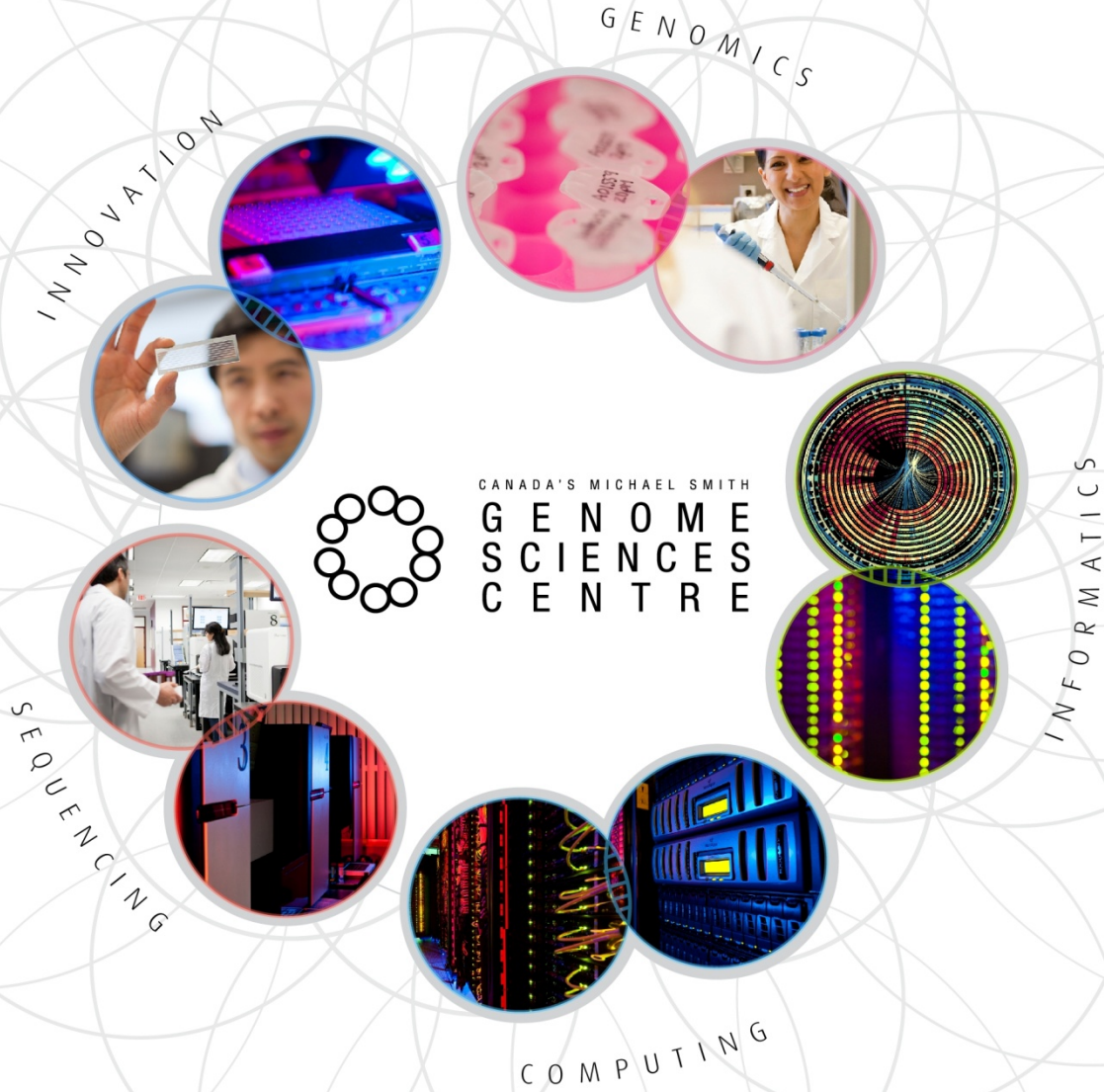
BC Cancer Agency
CARE + RESEARCH
An agency of the Provincial Health Services Authority

BC CANCER FOUNDATION
partners in discovery

CANADA'S MICHAEL SMITH GENOME SCIENCES CENTRE IS A LEADING INTERNATIONAL CENTRE FOR GENOMICS AND BIOINFORMATICS RESEARCH.



