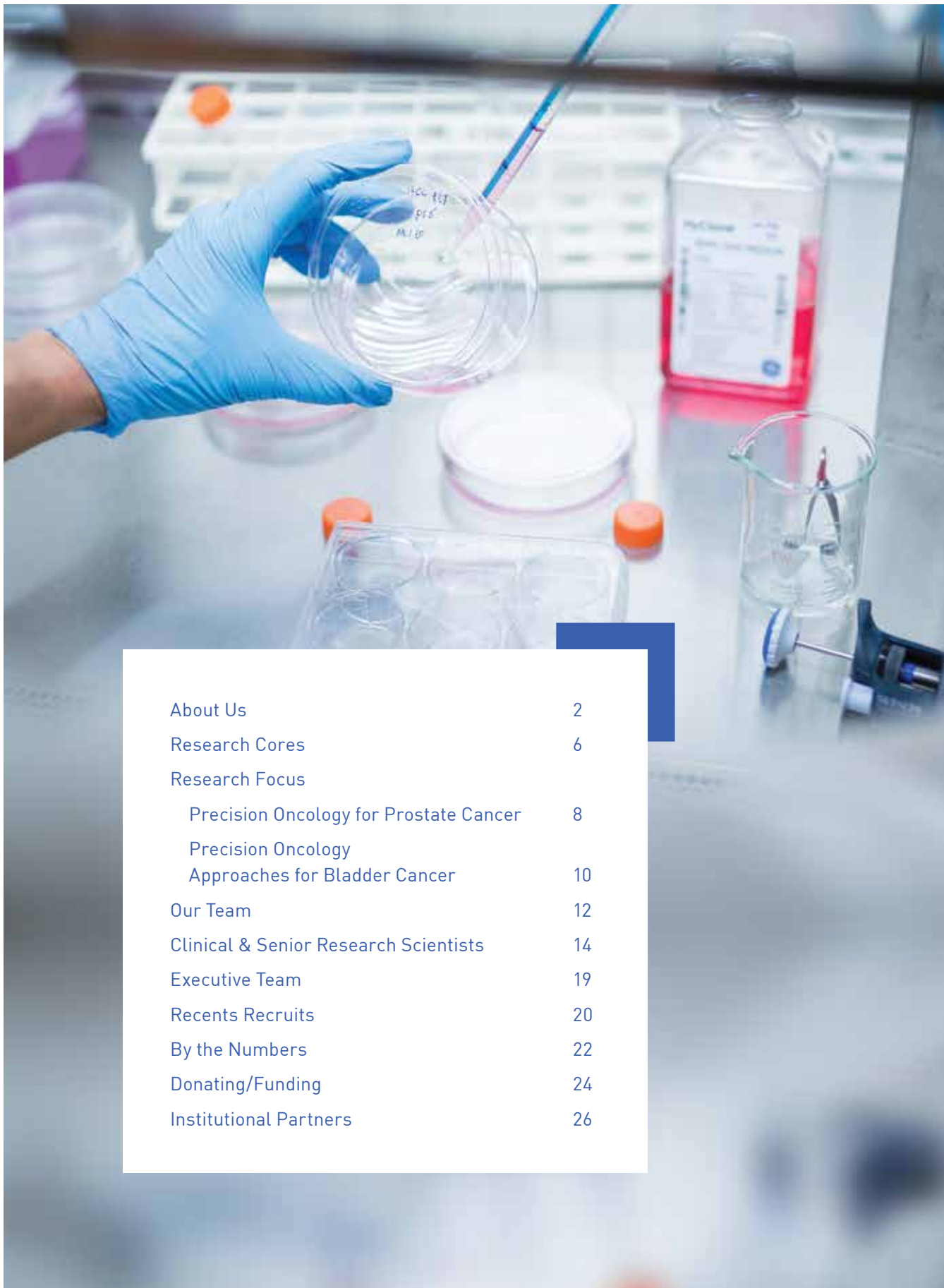




LEADING THE WAY AND FORGING BETTER OUTCOMES





VANCOUVER  
PROSTATE CENTRE  
A UBC & VGH Centre of Excellence




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**The Vancouver Prostate Centre fosters a paradigm of team-driven translational health research to discover molecular mechanisms of cancer progression and therapeutic resistance. This information is used to develop new services and products to improve outcomes in patients with cancer, and to promote national growth in biotechnology.**





## Researchers at the VPC focus on mechanisms of cancer resistance to develop new genomic biomarkers and therapies to improve cancer outcomes.

Prostate cancer is the most common malignancy diagnosed in North American men with one in seven men developing the disease during his lifetime. One in six of those men will die from the disease. The exact cause of prostate cancer is still unknown though a combination of genetic, nutritional and environmental factors play roles in its development.

Men diagnosed with low-risk prostate cancer are often best monitored on active surveillance, delaying intervention for several years. Higher risk cancers diagnosed when locally confined are often amenable to cure with surgery or radiotherapy. Prostate cancer can spread to other parts of the body (metastasize), or may recur after initial surgery or radiotherapy, requiring systemic therapy with androgen deprivation therapy (ADT) and recently developed androgen receptor pathway inhibitors (ARPI).

Following ADT, cancer can adapt to become resistant and recur as life threatening castrate resistant prostate cancer (CRPC). The development of treatment resistance is the main obstacle to improving survival and the quality of life for cancer patients.

In addition to prostate cancer, the infrastructure afforded by the Vancouver Prostate Centre (VPC)

enables a strong research and clinical stream in other urological cancers including bladder, testicular and kidney cancers. The teams that support these cancer programs have access to the VPC's Living Tumour Laboratory, which offers a unique environment for verifying drug targets. In this laboratory, human tumours are grown in model systems, allowing research on mechanisms of treatment response and resistance to potential new therapies.

Today 60% of bladder cancer patients who undergo chemotherapy and suffer its negative side effects will not benefit from the treatment. In those who do respond well initially, the cancer usually becomes treatment-resistant and leaves few options for patients and their physicians. Led by Dr. Peter Black, the team is building the critical mass to emerge as the leading bladder cancer program in Canada. This is enabled by the exceptional quality of the research enterprise at the VPC. The synergy created by close communication among the Centre's scientists and clinicians is foundational to the VPC's success in taking new cancer treatments from the very earliest discovery phase through to commercialization and patient benefit.





