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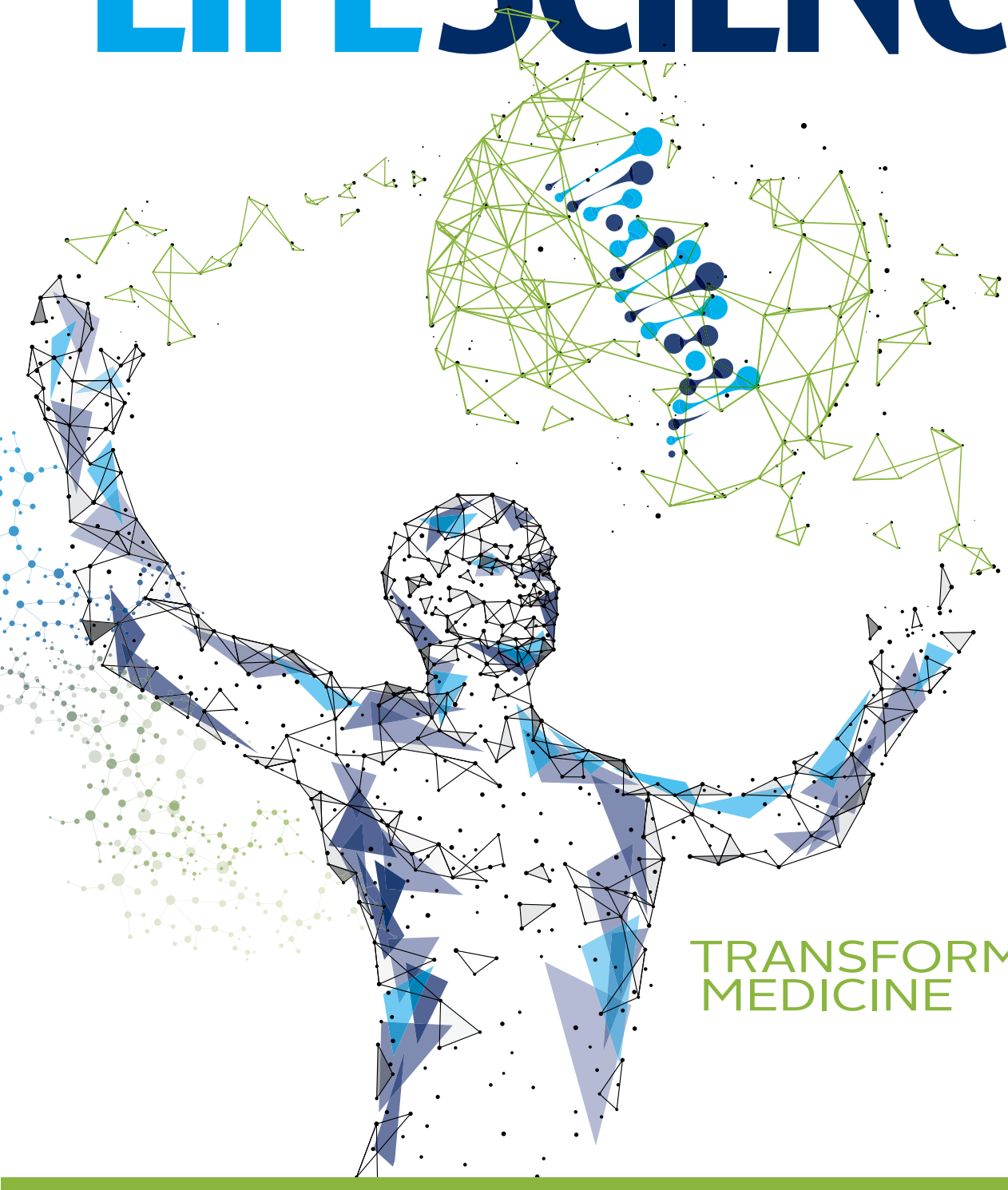

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OFFICIAL PUBLICATION

LifeSciences British Columbia

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Expanding treatment options

DR. EUGENIA SOCÍAS
is leading a series of clinical trials to evaluate promising alternative treatments for opioid use disorder to improve addiction care and treatment outcomes in BC.

University of British Columbia
2018 Scholar co-funded by St. Paul's Foundation; 2015 Research Trainee

Driving local innovation

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is developing the world's most advanced wearable robotic exoskeleton. It will help people with spinal cord injuries and lower limb disabilities walk again with a full and natural range of motion.

Simon Fraser University
2018 Innovation to Commercialization co-funded by the Rick Hansen Institute

Cutting treatment costs

DR. JONATHAN LITTLE
is working to reverse type 2 diabetes without drugs, using therapeutic nutrition and a partnership with community pharmacies to reduce and remove medications that are no longer needed.

UBC Okanagan
2018 Convening & Collaborating; 2017 Scholar

Improving quality of life

DR. CHRISTINE LEE
is creating oral capsules containing freeze-dried fecal microbiota to improve treatment access for people across BC with chronic gut disorders such as inflammatory bowel diseases and C. difficile infections.

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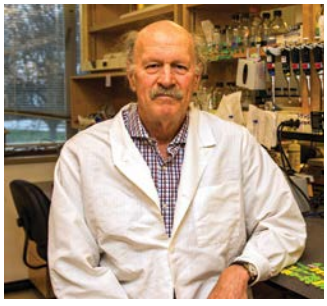

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TAKE ADVANTAGE OF CANADA'S CHANGING IP LANDSCAPE

Written by Jennifer A. Marles and Thomas W. Bailey

Canadian intellectual property (IP) legislation is undergoing major changes that open up new opportunities for Canadian companies globally. Amendments to industrial design legislation took effect last November, significant modifications to trademark law will come into force on 17 June 2019, and some important changes to patent practice are already in effect, with additional changes expected to be implemented late this year.

