
- The Government of Canada also provided the Foundation with a one-time grant of \$10 million to commemorate the 25th anniversary

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