Dr. Lucia Nappi studies the molecular mechanisms mediating resistance to the targeted and chemotherapy agents in testicular cancer, a growing area of knowledge and strength within the VPC. She has helped to identify a specific biomarker for testicular cancer malignancies.

In addition to studying testicular, bladder and prostate cancer the VPC team are also focused on the study of renal cell carcinoma, in particular the clear cell type and more specifically in mechanisms involved in drugresistance in metastatic clear cell renal cell carcinoma (mRCC). This groundbreaking work is primarily around the identification of novel therapies. They have recognized new pathways of resistance which has led to the identification of novel therapies to overcome this resistance. The team is currently extensively testing these new drugs before taking the into clinical trials.

**The VPC is an integrated, multi-disciplinary team built on a foundation of research excellence and clinical success.**



**1998**

The VPC receives its first Terry Fox Foundation program/project grant.



**1998**

The prostate cancer team moves to a larger facility at the Jack Bell Research Centre to accommodate growth and momentum.



**1999**

Local businessman Jim Pattison donates \$20M to the Prostate Centre at VGH to support a program lead by Dr Larry Goldenberg. Health Canada, under the direction of The Honourable Allan Rock, names the Prostate Centre at VGH and BCCA as a National Centre of Excellence with a grant of \$10M.



**2001**

The Canadian Prostate Cancer Research Initiative awards \$600,000 to the Prostate Centre at VGH, for the creation of a Training and Education Centre for Prostate Cancer.

**T**his melding of treatment and research on one site, to focus specifically on urologic cancers like prostate, bladder, and kidney cancer, is unique in Canada and represents a state-of-the-art model of translational research and excellence in clinical care.

The VPC is considered one of the top translational cancer research centres in the world. The engagement and generosity of local business leaders since the early years has played an integral role in leveraging growth and raising the profile of the VPC. The VPC serves the broader British Columbia community and is the go-to place for men in BC with prostate issues.

For 25 years VPC has been an international leader in research, training, education and clinical care. The strength of the organization can be traced back to the founding surgeon scientists - Dr. Larry Goldenberg, Dr. Martin Gleave and scientist Dr. Paul Rennie, when they consolidated their laboratories

on the Vancouver General Hospital campus under the umbrella of the Vancouver Coastal Health Research Institute.

Over the last two and a half decades the VPC's pivotal work in the application of neoadjuvant hormone therapy, intermittent ADT, active surveillance, mechanisms of treatment resistance, drug development and more recently, the introduction of circulating tumour DNA assays with precision oncology have solidified the VPC as a major contributor to improved outcomes for prostate cancer. In that time the life expectancy of men with CRPC has more than tripled, and death rates from prostate cancer has dropped by 50%, thanks to earlier detection, and the introduction of several new drugs and a better understanding of how to use them. However, there is much more to do to combat this disease.

While many new drug therapies induce responses and prolong survival, most cancers adapt and



**2001**

The Terry Fox Foundation/NCIC announces that Dr. Rennie and his team of investigators have been awarded a five-year renewal research grant totaling \$6.3M to continue their work on the study of prostate cancer progression has been renewed every five years since then.



**2001**

The VPC partners with the University of Washington for the first national Specialized Programs of Research Excellence (SPOREs) in prostate cancer.



**2001**

The VPC spins out OncoGenex, a drug discovery and development company founded by Dr. Gleave and team, uniquely focused on the challenge of cancer treatment resistance.



**2002**

Western Economic Development Fund provides \$1M to fund renovations and expansion of the Gene Array Facility/Genome BC Microarray Platform.

develop treatment resistance. To combat this, the VPC integrates world-leading genomics, structural biology, translational cancer research and computer aided drug design (CADD) to optimize and accelerate cancer drug discovery. This research has created breakthroughs in understanding disease progression, discovered new drugs and biomarkers to control treatment resistance while expanding our province's bio-technology sector, and attracted international partnerships and clinical trials.

Over the past decade, the investment made by the national Networks of Centres of Excellence (NCE) and the Canadian Foundation for Innovation (CFI) into the VPC has established an international centre of excellence in discovery cancer research: Prostate Centre's Translational Research Initiative for Accelerated Discovery and Development (PC-TRiADD).

PC-TRiADD is a globally unique, research-driven, prostate cancer drug design pipeline comprised of five integrated research cores.



**The VPC is amongst the top translation cancer research centres in the world. The engagement and generosity of local business leaders since the early years has played an integral role in leveraging growth and raising the profile of the VPC.**



## 2004

Dr. Martin Gleave and team are awarded \$19.2M from the Canada Foundation for Innovation for infrastructure funding for the Prostate Centre's translational research program PC-TRiADD.

## 2006

Dr. Martin Gleave is appointed as Executive Director of the Prostate Centre at VGH. The Terry Fox Foundation renews funding for the VPC for a third time.

## 2007

Introduction of surgical robotics thanks to a generous donation from the late Mr. Jack Poole and his wife Darlene.

VPC is funded through the NIH Pacific Northwest Prostate Cancer Specialized Programs of Research Excellence (PNW-SPORE) program.

## 2008

The Prostate Centre's Translational Research Initiative for Accelerated Discovery and Development (PC-TRiADD) is named as a national Centre of Excellence for Commercialization and Research by the Networks of Centres of Excellence and awarded \$15M in funding.



## RESEARCH CORES

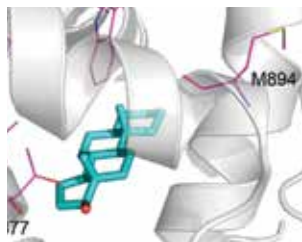
**Through its cores—Genomics and Computer Science, Molecular Pathology, Functional Genomics, Therapeutics Development, Protein Engineering, and Clinical Trials—VPC researchers identify novel protein targets, then structurally characterize and screen them to design new drugs.**

**T**his expertise, focusing specifically on treatment-resistant cancer, is a world first. Its ability to accelerate the discovery of novel new drugs for previously “undruggable” cancer targets makes the VPC a globally unique centre. What distinguishes the VPC is the team-based organization and research cores that integrate oncology, genomics, pathology, biobanking, computer science (including bioinformatics and CADD), engineering, biology, protein modeling, animal models and drug technologies.