The new regime impacts high-level IP strategy for companies in the life sciences industry. For trademarks, it will be advantageous to file new applications and renew existing trademark registrations before 17 June 2019 for those whose trademarks are used in association with a range of products or services, to take advantage of the current lower fee structure.

The Madrid Protocol, a system that streamlines and decreases the cost of seeking foreign trademark protection, will become available to Canadians on 17 June 2019. Filing applications via the Madrid Protocol will likely result in lower overall costs in taking a trademark portfolio global. Companies that have limited their foreign filings due to budgetary constraints may want to revisit their global trademark protection strategies.

Similarly, for industrial designs, Canadians can now file international design applications via the Hague Agreement. Again, this may decrease the cost of seeking protection in multiple countries. Companies for whom protection of the visual design of their products or graphical user interfaces is important may wish to reconsider and develop new foreign filing strategies.

For patents, the forthcoming changes will affect the way that some deadlines are calculated or treated. For example, late national phase entry for a Patent Cooperation Treaty (PCT) application will no longer be possible unless the failure to meet the deadline was unintentional. Examination will also need to be requested within four years of the Canadian filing date instead of the current five. On the positive side, restoration of priority will become available in Canada in appropriate circumstances, to allow the valid filing of an application within fourteen months of the priority date if the one-year Convention priority deadline is unintentionally missed.

Canadian patent law has also been amended by the introduction of a modified form of "file wrapper estoppel" with the coming into force of the government's 2018 budget bill. This change could impact decisions on the strategic approach taken during the examination of Canadian patent applications. Those who work in the trenches building and managing patent portfolios will want to work closely with Canadian IP counsel to ensure their company's patent prosecution strategy takes into account the new regime.

Overall, the changes to Canadian IP legislation open new doors to Canadian companies, particularly those who do business in other countries. Now is a good time to revisit IP strategy, in particular global strategy for trademarks and industrial designs, and see if the legislative changes open new avenues for expanding IP portfolios.

Our lawyers would be pleased to discuss how your company should address these many changes, and explore whether the new options for seeking global protection could be used to expand your IP portfolio in a cost-effective manner.

Jennifer A. Marles, Partner

Thomas W. Bailey, Partner

MESSAGE FROM CANADA'S MINISTER OF INNOVATION, SCIENCE AND ECONOMIC DEVELOPMENT

NAVDEEP BAINS, CANADA'S MINISTER OF INNOVATION, SCIENCE AND ECONOMIC DEVELOPMENT

From the discovery of insulin to the invention of the pacemaker, Canada has a strong record of health innovation. In a time of rapid technological change and global interconnectedness, the Government of Canada and partners like LifeSciences BC have an opportunity to lead the next wave of technological advancements in digital health and artificial intelligence (AI). These are the technologies that will help researchers develop new and better medicines – enhancing the quality of life of all Canadians.

The life sciences sector employs more than 91,000 people and spends nearly $2 billion annually on research and development. With over 100 health and life sciences research institutes and centres affiliated with Canadian universities, there is a critical mass of talent that has earned our country the respect of the global community.

Our Liberal government recognizes the significant contributions of the life sciences industry to the advancement of science as well as economic growth. Our Innovation and Skills Plan puts people first, in order to have the most talented and skilled workforce in the world. It also promotes science excellence to develop and adopt new technologies and stimulates new investments to grow world-class companies and create good middle-class jobs for Canadians.

As opposed to our predecessors, we believe that strong science makes for a strong Canada. We are committed to being a strong partner to the life sciences industry. The Strategic Innovation Fund, in particular, is helping innovators in the life sciences. For example, in British Columbia, the federal and provincial governments provided a joint investment of $138 million to build a new advanced manufacturing facility for biologics in Burnaby. Some of our funding also goes directly to the health and bioscience sector to support projects focused on health data and infrastructure. These projects will lead to greater breakthroughs, discoveries and real-life applications of innovative health technologies across Canada. These discoveries will generate quality jobs and an improved quality of life for all Canadians.

As part of our Innovation Superclusters Initiative, the B.C.-based Digital Technology Supercluster will develop platforms that provide precision health services, both domestically and globally. The projects will focus on using health and genetic data to advance research in precision medicine, and to provide more rapid and accurate diagnoses by leveraging artificial intelligence and telemedicine. The Supercluster will bring together companies and researchers to collaborate on generating innovations in areas where Canada can lead globally.

To maintain the momentum created by our life sciences sector, we selected health and biosciences as one of our six industry-led Economic Strategy Tables, with the task of identifying innovation opportunities. B.C. industry leaders are playing an instrumental role in charting an ambitious road map for Canada's life sciences sector through their participation in the Health and Biosciences Table, chaired by the former president of LifeSciences BC, Karimah Es Sabar. Industry has coalesced around a bold vision to double the size of the sector by leveraging and advancing innovative technologies; attracting and retaining capital, skills and talent; and ensuring a vibrant ecosystem that will unleash the full potential of the sector and lead to improved health outcomes. We will keep working with the Health and Biosciences Table and engaged stakeholders to jointly act on the recommendations from the report and fully realize the Table's vision for the sector and our country.

As we collectively work to strengthen the life sciences ecosystem in Canada and be a major global player, we also see exciting opportunities related to AI in medicine and technology development and adoption. Canada has more than 50 fast-growing companies developing AI applications in the health and bioscience sector, including several in B.C. These new applications hold tremendous potential to revolutionize health care and to improve the lives of all Canadians.

