TERRY FOX
PROFYLE
PRECISION ONCOLOGY FOR YOUNG PEOPLE

Improving the outcomes of young people with cancer, one child at a time

This year over 700 Canadians from birth to 29 years of age will die of cancer. That is two young people each day, every day of the year. Their cancers are refractory, relapsed, or metastatic. Common to them all is that the initial treatment did not work. Common to them all is that there is no cure.

Our Solution: Terry Fox PROFYLE

Together, we can change these stories. Advances in molecular profiling and targeted drug therapies over the last ten years make it possible to change the trajectory for young people with relapsed, refractory, and metastatic cancer.

Expected outcomes of the project

- Patients across Canada who are determined to be eligible for the program will have access to tumour molecular profiling that improves and expands their treatment options and may change the outcome of their cancer
- A new paradigm for cancer research in Canada will be developed; a national multi-disciplinary approach to address cancer for young people
- New methods will be developed that will allow us to apply precision approaches to patients of all ages
- New treatment options will be developed and made available for children and adults.

How Terry Fox PROFYLE works

Advances in molecular profiling and targeted drug therapies over the last decade make it possible to address and, with time, successfully treat relapsed, refractory, and metastatic cancer in young people. The information gathered from molecular profiling is used to identify and design target-specific therapies. By targeting the cancer-specific molecular changes, therapies promise to have less negative impact on the patient, resulting in both a better quality of life and longer life.

Advancing molecular profiling for a patient population that is dispersed across Canada requires the collaboration and cooperation of the nation's top researchers and cancer specialists working in the top research facilities and cancer centres across the country. Catalyzed by the leadership of The Terry Fox Research Institute, more than 50 of Canada's top researchers from fields as diverse as paediatric and medical oncology, genomics, proteomics, biomarker analysis, pathology, biobanking, bioinformatics, drug development, clinical trials, regulatory affairs, the biopharmaceutical industry, patient advocacy, and bioethics are combining their renowned expertise to tackle this problem. Together they are creating a common platform for tissue biobanking, disease modeling, and genomic sequencing that builds on and complements the expertise in hospitals and research facilities throughout Canada.

This new shared research infrastructure makes it possible to perform population-based studies on youth dispersed across the country. For the first time ever a young person anywhere in Canada is now able to access a pan-Canadian (i.e. national) network of expertise, diagnostic tools and treatments that has previously not been available to them.

In practice, this means a hospitalized child in Manitoba, for example, will have a tissue sample taken from their cancer that could be sequenced and profiled in Vancouver to identify the target most likely to respond to therapy. It could be clinicians in Toronto who advise on the best treatment, and scientists in Halifax and Montreal who could model that tumour to examine even more effective treatments (compounds) and make a novel clinical trial available.

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The Potential of Terry Fox PROFYLE

This project is:

- transforming the way children and young adults are diagnosed and treated in our nation's hospitals;
- accelerating a transformation in regulatory and health policy reform to improve access to promising agents and make clinical trials available for the pediatric and young adult population;
- establishing a model for similar networks to be created for adults with cancer and improve cancer outcomes for all patients.

Terry Fox PROFYLE: Nodes of expertise

Terry Fox PROFYLE has recruited leaders in pediatric, adolescent and young adult cancer research and care from across Canada. Recognizing no geo-political boundaries, this remarkable collection of talent is driven by the sole purpose to improve the outcomes of young Canadians with high risk cancers. To harness the collective knowledge and expertise, our multidisciplinary team of over 50 investigators and collaborators has been structured into ten interconnected nodes. Each node, which oversees the execution of one or more specific research projects, is chaired by one or two members of the Program Executive Committee and ensures adherence to the project plan and timelines. The boundaries between the nodes are fluid with several members sitting on more than one node. These nodes include biobanking, biomarkers, adolescent and young adults, genomics, therapeutics, program ethics, proteomics, biobanking and the partnership/sustainability.

The **Biobanking Node,** led by Dr. Jennifer Chan (University of Calgary, Calgary, Alberta), is implementing a national strategy for tissue collection, preparation, and storage. This node has built an online portal for patient referral/enrollment, and data capture and sharing with the PROFYLE network.

The **Biomarker Node,** co-led by Drs. Nada Jabado (McGill University, Montreal, Quebec) and Cynthia Hawkins (SickKids, Toronto, Ontario), is developing profiling methods to allow for more accurate information about disease progression or regression, using less invasive 'liquid biopsy' samples from blood, urine or spinal fluid. These biomarkers may ultimately be used as surrogate diagnostic, prognostic, and therapeutic tools to replace the need for tissue biopsy.