The VPC’s translational cancer research model uniquely integrates genome sequencing from tissue biopsies and circulating tumour DNA in plasma

to pathway analysis and biologic mechanisms of treatment resistance in unique model systems. Unlike many other centres that focus on genomic evaluation of biopsies at diagnosis, the VPC’s genomic profiling focuses on treatment resistant and metastatic cancers. Coupled with longitudinal clinical follow-up (before, during and after treatment) these enable the study of the evolution of treatment resistance in patients. These key components of precision oncology are established at VPC and are already guiding treatment decisions in patients with advanced cancer.

The functional interpretation of genomic data sets linked to CRPC is enabled by deep and



2009

Cutting-edge computer aided drug modeling and design enables huge advancements in drug therapy development.

2009

The name is changed to Vancouver Prostate Centre and ground is broken on a new research building with support from the Canadian Foundation for Innovation and a generous donation from Mr. Robert H. N. Ho.

2011

The Robert H. N. Ho Research Building is completed and the VPC gets much needed laboratory and research space. The Terry Fox Research Institute (TFRI) commits a fourth renewal for the VPC.

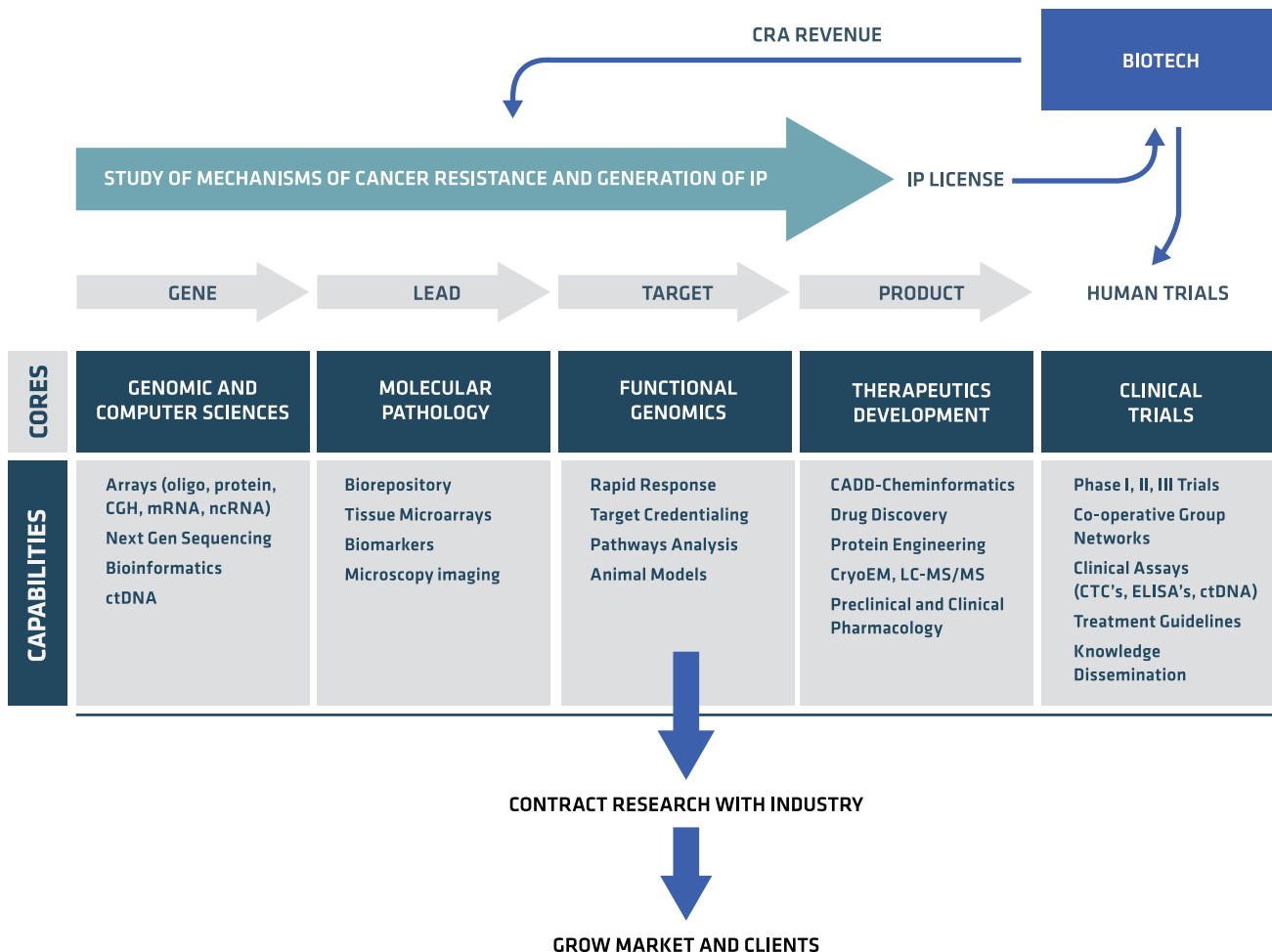
2012

NIH SPORC is renewed for a second time.

broad expertise in cancer biology (metastasis, invasion, and drug resistance), structural biology, preclinical modeling (e.g. patient-derived organoids, xenografts), drug discovery, and molecular imaging. These capabilities support functional evaluation of genes, prioritization of cancer-driving targets, and preclinical/clinical pharmacology testing of promising drug candidates.

Underpinning this richly diverse and highly collaborative environment is an established track record in traversing the bench-to-bedside gaps,

with programs in experimental therapeutics and Phase I, II and III clinical trials. Activity in clinical trials for bladder cancer has increased dramatically in recent years, and the team at VPC has been actively involved in this area. OGX-427 (an antisense oligonucleotide) was developed at VPC and the first-in-man trial was conducted there. Another Phase I trial, STK-01, is a collaboration between UBC, the VPC and Sitka Biopharma. In addition, the team at VPC actively participates in cooperative and industry trials in bladder and kidney cancer.



## RESEARCH FOCUS

PRECISION ONCOLOGY  
FOR PROSTATE CANCER

The VPC's precision oncology program strives to deliver better personalized therapeutics to patients with advanced or treatment-resistant cancer of the prostate, kidney, testes or bladder. Advances in computer science, technology, and biology promise disruptive progress in medicine by using large-scale sequencing databases, rapid and cheaper assays for characterizing patients at the molecular level (eg. genomics, proteomics) and computational tools for analyzing big data. In cancer, the use of molecular-targeted agents inhibiting driver mutations and the selective inhibition of adaptive responses represent two strategies that are revolutionizing treatment outcomes.