At the end of the day, the life sciences sector's success will be shaped by the level of commitment and bold action generated by industry, academia and governments. I am proud to say LifeSciences BC is helping make Canada a top destination for investment and talent. Together, we are growing our health and bioscience firms to support a more sustainable and innovative health system, while advancing Canada's prosperity.

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ENTREPRENEUR DEVELOPMENT

MESSAGE FROM THE MINISTER OF JOBS, TRADE AND TECHNOLOGY

BRUCE RALSTON, MINISTER OF JOBS, TRADE AND TECHNOLOGY

British Columbia has a vibrant life sciences sector that continues to innovate and develop leading technology to help improve peoples' lives. The province has a variety of startups, companies, post-secondary institutions and research centres doing cutting-edge work in precision medicine, biotech, oncology, digital health and genomics, to name just a few.

Regardless of the discipline, this sector continues to grow in our province, and LifeSciences BC is an important part of this success, providing leadership and promoting world-class science and business development throughout the industry.

The life sciences sector offers significant opportunities to work together to create good jobs, solve health challenges and improve lives for people around the world. Last April, together with the federal government, we invested $45 million in Vancouver-based STEMCELL Technologies. The investment will allow STEMCELL to create more innovative products that help people who need cell-based therapies and regenerative medicine to repair damaged tissue or organs. The company will build an advanced manufacturing facility in Burnaby and hire about 2,200 additional B.C. workers in the years to come.

We have also invested in British Columbia's medical isotope industry to help advance treatments for people living with cancer, heart disease and other medical conditions. At TRIUMF, Canada's national particle accelerator centre, we are helping build the Institute for Advanced Medical Isotopes, which will be a premier research centre for medical isotope production and radiopharmaceuticals for cancer therapy, drug development and clinical imaging. The Province provided more than $12 million, partnering with the federal government, University of British Columbia, BC Cancer Foundation and TRIUMF. The new institute will mean better treatment for thousands of Canadians suffering from a variety of illnesses.

Researchers across B.C. are working to improve peoples' lives through precision medicine for asthma and chronic heart conditions, wearable biomedical technologies for rehabilitation, personalized cancer treatments and other developments. To support this type of research, we invested more than $40 million in state-of-the-art equipment for life sciences projects at post-secondary institutions through the BC Knowledge Development Fund.

Another big development for innovation in our province came with the launch of the B.C.-based Digital Technology Supercluster late last year. We anticipate that many exciting projects will come from the supercluster initiative. LifeSciences BC played an important role establishing precision health as one of the top priorities for the first phase of operations. Projects in development have the potential to help improve people's prescriptions based on their genetic makeup and medical history, improve skin cancer diagnoses using artificial intelligence and cloud-based medical imaging, and more.

In addition, progress has been made through the Cascadia Innovation Corridor to expand our economic connections in the region across diverse areas, including in the life sciences sector. B.C.'s Innovation Commissioner Dr. Alan Winter has been actively promoting B.C.'s life sciences to business, academic and government leaders through the region, and to international audiences and investors beyond our borders. For my part, in June 2018 I travelled to the BIO Conference in Boston, where I took the opportunity to highlight many local companies and share some of the exciting things that are happening in the sector. This year, I look forward to continuing that advocacy work both within British Columbia and around the world.

All of this adds up to a life sciences industry in B.C. that is thriving. People with skill and determination are creating life-saving products right here at home, and our government is committed to supporting this success into the future.

LifeSciences British Columbia

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MESSAGE FROM THE CHAIR

NANCY HARRISON, CHAIR, BOARD OF DIRECTORS, LIFESCIENCES BC

On behalf of the board of directors and management of LifeSciences British Columbia, I am pleased to introduce the 2019 edition of our annual *LifeSciences* magazine. This year's theme, "Transformative Medicine: Targeted Insights – Advancing Discoveries" was chosen to reflect the ever-increasing ability of B.C.'s life sciences community to generate groundbreaking discoveries, to translate that knowledge into innovative health products on which we can build strong B.C.-based companies of scale and, most importantly, to have a transformative impact on the lives of patients.

In the following pages, we highlight the contributions of just a few of our many leading innovators – recognizing their shared curiosity and ingenuity, dedication, discipline and dogged commitment to making a difference. You will read how we have fortified our sector by embracing collaboration and the pursuit of excellence, how we have rallied investors, had defining spin-outs from the Centre for Drug Research and Development (CDRD) and conducted world-leading research at our academic institutions and centres like BC Cancer and the BC Centre for Excellence in HIV/AIDS.

It is ever-emerging and ever-evolving stories such as these that will continue to drive us toward the realization of our vision of B.C. being among the world's leading innovation ecosystems – one where life sciences and health technology organizations thrive. To this end, it always gives me great pleasure to take this opportunity to reflect on our sector's development from one year to the next.

Numerous B.C.-based organizations made great strides and a real impact on our ecosystem in 2018 – fuelled in great part by historic levels of investment by the federal government. In November, Canada's Digital Technology Supercluster was officially launched in Vancouver with the securing of $153 million from Innovation, Science, and Economic Development Canada (ISED) to facilitate and fund the collaborative development of ambitious technology products and platforms. ISED also supported the growth of our cluster with $48 million in new funding for CDRD to create and grow companies of scale and train the scientific and business talent needed to drive them to become leading global anchors for Canada. Canada's largest life sciences company, Stemcell Technologies, was the recipient of $45 million from ISED and the Government of British Columbia to help them build a new state-of-the-art advanced manufacturing facility. Our federal and provincial governments, the BC Cancer Foundation, University of British Columbia and private philanthropists also came together to provide $50 million for TRIUMF, Canada's national particle accelerator centre (which celebratedits 50th anniversary in 2018), to construct the Institute for Advanced Medical Isotopes, a new premier centre for the life sciences that will expand Canada's role in fast-moving advances in nuclear medicine.