Our mandate is to advance knowledge about cancer and other diseases and to use our technologies to improve health through disease prevention, diagnosis and therapeutic approaches.

CIHR IRSC
Canadian Institutes of Health Research / Instituts de recherche en santé du Canada

CIHR/MSFHR Strategic Training Program in BIOINFORMATICS

genome science + technology
GRADUATE PROGRAM

AFFILIATIONS Genome BC • Simon Fraser University • University of Britsh Columbia • Genome Sciences Institute

WWW.BCGSC.CA

CANADA'S MICHAEL SMITH GENOME SCIENCES CENTRE

In 1999, the Genome Sciences Centre (GSC) was established with an original funding commitment of $25 million from the BC Cancer Foundation. This initiative, led by Drs. Michael Smith and Victor Ling, would develop Canada's first serious capacity in genomics and allow BC to emerge as a leader in genome research.

Since then, the GSC has experienced steady growth due to successes in grant applications and numerous collaborative ventures with investigators at UBC, SFU, UVic, others from around the world. In particular, significant success in attracting funding from Genome Canada and Canadian Foundation for Innovation has played an important role in establishing key capacities at the GSC. Today, the Centre employs more than 290 staff and trainees, and has been involved in 424 genomics grants and contracts representing 590 million dollars. The GSC has collaborated with more than 100 Canadian laboratories and 65 international laboratories, and has attracted 145 million dollars in international project funding. The direct impact of these collaborative interactions and funding dollars has been profound, and has influenced the Canadian national genomics agenda. Added to these accomplishments are the wealth of discoveries, spin-off projects and intellectual property derived from the science performed with these dollars.

Today, the Centre is viewed as leading internationally in several areas, including cancer genomics, informatics and technology development. In collaboration with other local and national scientific leaders, the GSC has applied genomic approaches to human health studies and important research initiatives in other disciplines. Notable examples include:

- The world's first published research in personalized cancer genomic medicine.
- Identification of key gene mutations in neuroblastoma, follicular lymphoma, diffuse large B-cell lymphoma, non-Hodgkin lymphoma, ovarian and breast.
- Discovery of new drugs for prostate cancer treatment.

RESEARCH GOALS

In recent years, the GSC has targeted cancer, with the specific aim of improving our knowledge of how cancers develop, grow and spread. The ultimate application of such knowledge will be improved outcomes for cancer patients

A philosophy of active sharing and collaboration has allowed the broadly applicable and highly relevant expertise and technology at the GSC to impact many scientists and a diversity of disciplines locally, nationally and internationally.

The availability of "next generation" DNA sequencing technologies over the past 6 years has dramatically increased the rate and decreased the cost of DNA sequencing, making feasible very large studies involving hundreds and even thousands of samples. Our early adoption of these technologies, and our strategic decision to make such technologies available to others through collaboration, has had profound impacts on genomics research capacity and capability in BC and Canada. The technology continues to advance rapidly and developments over the next few years will further enhance throughput and decrease cost, with the ability to sequence a human genome for a few thousand dollars already a reality.

The availability of "personal genomics" information will have significant impact on health economics and on the health of populations, both human and other. To remain leaders in genomics, local researchers will require collaborative access to these rapidly changing transformative technologies. The GSC is ideally positioned to provide this access as a consequence of our expertise in genome science and our collaborative philosophy, and ongoing developments and expansion of GSC capacity will allow the GSC to meet the demand for this leading-edge technology.