Genomic sequencing has uncovered significant tumour heterogeneity and identified some key drivers of cancer progression, but insufficiently predicts tumour biology and treatment responsiveness in most patients. A missing key piece is the ability to study biology of individual cancers, growing individual tumours as "avatars" in tissue culture (as "organoids") or in mice (as patient-derived xenografts). Another key limitation is obtaining representative tissue

for sequencing, where biopsies are subject to sampling misrepresentation; in this regard, "liquid" biopsies from blood using cell free DNA assays represent a promising advance. The prospect of bioinformatic integration of DNA/RNA sequencing with contextually relevant biology and pathway analyses promises meaningful characterization of cancer heterogeneity and definition of mechanisms responsible for it, with more precise cancer segmentation and personalized treatments in patients.

A VPC team, led by Dr. Alex Wyatt, have recently demonstrated that plasma circulating tumor DNA (ctDNA) is highly representative of metastatic lesions in prostate and bladder cancer, and that somatic alterations detected in ctDNA can help predict therapy resistance or response. The lab currently runs a phase II 'umbrella trial' to prospectively test this concept in 500 patients with metastatic prostate cancer in collaboration with Dr. Kim Chi. Dr. Wyatt's team also leverages the serial sampling afforded by ctDNA to study how the prostate tumor genome evolves under the evolutionary pressures of different therapeutic



2013

Prostate Cancer Survivor Care (PCSC) program is embedded throughout clinical care process with a \$500,000 investment from the BC Medical Association and the Province of BC.



2013

The Vancouver Prostate Centre's PC-TRIADD program receives an additional award of \$11.3M for 2013 - 2018 as a CECR.



2015

The VPC leads UBC's richest intellectual property deal in its history – over \$140M USD with pharmaceutical giant Roche.



2016

TFRI renews operating funds for a fifth time.



regimens, and has established a provincial biobank in order to support further research in this area.

Another trial, the Genomic Biomarker-Selected Umbrella Neoadjuvant Study for High Risk Localized Prostate Cancer (GUNS) trial, will determine if providing an appropriate therapy based on the genomic testing of prostate tumour tissue will result in an improved clinical response.

The VPC has already established the core platforms to support precision oncology and is actively involved in numerous clinical trials to validate this approach in prostate, kidney and, testicular and bladder cancers. This program will fuel discovery and translational research as well as aid therapeutic decision-making by integrating genomics with pathways analysis across treatment resistant cancers within already an established world-leading centre, ensuring our enterprise as a whole is always greater than the sum of its parts.

The Accelerated Drug Discovery Using Clinical Translation (ADDUCT) program adds emerging structural elucidation technologies to our existing drug discovery platform and increases capacity for related cores to produce the target proteins and to evaluate potential therapeutics identified in silico. Funded by CFI and lead by Dr. Art Cherkasov, the ADDUCT program integrates the critical elements of personalized (precision) genomics, protein production and analysis, structural biology, bioinformatics, cheminformatics, and computer-aided drug design with preclinical testing and novel genomic biomarker-enriched clinical trials design.

## Biomarkers and Biology

Drs. Zoubeidi, Dong, Cox, Wang and others lead the VPC's research program that aims to provide mechanistic insight into the molecular (genetic and epigenetic) sources that fuel tumour cell plasticity and emergent aggressive resistance phenotypes, such as Neuroendocrine prostate cancer (NEPC), following targeted therapy. The group leverages this knowledge to identify early detection biomarkers and nominate new targets to block the pathways

utilized by tumour cells to gain access to cell plasticity that can be targeted alone or in combination to improve the efficacy of existing therapies and patient outcomes. Importantly, as lineage reprogramming is emerging as a conserved mechanism of resistance across tumour types, results from this research program may have relevance in other highly prevalent cancers outside of the urologic field, such as melanoma, lung and breast cancer.



## PRECISION ONCOLOGY APPROACHES FOR BLADDER CANCER

### Treatment Resistance

**T**he bladder cancer team is building on their previous work to investigate molecular pathways of resistance to cisplatin-based chemotherapy in patients with muscle invasive bladder cancer (MIBC) and are working to develop a strategy for translating this information into patient-specific targeted therapy. Chemotherapy is administered to patients with MIBC prior to radical cystectomy, or to patients with metastatic disease as primary therapy.

Immunotherapy, which has been recently introduced into the clinic, has become standard second-line therapy with proven benefit but only ~20% of patients respond. Targeted therapies, which involve drugs that affect specific molecular changes in an individual tumour, have been introduced as third-line therapy for patients with metastatic bladder cancer, and studies are underway to determine

how tumours become resistant to these targeted therapies over time. As the number of available treatments increases, understanding the biology that informs treatment selection and combination in addition to resistance will pave the way to further clinical advances.