In terms of new private venture capital investment, B.C. life sciences companies were successful in raising approximately $147 million in 2018, representing 28 per cent of the national total. We also saw in 2018 the first cohort of companies through Creative Destruction Lab West, a seed-stage program for highly scalable science-based companies. Through the program several local companies, such as Blue Mesa Health and HeadCheck Health, were able to secure critical early private investment.

Overall, B.C. remains a significant player in Canada with additional established and emerging leaders like Aurinia Pharmaceuticals Inc., Zymeworks Inc., Xenon Pharmaceuticals Inc., Arbutus Biopharma Corp., ABM Applied Biological Materials Inc., StarFish Medical Inc., Kardium Inc., Precision NanoSystems Inc., AbCellera Biologics Inc. and many others.

We should all take pride in these successes and in our continued collaboration, evolution and expansion as a cluster. It is critical, however, that we now turn our focus to significantly amplifying our collective growth. The world is changing at an unprecedented pace. We constantly find ourselves at new crossroads of innovation where sciences and technologies are rapidly intersecting and converging in novel ways, and where the medicines of tomorrow will look nothing like those of yesterday. The challenge before us is great – that is, to not only keep up with this pace but also be a driver of it.

This fall, Canada's Health and Biosciences Economic Strategy Table announced its recommendations and set out a vision that, by 2025, Canada will double the size of its health and biosciences sector to become a top-three global hub. Its report rightly declares and reinforces the fact that incremental growth at our current velocity is not enough to compete globally. The only way for us to do so as a provincial and national sector is by working together, particularly to address our persisting challenges – most predominantly, availability of people and capital, issues that were once again at the forefront of the key findings of Deloitte and BIOTECanada's annual Biotechnology Industry Data Survey.

While B.C. companies did well in 2018 in raising funds, our success is dwarfed by the scale of fundraising to the south. Silicon Valley Bank estimates that a total of US$21 billion was invested across U.S. life sciences companies last year, including US$4.1 billion in Series A funding for biopharmaceutical companies alone. Additionally, U.S.-based venture capital firms raised an estimated US$9.6 billion in 2018. Clearly, if we are to compete, we must find new and innovative means to increase the funds flowing into our venture capital companies and, in turn, into our life sciences companies.

Far outweighing these new and persisting challenges, however, is the unparalleled opportunity before us not only to advance our sector but also to impact the broad global human condition like never before. We encourage everyone to firmly embrace both the challenge and the opportunity and let us know how LifeSciences BC can help ensure that you, as a member, have the resources and support you need to make your unique difference in creating a healthier world, and to write your unique "Transformative Medicine: Targeted Insights – Advancing Discoveries" story.

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FROM STARTUP TO ANCHOR

The Centre for Drug Research and Development has a plan and a vision to anchor more life sciences companies in Canada

IN THE 20-PLUS YEARS I'VE BEEN IN THIS BUSINESS, WE'VE NEVER BEEN IN A BETTER SPOT WITH MULTIPLE COMPANIES IN VARIOUS PARTS OF CANADA

Gordon McCauley
President and CEO, Centre for Drug Research and Development

HAYLEY WOODIN

Four years ago, Dr. Bob Hancock made what he calls a fairly significant discovery. In a lab that bears his name at the University of British Columbia (UBC), he drove a gene expression signature of endotoxin tolerance and found that it differed in individuals with sepsis and those without it.

In other words: he potentially found a way to help doctors make an earlier diagnosis of a disease that kills five million to eight million people a year.

"I submitted this to UBC for consideration for patenting, and they turned me down," says Hancock, Canada Research Chair in health and genomics and director of the Centre for Microbial Diseases and Immunity Research. "I decided to go it alone."

For an experienced researcher with 55 patents to his name, filing a provisional one was hardly a challenge. But as an idea scales, patenting costs scale too.

"Instead of paying like $300 out of my pocket, I was now paying like $8,000 out of my pocket," Hancock says.

It was at that point that he turned to the Centre for Drug Research and Development (CDRD), the national, independent and not-for-profit life sciences development organization he helped co-found in 2007. Together in partnership, Sepset Biosciences Inc. was formed – one of seven spinoff companies to come out of the CDRD to date, all of which are headquartered in Vancouver.

Sepset's model is unique, explains Hancock. It's a virtual company with no office space and just one employee. Its scientific work is run out of UBC's Hancock Lab. The CDRD has lent the company non-dilutive funding and provides it access to management personnel and other scientific experts.

This framework means Sepset operates at a very low burn rate, even as it gathers 1,000 samples from patients worldwide in the biggest study in sepsis history.