The **Adolescent and Young Adults (AYA) Node,** co-led by Drs. Paul Grundy (Stollery Children's Hospital, Edmonton, Alberta) and Abha Gupta (SickKids/Princess Margaret Hospital, Toronto, Ontario) ensures seamless integration of patients whose ages are from 14 to 29 years into the program. The node is establishing partnerships with adult treatment centres and developing a process to access and share AYA patient data (genomes that have been sequenced as part of adult personalized oncology programs).

The **Genomics Node,** co-led by Drs. Adam Shlien (SickKids, Toronto, Ontario) and Steven Jones (BC Cancer Centre, Vancouver, British Colombia), have implemented of a harmonized and integrated national tumour sequencing platform. Their focus is to provide real time sequencing to identify epigenetic and/or genetic drivers as treatment targets. Sequencing for patients in Quebec and the eastern provinces is done in Montreal, sequencing for patients in Ontario is performed in Toronto and sequencing for patients from Manitoba west is done in Vancouver.

The **Therapeutics Node,** co-led by Drs. Rebecca Deyell (BC Children's Hospital, Vancouver, British Columbia) and Jim Whitlock (SickKids, Toronto, Ontario), has initiated development of new and innovative clinical trials and clinical trial designs and international precision medicine program in Europe, Australia and United States for the underserved patient population that Terry Fox PROFYLE is focused on. The members of the node have been working with industry, provincial and federal governments and Health Canada. This node has been developing robust partnerships to ensure real-time access to state-of-the-art clinical trials and candidate drugs for all patients. In addition, Terry Fox PROFYLE has the

potential to make inroads on making clinical trials available to the adolescent and young adult population.

The **Ethics Node,** led by Dr. Conrad Fernandez (IWK Health Centre, Halifax, Nova Scotia), has created a harmonized approach to recruitment, consent and return of results for all 16 participant centres in the country.

The **Proteomics Node,** co-led by Drs. Poul Sorensen (UBC, Vancouver, British Columbia) and Michael Moran (SickKids, Toronto, Ontario), is using the proteome to study disease and identify novel biomarker assays. Integrating proteome analysis with genome analysis will provide a unique and powerful approach to defining the molecular basis of these cancers.

The **Model System Node,** co-led by Drs. Jason Berman (CHEO, Ottawa, Ontario) and Meredith Irwin (SickKids, Toronto, Ontario), is studying disease markers in several animal models and tumour cell systems to improve understanding of the molecular basis for malignant transformation, and screen for and identify new therapeutic compounds.

The **Clinical Site Lead Node,** led by Dr. Rod Rassekh (BC Children's Hospital, Vancouver, British Columbia), ensures that the PROFYLE program runs at each site, recruiting/enrolling patients, collecting samples and entering data,

The **Advocacy, Partnership and Sustainability Node,** led by Mr. Patrick Sullivan (Team Finn Foundation, Vancouver, British Columbia), is engaged in (1) providing important advocacy support, (2) identifying partnership opportunities, and (3) raising funds.

Committees

The **Molecular Tumour Board Committee**, co-chaired by Drs. Anita Villani (SickKids, Toronto, Ontario) and David Mitchell (McGill University, Montreal, Quebec), has planned and implemented a national PROFYLE molecular tumour board initiative through which sequencing data generated from each patient sample is reviewed and evaluated by a multi-disciplinary team. A formal report is generated and shared with the treating oncologist to inform clinical management on an individual patient basis.

The **Enrollment Committee**, Drs. David Malkin and Anita Villani (SickKids, Toronto, Ontario), Nada Jabado (McGill University) and Daniel Sinnett (CHU Sainte-Justine, Montreal, Quebec), and Rebecca Deyell and Rod Rassekh (BC Children's Hospital, Vancouver, British Columbia), review and approve or reject each enrollment request submitted. The committee ensures that the potential PROFYLE patient meets eligibility criteria and that financial resources are available prior to the patient being informed about the opportunity to participate in PROFYLE.

The **Biospecimen and Data Access Committee** review applications requesting access to PROFYLE biospecimens or data for secondary research purposes, as they are precious resources. The committee reviews each access requests from PROFYLE Team Members, PROFYLE Researchers and Third-Party Researchers who are wishing to access PROFYLE data or biospecimens and approve or deny the request based on criteria as laid out in the PROFYLE Data and Materials Access Policy.

Cost

Catalyzed by a $5M investment from the Terry Fox Research Institute, the project engaged multiple industry, institutional, and philanthropic partners. The project has completed three of the initial five-year $25M plan.