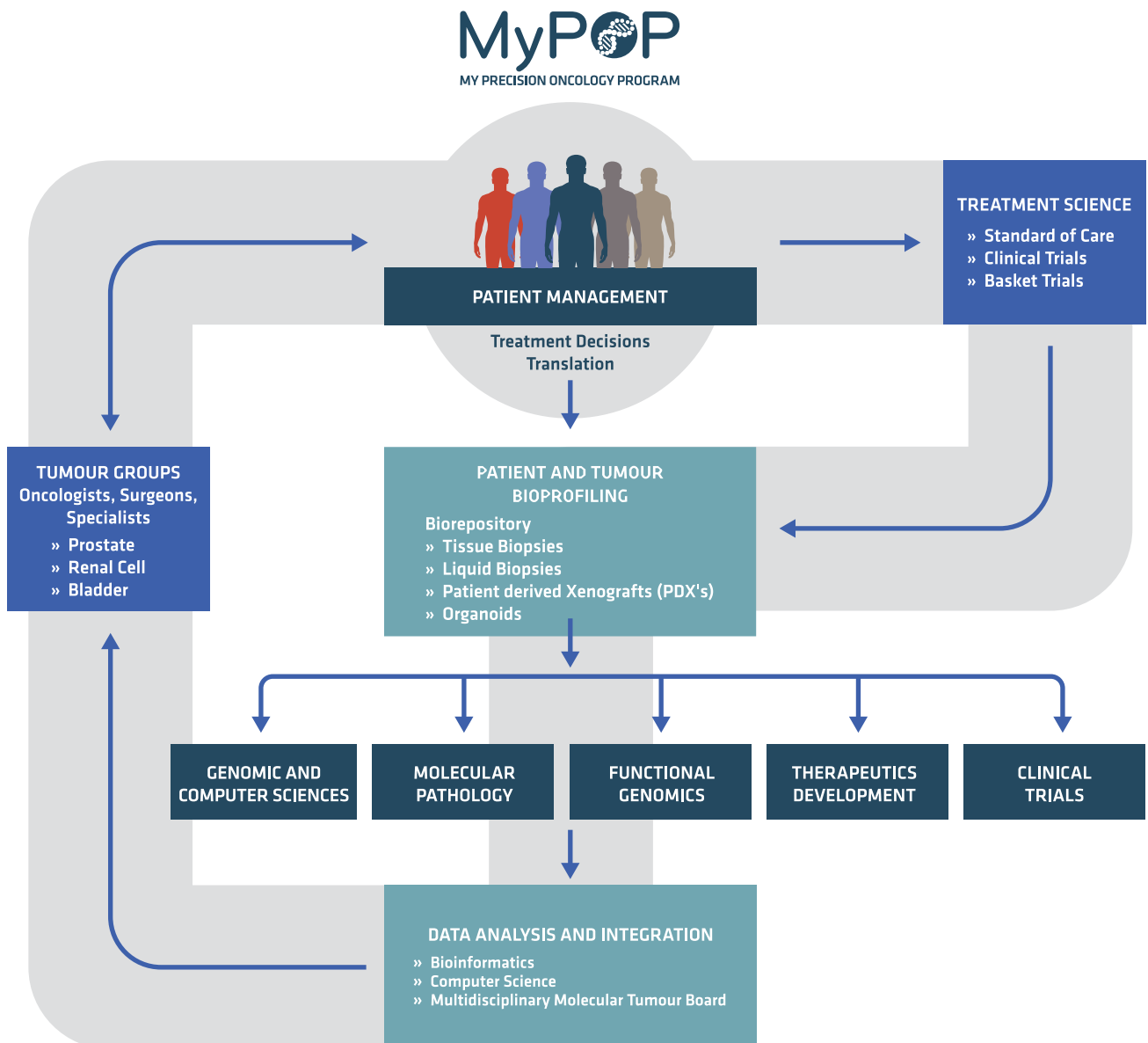
Another complementary stream of research focuses on non-muscle invasive bladder cancer (NMIBC). Up to 75% of patients start with this early stage of bladder cancer at the initial diagnosis. Ineffective treatment of NMIBC allows some tumours to progress to more invasive and potentially lethal stages. Ongoing work includes study of how the bladder and gut microbiome affect tumour response to standard BCG therapy as well as the development of novel gene therapies that can be put into the bladder to treat bladder cancer.

## Liquid Biopsy

A method for real-time genetic analysis of tumours is urgently needed, especially as patients move through different lines of therapy and only the original tumour that was sometimes biopsied or removed years earlier is available for molecular analysis. Genetic changes in those tumours may no longer reflect the make-up of the recurrent or metastatic tumour that is being treated currently. The ability to detect genetic changes in real time through analysis of circulating tumour DNA in the blood opens up new avenues for using this information to guide therapy.

## Tissue Engineering

The development of 3D bladder cancer tissue models offers a new platform for drug discovery, testing and personalized medicine. An individual patient's tumour can be grown 3D in the lab and a panel of drugs can be tested in these models to determine the most effective drug before treating the patient. Creating personalized 3D bladder cancer tissues for quick and accurate personalized drug testing will revolutionize patient care and outcomes.







## OUR TEAM

**T**he VPC is led by Dr. Martin Gleave (Director) and an executive committee of Laboratory Research Scientists Drs. Art Cherkasov, Amina Zoubeidi, Clinical Researchers Dr. Peter Black, Genomics Dr. Colin Collins, Development Dr. Larry Goldenberg and Chief Operating Officer Dr. Graeme Boniface.

The VPC today includes a team of 26 Senior Scientists from around the globe who bring with them international collaborations and funding opportunities. It is this group that is mentoring and building the next generation of scientists and clinicians. But all of this – the breakthroughs, the people, buildings, equipment and energy - takes consistent, ongoing investment.

Every dollar brought into the VPC is spent on research and highly leveraged at a one to four ratio by attracting competitive research grants,

industry partnerships, and out-licensing of patent-protected discoveries. Government investments reap rewards economically in the form of highly trained personnel and spinout companies that directly impact the local economy.

The VPC is housed in a 60,000 square foot, CFI-funded, state-of-the-art research laboratory space and an adjacent clinic that treats over 2,500 prostate, bladder and other urologic cancer patients annually. The VPC is also home to an integrated Clinical Trials Unit which enables the evaluation of promising new treatments to improve survival for men with prostate cancer, and a Prostate Cancer Supportive Care (PCSC) Program to assist knowledge dissemination and study of cancer survivorship. The PCSC Program offers a comprehensive survivorship program for prostate cancer patients, their



**2016**

A patient donation of \$10M enables the VPC to complete the development of MyPOP (My Precision Oncology Program) for sequencing patients with prostate, bladder and kidney cancers.



**2017**

The government of BC invests \$6M into the PCSC Program to expand its network across the province.



**2017**

TFRI renews \$7.5M of operating funds for five projects and five cores over five years.



**2018**

Dr. Art Cherkasov awarded a new grant totaling \$23M from CFI, BCKDF and vendors for the ADDUCT program.

**Every dollar brought into the VPC is spent on research and highly leveraged at a one to four ratio by attracting competitive research grants, industry partnerships, and out-licensing of patent-protected discoveries.**

partners and their family from the time of initial diagnosis to end of life care. VPC future visions will capitalize on convergent advances in genomics, structural biology, and computer sciences to expand its computer- aided drug design (CADD) platform and enhance its drug discovery capabilities. We are collaborating with Photonics Inc. to integrate advanced computer modeling for this purpose. Identification of drugs that inhibit protein targets associated with treatment resistance is critical to improve control of cancer progression. In parallel, the VPC has developed plasma circulating tumour DNA assays to better risk stratify cancers and support drug discovery in Vancouver and globally. Tumour banks of ctDNA are being collected across the province for prostate, bladder and kidney cancer patients, and umbrella clinical trials are being conducted across Canada utilizing this technology for patient selection and stratification.