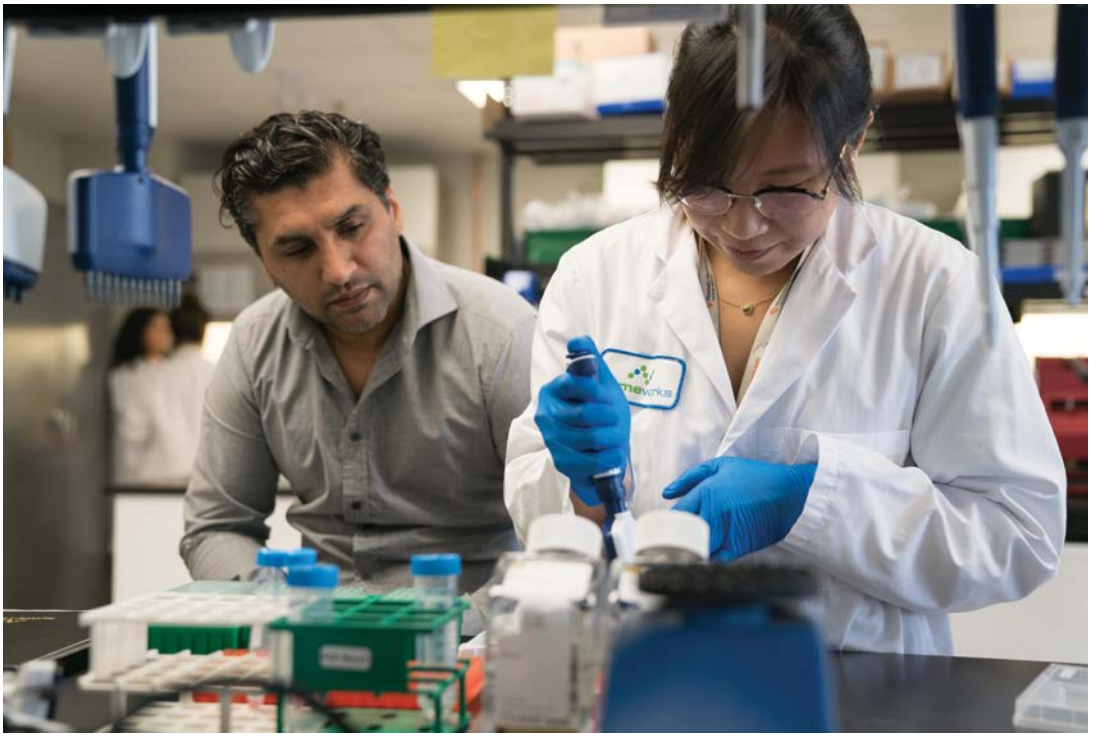
"What I see is in the way we're doing this, we have a good chance of retaining the technology in Canada, at least in some substantive form," says Hancock.

And that is the goal of the CDRD.

"Canada is the only advanced pharmaceutical market in the world without a research-based anchor company. So that's why CDRD exists," explains Gordon McCauley, president and CEO of the CDRD.

Headquartered in UBC's pharmaceutical sciences building, the organization has three areas of focus in Canada's life sciences space: creating companies of scale, helping existing companies scale up and training the next generation of scientific talent.

"We have an extraordinary opportunity to take incredible research in Canada and make it commercially



ABOVE: Ali Tehrani, president and CEO of Vancouver-based Zymeworks Inc., says "world-class" life sciences work is being done here in B.C. • SUBMITTED

LEFT: By integrating Kairos Therapeutics' technology, Zymeworks is in the process of testing a drug that could kill metastatic cancer cells and prevent them from proliferating • SUBMITTED

relevant," says McCauley. "The one thing we've done a lousy job of is translating that extraordinary research infrastructure into a sustainable commercial industry."

It is not always evident why this is. McCauley points out that Canada has an inherently entrepreneurial culture. The country has a global reputation for excellence in research. There is government support for technology and innovation. Good ideas have unprecedented access to capital. The pieces are there, but Canada's commercialization struggle has persisted.

"Canada has a great history of discovery and innovation. And that goes way, way, way back," says Karimah Es Sabar, former president and CEO of the CDRD and current CEO and partner of Vancouver-based Quark Venture Inc.

"What CDRD did was it bridged that valley ... from academic discovery to becoming an innovation and a technology, that could go into a company and be ready," she says. "It's a tremendous engine to create a pipeline of new companies."

To date, the CDRD has reviewed 1,747 discoveries, undertaken 285 projects and advanced 66 life sciences technologies. It's also helped raise $270 million in private capital for its spinoff companies, which in turn benefit from the CDRD's strategic partnerships with more than 50 universities and research institutes worldwide and six of the world's top global pharmaceutical companies.

The organization has recruited 350 commercially focused health science experts and launched a 10-month executive development program with funding from Pfizer to train life sciences professionals in life sciences leadership.

At the end of the day, the CDRD's goal is to build Canadian life sciences companies that are globally competitive as Canadian companies – ones that anchor and contribute to Canada, rather than take their talent and technology and move south.

It's been 12 years since the organization's founding, and McCauley believes its work is bearing fruit.

"In the 20-plus years I've been in this business, we've never been in a better spot with multiple companies in various parts of Canada," he says, "multiple companies that are entirely likely to be anchor companies of the future."

Dr. Ali Tehrani, president and CEO of Vancouver-based Zymeworks Inc., sees his company as one such anchor. In 2016, Zymeworks acquired Kairos Therapeutics – a CDRD spinoff company that was launched in 2013.