RECENT ACCOMPLISHMENTS AND ACCOLADES

Significant initiatives:

- The GSC is in its fourth year as part of The Cancer Genome Atlas (TCGA) project, and is the only Canadian centre participating in this US$275M project funded by the National Institutes of Health in the US.
- Ongoing work with the National Cancer Institute (US) in diffuse large B-cell lymphoma has been expanded to include studies in neuroblastoma, acute lymphoblastic leukemia (ALL), rhabdoid tumours, and cancers in HIV+ patients.
- Our work in establishing the Centre for Clinical Diagnostic Genomics is resulting in the delivery of high-throughput sequencing for diagnostics. With faster turnaround times and decreased costs, patients and clinicians are able to access genomic testing information as part of routine diagnostics.
- In collaboration with Dr. Janessa Laskin and other clinicians in BCCA, a pilot study to demonstrate the utilization of genomic information in cancer treatment planning has begun.

RECENT PUBLICATIONS/IN THE MEDIA

- "The 10th Anniversary of SARS" (07 Mar 13). Severe Acute Respiratory Syndrome (SARS) hit Vancouver 10 years ago. How did Vancouver fare? Includes an interview with Dr. Marco Marra on the activities of the GSC in sequencing the SARS genome.
  - http://www.cbc.ca/earlyedition/2013/03/07/the-10th-anniversary-of-sars/
- "New DNA technology to cut wait times for BC breast cancer patients" (27 Sep 12). The Centre for Clinical Diagnostic Genomics, led by Dr. Aly Karsan, becomes the first clinical lab in Canada to use "next gen" sequencing for routine clinical testing for BRCA1 and BRCA2.
  - Press release by PHSA, Genome BC, BC Cancer Agency, Ministry of Health. Wait time for inherited breast cancer testing cut dramatically with new technology
- MAGIC (Medulloblastoma Advanced Genomics International Consortium) discover subgroups in childhood brain cancer. Researchers focused on the molecular makeup of medulloblastoma cancer and identification of changes, specifically somatic copy number aberrations in each of four subgroups. In one group a gene associated with Parkinson's disease is duplicated and in another a gene is translocated. (27 Jul 12)
  - Northcott PA et al. Subgroup-specific structural variation across 1,000 medulloblastoma genomes. Nature. 2012 Aug 02, 488, 49-56.

AVAILABLE COLLABORATIVE SERVICES AND TECHNOLOGIES

The GSC currently operates an internationally leading genome centre. Large scale sequencing and bioinformatics projects are conducted in collaboration with scientists from around the world. Sequencing technologies include the ABI 3730XL, Illumina HiSeq 2000 and the MiSeq, and the Ion Torrent Personal Genome Machine. Expansions of our data analysis and management capacity have recently been completed to bring our total data storage capacity to 7 petabytes and our compute resources to 8,000 nodes, making the GSC among the largest data management centres in Canada. Collaborations in proteomics, in silico drug design and project management are also possible.

LOOKING AHEAD

Today, the GSC is an international leader in cancer genomics, informatics and technology development. GSC scientists are focused on development and application of innovative solutions to questions in cancer biology, while encouraging a philosophy of knowledge sharing and collaboration that has impacted research around the globe. GSC scientists are world-leading experts in the use of the latest sequencing technology, and look forward to using these tools for the discovery of novel biomarkers, therapeutic targets and insights into cancer prevention while furthering the patient-oriented mission of the BC Cancer Agency.

ACKNOWLEDGEMENTS

The GSC gratefully acknowledges the contributions and support of the BC Cancer Foundation. Ongoing research in cancer is a significant interest of GSC researchers and staff, and we share the vision of a world free from cancer.

For more information, visit www.bcgsc.ca or contact Robyn Roscoe at 604-707-5963 or rroscoe@bcgsc.ca.
Donations to research and care can be made at www.bccancerfoundation.com or call 604-877-6040.

BC Cancer Agency
CARE + RESEARCH
An agency of the Provincial Health Services Authority

BC CANCER FOUNDATION
partners in discovery