**2018**

Dr. Sriram Subramaniam awarded a Canadian Research Excellence Chair.



**2020**

The VPC is prioritized by UBC for two Tier 1 Canada Research Chairs.



**2021**

Two Tier 1 Canada Research Chairs were awarded to Drs. Amina Zoubeidi and Artem Cherkasov.



**2022**

CIHR awards six projects to VPC-led teams. TFRF renews \$7.5M of operating funds for four projects and translational cores over five years.

## CLINICAL & SENIOR RESEARCH SCIENTISTS



**Dr. Martin Gleave's** multidisciplinary program was the first to develop novel antisense drugs targeting clusterin and Hsp27 (OGX-011, OGX-427), leading to founding of OncoGenex (Canada's biotech Company of the Year, 2010) and the first human studies and later phase II and III trials showing anti-cancer activity in prostate, lung and bladder cancer when administered in combination with standard-of-care treatments. More recently his team has successfully crystallized the hsp27 protein and discovered a new small molecule inhibitor (VPC-27) using CADD.

Dr. Gleave is also developing a biocompatible polymer paste formulation that allows sustained delivery of active drugs at site of injection, accurately delivered using MRI-ultrasound fused image-guided injection. ST-4PC is loaded with docetaxel and bicalutamide for image-guided injection into early prostate, bladder, and kidney cancers. Several other drug pastes in development include therapeutics targeting post-surgical incisional pain and chronic pain control.

Dr. Gleave is a Distinguished Professor and Chair of the Department of Urologic Sciences at UBC. He was awarded a BC Leadership Chair in 2005, the 2007 BC Innovation Council Frontiers in Research Award, the Barringer Medal from the American Association of GU Surgeons, the Eugene Fuller Award from the American Urological Association (AUA), the Aubrey Tingle Prize from the Michael Smith Foundation for Health Research, and the NCIC William Rawls Award for contributions to cancer control in Canada. In 2017 he was recognized nationally for his exceptional efforts in cancer research of treatment resistance, with the Order of Canada.



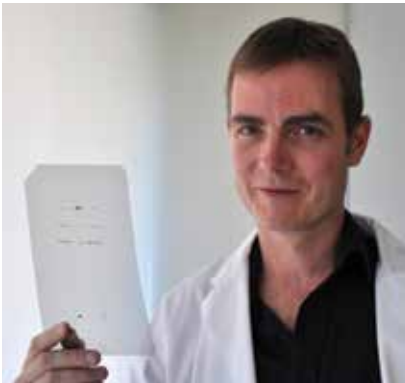
**Dr. Amina Zoubeidi** focuses on deciphering and targeting mechanisms exploited by prostate cancer cells to evade therapy, with a particular focus on lineage plasticity. She discovered that the lineage plasticity switch is assumed by dynamic and reversible epigenetic regulation, which guide alternative cell phenotypes. Hence, allowing an opportune environment for certain transcription factors to be "reprogrammed" to facilitate tumour lineage plasticity and therapy resistance. She identified new drivers/targets including BRN2. For instance, she found that BRN2 facilitates global epigenetic reprogramming by increasing a permissive chromatin state to support lineage plasticity and treatment resistance. She developed first in-field drug targeting BRN2 (patented by UBC) with remarkable anti-cancer activity with the goal of initiating a clinical trial in near future. She also leads the 2022 Terry Fox program grant.



**Dr. Alex Wyatt** works on the development of liquid biopsy techniques and the use of serial circulating free DNA sequencing for the analysis of tumour mutations, the outcome of which may be used for precision medicine. Previously, the only way to genetically profile a person's metastatic cancer was through a bone biopsy, which is expensive and painful, difficult to target, and associated with complications. His work has garnered international attention with high impact publications and several grants to optimize and produce prognostic and predictive tests.



**Dr. Larry Goldenberg** (CM, OBC, MD, FRCSC, FACS, FCAHS) is a urologic surgeon and clinical scientist with an international reputation for excellence in prostate cancer research and treatment. His current research interests involve the evaluation of artificial intelligence algorithms in reading digitized prostate pathology and MRI to risk stratify active surveillance patients, the identification of targeted radioactive theranostics ligands (aptamers) for diagnosis and treatment of prostate cancer, prostate cancer supportive care and patient education. He has been recognized for his contributions to health care by being inducted into the Order of British Columbia and the Order of Canada.



**Dr. Mads Dugaard** is a molecular biologist specialized in pre-clinical and translational cancer research. His ongoing research focuses on molecular and biochemical events underlying sugar-modifications of proteins in solid tumors, chromatin context-dependent DNA repair mechanisms, chemotherapy resistance mechanisms, and immune-evasion mechanisms in cancer. Dr. Dugaard is a biotech entrepreneur and a co-founder of the biotech companies VAR2 Pharmaceuticals (2012), VarCT Diagnostics (2017), Rakovina Therapeutics (2020), and SnapCyte Solutions (2022).



**Dr. Michael Cox** focuses on early genetic changes in prostate cells, how resulting tumor cells respond to growth factors in the presence or absence of testosterone and how these cellular changes allow prostate tumor cells to utilize these growth factors to aid development of testosterone independence. With colleagues at the VPC and UBC, he is developing combinatorial antisense and small molecule drug strategies that decrease the responsiveness of tumor cells to growth factors and has shown that prostate cancer cells treated in this way are more sensitive to testosterone deprivation or treatment with other chemotherapies. These are first steps in developing effective treatments for patients with advanced prostate cancer.



**Dr. Yuzhuo Wang** discovered how the membrane transporter MCT4 allowed cancer cells to reprogram cell metabolism to increase energy production and export excessive lactic acid which significantly inhibits anti-cancer immunity. MCT4 inhibition suppressed tumour growth by decreasing cancer cell intra-cellular pH and increasing tumour micro-environment pH, helping restore host anticancer immunity. Supported by the CADD platform in VPC, novel antisense and small molecules targeting MCT4 have been generated and a spin-off biotech company (LAST Innovation) established.



**Dr. Colin Collins** is focused on the sequencing of tumours and surrounding tissue, and building novel databases to address clinically relevant questions such as distinguishing between indolent vs. aggressive cancer. Much of his work uses computer science and bioinformatics to perform sophisticated data analyses. This work provides fellow scientists with a focus for validation and evaluation of new drug development.