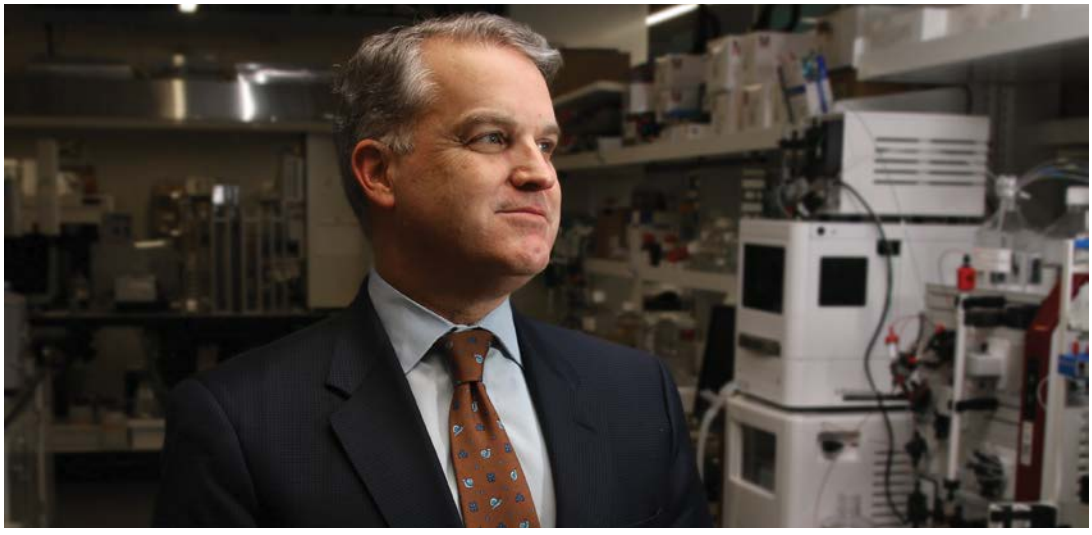
"The acquisition of Kairos did enable Zymeworks to scale," says Tehrani. "If you think about the whole purpose of CDRD, it was really designed to not only accelerate but also provide resources to projects, to people, to entrepreneurs, that otherwise would not have been able to gain access."

Tehrani saw in Kairos a unique opportunity, one that happened to be in Zymeworks' backyard. The technology developed by both companies has been integrated and combined to create a drug now undergoing clinical trials in Canada and the U.S. – one that is designed to attack metastatic cancer cells from inside the cell.

"What you see between Zymeworks and between Kairos is the fact that global work – world-class work – is being done here in British Columbia," Tehrani says.

To create a world-class company that stays in B.C. or Canada, McCauley says, you need to give it as many

FROM STARTUP TO ANCHOR



Gordon McCauley, president and CEO of the Centre for Drug Research and Development, says, "Canada is the only advanced pharmaceutical market in the world without a research-based anchor company. So that's why CDRD exists" • ROB KRUYT

opportunities as you can. That often hinges on access – to experts, labs, lawyers, funding and time.

"I want to see a product; that's why I'm doing this," says Hancock. As he continues to develop the Sepset product, he will need to rely on experts in physiology, pharmacology or other areas through the CDRD to design studies, tests and versions of the drug that are outside his area of expertise.

"This is where CDRD really is valuable, because they provide all of those potential services," he says. "That's what allows you to progress from an idea to a potential technology."

BIG DATA, BIG CHALLENGE

Data sharing can accelerate disease research and improve health outcomes, but as data grows, so does the potential for error

With big data growing at a rapid pace, Scott Morrison, chief technology officer at PHEMI Systems, recommends using a management platform that supports "privacy by design" to reduce human error and hacking • ROB KRUYT

BRIGITTE PETERSEN

Big data offers giant opportunities in life sciences, but it also creates huge challenges when balancing information access with patient privacy, according to industry experts. With big data, the cloud and machine learning, research outcomes can offer more precision, predictability and personalization for patients. Yet, as data grows, so does the potential for error.

OUR IDEA OF BIG 10 YEARS AGO IS SMALL COMPARED TO WHAT WE ARE WORKING ON TODAY

Scott Morrison
Chief technology officer, PHEMI Systems

BIG DATA, BIG CHALLENGE

Kim McGrail, data director for the BC Academic Health Science Network, says more researchers are reusing collected data, such as for genomics, to reduce costs and maximize data use • SUBMITTED

Scott Morrison, chief technology officer at the Gastown-based big-data warehouse company PHEMI Systems, says the greatest challenge is integrating data sets from diverse sources, but it's not due to technical issues.

"It's more of a challenge of people, process and politics," says Morrison. "The moment you cross organizational boundaries, you experience friction because people don't want to lose control of data under their jurisdiction."

The stakes are high when it comes to health-care data, and processes are hard to break.

"Changing a process always entails risk," he explains. "The data flow might stop. Records could be lost or overlooked."

Morrison recommends using a management platform, such as PHEMI Central, that supports "privacy by design" to reduce human error and hacking. He recommends curating data, tagging with descriptions and determining when it can be accessed. Making sure records can be tracked back to their origins, auditing changes and ensuring researchers are able to see the data are also vital.

While access to research is important, privacy should always be top of mind, according to Morrison. Big-data growth has created demand for information-handling tools and methods to ensure accuracy.

"Scale always increases," he says. "Our idea of big 10 years ago is small compared to what we are working on today."

Morrison sees access opening up with better tools in the future.

"I predict an increase in the democratization of access to data," he says. "Look at how technologies like Amazon Alexa are exploding because they empower non-specialists to easily build recipes to knit together applications on the internet. The more eyes we have on information, the more original, innovative insights will follow."

BEST PRACTICES

The BC Academic Health Science Network's data director, Kim McGrail, says responsibility for data management is increasing and raises ethical issues about data access and use.

"The data for life sciences are mostly about people, which means you have responsibility for taking care of the data appropriately," says McGrail, a professor at the University of British Columbia's School of Population and Public Health.

Best practices for managing big data include having a set of guiding principles, as well as clear and

transparent policies and processes consistent with legal requirements.

McGrail recommends using the "five safes" framework, which identifies safe people, projects, data, environment and output, when allowing access. This involves finding out who is requesting data, who will benefit from the project, de-identifying data for privacy protection and determining the research environment and what will be made public.