**Dr. Faraz Hach's** main focus is the field of computational genomics and biomolecular sequence analysis especially in the context of cancer research. His research involves designing novel and high performance algorithms for analyzing large, high dimensional omics data produced by next-generation sequencing technologies. Recently, he is working on developing computational algorithms for the detection of aberrations using sequencing data obtained from tissue and liquid biopsies in order to understand clonal evolution in cancer genomes.



**Dr. Alan So** focuses on the development of novel therapeutics for bladder cancer and determination of the functional role of GLI1/2 in the progression of prostate cancer to its lethal stage of androgen independence. He has characterized the functional role of different survival genes (including clusterin and Hsp27) in different tumour models (prostate, breast, lung, and bladder) in cancer progression. His current research focuses on discovery and development of novel agents to treat bladder cancer as well as development of the mechanisms of treatment resistance in renal cell carcinoma.



**Dr. Kim Chi's** research is focused in the area of genitourinary cancers with a special interest in prostate cancer and investigational new drugs. He has led a number of multi-centre international Phase I, II and III clinical trials including cooperative group studies and investigator sponsored studies with novel agents sourced from the US National Cancer Institute's Cancer Therapy Evaluation Program (NCTEP) and numerous industry collaborators.

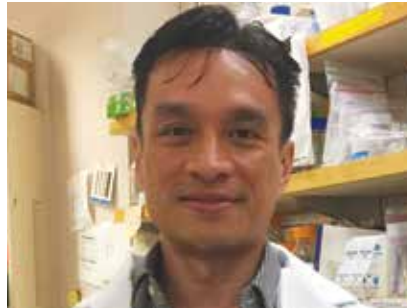


**Dr. Poul Sorensen's** laboratory uses a combination of genetic and biochemical approaches to identify proteins that are specifically altered in human tumours. His laboratory has discovered many novel genetic alterations in childhood cancer and breast tumours, and these discoveries have been translated into new diagnostic tests for specific tumours, and have advanced our understanding of how the involved proteins transmit signals that cause cells to become cancerous.





**Dr. Xuesen Dong** laboratory investigates how RNA binding proteins regulate RNA processing to contribute to therapy-resistant prostate cancer progression. We also apply rational drug design to develop small molecule inhibitors as potential anticancer agents. Our research programs have been continuously funded by CIHR, PCC, DoD, and NIH R01.



**Dr. Chris Ong** investigates molecular mechanisms of disease, and develops new targeted therapies for treating a variety of diseases, including prostate cancer and immune related disorders such as transplant rejection and inflammatory diseases. A strong underlying basis of his research efforts is in translational research with the aim of translating laboratory-based discoveries into new therapeutics. He has identified a key signaling protein, SEMA3C, that functions as a master regulator of growth and survival of prostate cancer and is now working to develop novel protein therapeutics to inhibit this pathway.



**Dr. Peter Black** is working on new methods to predict response to chemotherapy and immunotherapy, and to develop novel treatments to overcome resistance to these therapies. He has developed a gene signature panel which has been licensed to Veracyte and is commercially available in the US. He is co-leading clinical trial design to test this signature and other novel therapies in bladder cancer.



**Dr. Artem Cherkasov's** research interests include computer-aided drug discovery (CADD), structure-activity modeling, drug reprofiling, new cancer therapeutics discovery and development of novel CADD tools and applications. He's the Head of the VPC's Precision Drug Design team, and heads the Accelerated Drug Discovery Using Clinical Translation (ADDUCT) program.

## EXECUTIVE TEAM

### Dr. Martin Gleave

Executive Director, Vancouver Prostate Centre  
Chief Executive Officer, PC-TRIADD  
Distinguished Professor and Head, Department of  
Urologic Sciences, University of British Columbia  
BC Leadership Chair in Prostate Cancer Research

### Dr. Larry Goldenberg

Director of Development and Supportive Care,  
Vancouver Prostate Centre  
Professor, Department of Urologic Sciences,  
University of British Columbia  
Stephen A. Jarislowski Chair in Urologic Sciences at VGH

### Dr. Graeme Boniface

Chief Operating Officer, Vancouver Prostate Centre  
Chief Operating Officer, PC-TRIADD

### Mr. Brian Shankaruk

Chief Financial Officer, Vancouver Prostate Centre  
Chief Financial Officer, PC-TRIADD

### Dr. Colin Collins

Senior Research Scientist, Vancouver Prostate Centre  
Director, Laboratory for Advanced Genome Analysis,  
Vancouver Prostate Centre  
Professor, Department of Urologic Sciences,  
University of British Columbia

### Dr. Amina Zoubeidi

Senior Research Scientist, Vancouver Prostate Centre  
Professor, Department of Urologic Sciences,  
University of British Columbia  
Canada Research Chair in Cancer Therapy Resistance

### Dr. Peter Black

Senior Research Scientist, Vancouver Prostate Centre  
Associate Director, Clinical Research,  
Vancouver Prostate Centre  
Professor, Department of Urologic Sciences,  
University of British Columbia  
Khosrowshahi Family Chair

### Dr. Artem Cherkasov

Senior Research Scientist, Vancouver Prostate Centre  
Head, Precision Cancer Drug Design,  
Vancouver Prostate Centre  
Professor, Department of Urologic Sciences,  
University of British Columbia  
Adjunct Professor, Computer Science,  
Simon Fraser University Canada Research Chair in  
Precision Cancer Drug Design

## RECENT RECRUITS



**Dr. Syam Somasekharan**

joined the Vancouver Prostate Centre as a Research Scientist in 2016, and was appointed Senior Research Scientist in 2021.

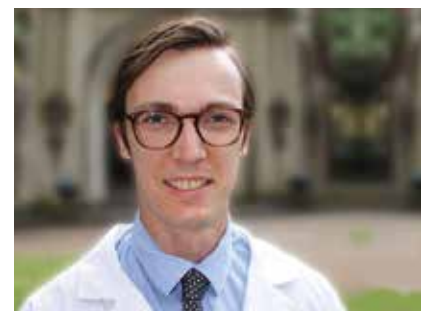
Dr. Somasekharan's laboratory is located at the Vancouver Prostate Centre and focuses on RNA biology. The laboratory is particularly interested in interdisciplinary research to understand the molecular mechanism of regulation of RNA in health and disease.



**Dr. Govind Kaigala** and his team are focused on the understanding and characterizing spatio-temporal biological processes, which requires interrogation of biological samples across different scales and innovations in technological devices and platforms, highly sensitive bioassays, and multimodal data integration within cell biology and pathology workflows. In addition to assisting in discovery-based research, Dr. Kaigala works to discover new methods that may assist in improved patient stratification and diagnostics, and the multi-modal acquisition and data handling may also aid in better therapeutic decisions.



**Dr. Ryan Flannigan's** research program is focused on evaluating genetic and molecular mechanisms contributing to non-obstructive azoospermia (NOA), using precision single-cell strategies and in vitro methods. Presently, Dr. Flannigan is continuing his work evaluating the genetic and molecular mechanisms contributing to NOA focusing on techniques that facilitate cell-specific evaluation and functional interactions, with the goal of identifying novel therapeutic targets to treat men with no presently available treatments.



**Dr. Connor Forbes'** primary research interests are in the pathophysiology, treatment, and patient experience of Benign Prostate Hyperplasia and kidney stones. He works closely with Drs Dirk Lange and Ben Chew on this front in the Stone Centre research group.



**Dr. Lucia Nappi's** work is intimately involved in the clinical development of miR371 as a practice-changing adjunct to management of germ cell tumours and germ cell tumour survivorship. One of her research focuses is the validation, scaling, implementation and dissemination of this promising family of liquid biomarkers across the spectrum of the germ cell tumours. She has also been a key person in the discovery of a new anti-Hsp27 small molecule. She has demonstrated that the drug has a high activity in controlling prostate cancer proliferation in vitro and in vivo, modulating different molecular pathways involving AR and its abnormal variants (i.e. AR-V7).



**Dr. Nathan Lack's** laboratory is focused on identify and characterizing novel drug targets to treat aggressive late-stage prostate cancer by utilizing advanced functional genomics techniques in combination with classical pharmacology. In addition to extensive publications, the research from his group has identified several compounds that have been licensed and progressed to clinical development.



**Dr. Nada Lallous** has a strong knowledge in protein handling and characterization and wide expertise in preclinical validation of novel inhibitors against various cancer targets, acquired during her PhD in structural biochemistry and biophysics and subsequent 10 years of international cancer research experience. She leads projects from inception to structural determination using X-ray crystallography, and contributed to 20 structures currently available in the Protein Data Bank.

## Research Scientists and Associates

Dr. Claudia Chavez-Munoz	Dr. Marcel Bally	Dr. Richard Gallagher
Dr. Alberto Contreras-Sanz	Dr. Dong Lin	Dr. William Jia
Dr. Samuel Aparicio	Dr. Fan Mo	Dr. Htoo Zarni Oo
Dr. Nader Al Nakouzi	Dr. Stas Volik	Dr. Morgan Roberts
Dr. Shoukat Dedhar	Dr. Susan Moore	Dr. Gang Wang

## BY THE NUMBERS SINCE 2008

As a vibrant, integrated research and innovation hub, the Vancouver Prostate Centre has continued to have major impact in all aspects of its key objectives by improving cancer outcomes.

ACCELERATE DISCOVERY,  
DEVELOPMENT, AND  
COMMERCIALIZATION OF  
ANTI-CANCER THERAPEUTICS  
AND CANCER BIOMARKERS

TRAINING THE NEXT  
GENERATION OF SCIENTISTS

786

TRAINEES

30

CLINICAL FELLOWS



10

NEW COMPANIES  
SPUN-OFF

1679

NUMBER OF PUBLICATIONS



349

NUMBER OF NEW  
OR ONGOING CRAs VALUE:

\$15.6m



ENHANCE COMMERCIALIZATION OF OUR  
EXPERT SERVICES, NOVEL PRODUCTS,  
AND PATENTED TECHNOLOGIES



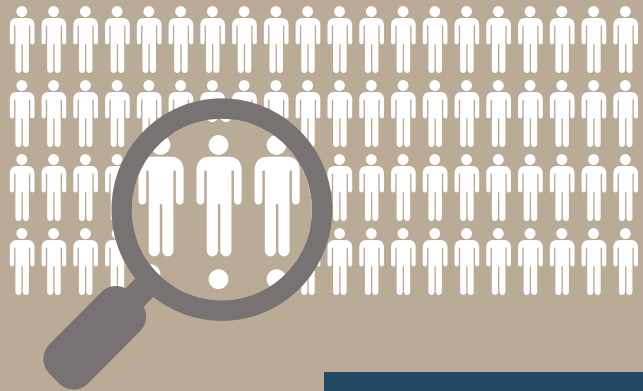
**279**  
PATENTS  
ISSUED/FILED



**286**  
PEER-REVIEWED  
RESEARCH GRANTS  
WORTH:

**\$150.3m**

IMPROVE MANAGEMENT OF CANCER  
PATIENTS IN BC AND CANADA. ACCESS TO  
NEW DRUGS, AND NEW CLINICAL TRIALS



**3905**  
PATIENTS ENROLLED

**163**  
CLINICAL TRIALS




## DONATING/FUNDING

Large, multi-year programmatic research grants from the Terry Fox Research Institute, Prostate Cancer Canada and the Prostate Cancer Foundation have supported ongoing research and a key objective around supporting trainees, post-doctoral fellows and knowledge sharing. The VPC's research team is training the next generation of scientists and clinicians, and has spun out numerous successful companies.

Thanks to the generosity of our donors over the past two decades, Vancouver Prostate Centre researchers and clinicians have:

- › Developed and delivered optimized care to BC men with prostate cancer.
- › Created a globally recognized Centre of Excellence in prostate cancer research that attracts top research talent.
- › Discovered and developed a number of new drugs and biomarkers, and led numerous human studies in prostate, kidney, and bladder cancer.





## MAJOR INDIVIDUAL DONORS

The VPC has benefited greatly from the generous donations of individuals including:

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The Vancouver Prostate Centre receives directed donations through the VGH & UBC Hospital Foundation, the UBC Faculty of Medicine and the Sullivan Urology Foundation.

[www.prostatecentre.com/donate](http://www.prostatecentre.com/donate)

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As with any successful research enterprise the key to success is establishing and maintaining strong networks and partnerships with local, national, and international collaborators, as well as funders, patients and benefactors.



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OF BRITISH COLUMBIA  
Faculty of Medicine



Provincial Health Services Authority



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