She also suggests using the FAIR principles – findable, accessible, interoperable and reusable – when cataloguing and tagging data to allow others to find data sets. More researchers are reusing collected data, such as for genomics, to reduce costs and maximize data use.

"I've seen more collaboration across institutions rather than people trying to do it all on their own," she says.

COLLABORATING GLOBALLY

A new international initiative unveiled in January will provide registered researchers with rapid access to an "unprecedented scale" of clinical research data. The Common Infrastructure for National Cohorts in Europe, Canada and Africa (CINECA) focuses on access to human big data to accelerate research and improve patient care.

Now able to share research findings and reduce costly duplicate studies, approved researchers have access to a virtual cohort of data from 1.4 million individuals through a distributed cloud-based network.

The initiative's Canadian lead, Simon Fraser University (SFU) professor Fiona Brinkman, says the project will accelerate disease research and benefit patients worldwide through the sharing of genetic, physical and lifestyle data.

"CINECA is all about trying to pool resources to empower better analyses," says Brinkman, who works in SFU's department of molecular biology and biochemistry. "Some insights, such as new medicines that may help treat a subset of people, don't show up in analyses until you have enough people in your clinical study."

Research is expected to support studies of variability existing in the human genome of patients to help improve the effectiveness of drugs. A common language for data sets will be used for data sharing.

Brinkman says a strong ethics component is included to ensure data is not presented in a way that reveals participants' identities and to limit access to the right people. She says there is a need for more investment when it comes to big-data management.

"Many life sciences researchers really struggle with big data," explains Brinkman. "They don't have the training and resources to deal with it, let alone know all the possibilities for how they could capitalize on it."

Simon Fraser University professor Fiona Brinkman is the Canadian lead for the new Common Infrastructure for National Cohorts in Europe, Canada and Africa, which focuses on access to human big data to accelerate research and improve patient care • SUBMITTED

THE BATTLE WITH BUGS

Local researchers are developing new approaches to antibiotic resistance

NELSON BENNETT

Since the discovery of penicillin in 1928, antibiotics have saved millions of lives. But drug makers and physicians have been running a non-stop race to try to keep one step ahead of bacteria that develop resistance to antibiotics. Their overuse has increased antibiotic resistance – a problem the World Health Organization has identified as a serious concern.

THEY REPRESENT TWO-THIRDS OF ALL INFECTIONS IN HUMAN BEINGS, AND YET THERE HAS NEVER BEEN AN AGENT DEVELOPED FOR BIOFILM INFECTIONS

Bob Hancock
Professor of microbiology and immunology, University of British Columbia

ABOVE: Ondine Biomedical CEO Carolyn Cross says that "multi-drug resistance is now 40 per cent of hospital-acquired infections" • SUBMITTED

LEFT: Dr. Bob Hancock, professor of microbiology and immunology at the University of British Columbia and a Canada Research Chair in health and genomics, leads a team of researchers who have been using peptides, in conjunction with existing antibiotics, to create anti-biofilm agents • CHUNG CHOW

"Antibiotic resistance is rising to dangerously high levels in all parts of the world," the organization warns.

A study published in November 2018 in *The Lancet* medical journal estimates that more than 33,000 deaths in Europe in 2015 were attributable to infections from drug-resistant bacteria.

The urgency to find more effective drugs, or alternatives to antibiotics, recently led the U.S. Food and Drug Administration (FDA) to give a disinfection device developed by Vancouver's Ondine Biomedical Inc. a "qualified infectious disease product" designation.

The designation reduces a device's review time by 40 per cent and adds five years of market exclusivity to drugs or devices that get FDA approval.

Ondine is also getting interest and help from advisory board members from Hospital Corp. of America, which operates close to 300 hospitals and surgery centres in the U.S.

"They love the technology," says Ondine CEO Carolyn Cross. "They see antimicrobial resistance as an increasing problem because multi-drug resistance is now 40 per cent of hospital-acquired infections."

Ondine's Steriwave photodisinfection device is currently used in hospitals in the Vancouver Coastal Health and Interior Health regions.

It uses a specific wavelength of laser light to "decolonize" the nasal passages of patients undergoing surgery. It instantly kills all pathogens in the nasal passage, not just bacteria. This reduces the possibility of infection in patients undergoing surgery.

"It was proven to be effective – dropped by about half the number of infections at Vancouver General [Hospital]," says Dr. Nicolas Loebel, Ondine's chief technology officer.

While the device is currently being used to disinfect nasal passages in patients before surgery, Ondine is also working on other potential applications – disinfecting burns, wounds and catheters, for example.

"We have been focusing on expanding our technology development across different applications with the focus to get three of them through the FDA," Cross says.

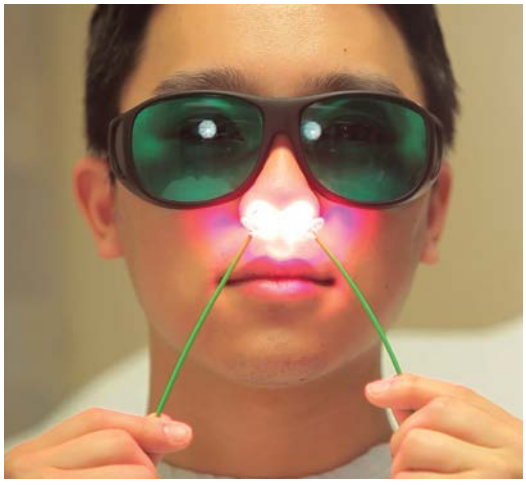
One nasty talent that bacteria possess is the ability to pass on the genes that make them drug resistant to other species of bacteria.

For example, one strain of staphylococcus that was vulnerable to the drug vancomycin can borrow resistance genes from streptococci to become vancomycin resistant.

"These are the kinds of things that happen when antibiotics get overused, and why companies like ours are starting to become rather valuable ... to health centres, to centres for disease control, because there are so few ways to combat bugs that aren't antibiotic related," Loebel says.

Another nasty talent of bacteria is their ability to form defensive colonies wherein one strain of bacteria – or multiple strains – forms a biofilm. Biofilms can form around heart valves, stents and catheters and cause

THE BATTLE WITH BUGS



Ondine Biomedical's Steriwave photodisinfection device uses a specific wavelength of laser light to "decolonize" or kill all pathogens in the nasal passage, reducing the possibility of infection in patients undergoing surgery • SUBMITTED

severe infections. They can also cause a range of other infections, including sinusitis.

Dr. Bob Hancock, professor of microbiology and immunology at the University of British Columbia, director of the Centre for Microbial Diseases and Immunity Research and a Canada Research Chair in health and genomics, leads a team of researchers who have been using peptides, in conjunction with existing antibiotics, to create anti-biofilm agents.

"They represent two-thirds of all infections in human beings, and yet there has never been an agent developed for biofilm infections," Hancock says. "Whenever you have a chronic type of infection – one that lasts for a long time – that's almost always because the organism forms a biofilm, and it's really hard to get rid of."

Bacteria congregate into biofilms when stressed, and stressors can include antibiotics or immune system responses. Certain peptides can interfere with the stress mechanism to either prevent the biofilms from forming or disrupt existing colonies.

The peptides would be taken as a drug in conjunction with existing antibiotics.

"Since the resistance mechanisms are fundamentally different for the two agents, it's much harder to get organisms to be resistant to both, as opposed to a single agent," Hancock says.

Hancock's lab has developed 12 synthetic peptides that appear to work on multiple species of bacteria.

In order to get the broad-spectrum treatment approach from the lab bench to market, Hancock has founded a startup called ABT Innovations, which is now working to get various formulations to the preclinical trial stage. One of the formulations being advanced would be used to treat sinusitis.

BRI Biopharmaceutical Research Inc.

Highlights: www.bripharm.com

In Vitro and In Vivo Human Fecal Microbiome Metabolism - Drug and Food Interplay Supported by LC/MS/MS and Multiplex ELISA Biomarker Assays

A Unique Contract Research Laboratory

For more than two decades, BRI has focused on pre-clinical and clinical programs supporting biotech and pharmaceutical companies. BRI is uniquely operated in British Columbia as an independent CRO with capabilities in LC/MS/MS and multiplex ELISA bioanalytical, in-vivo and in-vitro drug metabolism, pharmacokinetics and human tumor xenograft mouse models.

GLP Accreditation

BRI is accredited by Standard Council of Canada for GLP compliance. All IND and NDA enabling preclinical and clinical studies performed at BRI follow internal SOPs and relevant "fit-for-purpose" regulatory requirements for US FDA and Health Canada submissions.

QAU and Data Integrity

IND-Enabling animal TK/PK and clinical PK samples are managed by Thermo Watson™ LIMS validated to ensure sample and data integrity during generation and processing of analytical data.

Comprehensive Capabilities

- BRI has co-authored numerous publications over the past decade in human fecal microbiome in vitro metabolism studies and clinical drug and food studies supported by specialized fecal microbiome biomarker assays
- BRI's rodent facility provides oral and parenteral formulation development, in parallel with human tumor xenograft efficacy, ADME, drug metabolism and pharmacokinetic studies in rodents
- BRI has a long track-record in conducting LC/MS/MS and multiplex ELISA assays of small molecules, protein drugs, biomarkers, siRNA, and mAb drug candidates
- BRI also provides CMC studies supporting manufacturing and storage stability testing of API and clinical products in support of Phase I clinical trial
- ^{14}C-radioisotope license at BRI supports in vitro and in vivo drug metabolism, tissue distribution and elimination mass balance ADME studies
- Controlled drug license at BRI provides bioanalytical assay support to numerous controlled substances

Contact: Ms. Clara Faan, VP Business Development
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UNLOCKING THE DIGITAL TECH SUPERCLUSTER

New initiative has $153m in funding to stoke collaborations between private enterprises and post-secondary institutions

TYLER ORTON

"Let's run some tests." It's among the most common statements a general practitioner or specialist has chambered for a medical patient still trying to navigate the often Byzantine nature of the health-care system. "What if when you ended up in the hospital, the hospital doesn't say, 'Let's run some tests' – the same ones that you've already had twice?" says Sue Paish, CEO of Canada's Digital Technology Supercluster.

"What if the data could be collected, protected, leveraged and backed up ... so that we have a smoother, more sustainable and effective health-care system?"

Paish envisions that possibility creeping closer to reality with the collaborations being cultivated through the Vancouver-based Digital Technology Supercluster.

Before assuming the top job in May 2018, Paish served for more than five years as CEO of LifeLabs, the country's largest diagnostic laboratory.

Her experience in the health-care sector appears to be a natural fit for a national program aimed at producing partnerships in the digital realm among educational institutions, large enterprises and startups.

"We know [data] is segregated, we know it's disaggregated and we don't leverage data very well. What if we could have a data platform where we can use analytics and digitalization to transform health-care delivery?" Paish says.

By bringing together organizations that otherwise don't share long histories of working together – say, hospitals and tech startups – the supercluster has the potential to produce industry innovations that have yet to be tapped.

The Digital Technology Supercluster was created through a federal government initiative that saw Ottawa earmark $950 million for successful bids.

The pitch that originated in B.C. was one of five eventually selected for federal funding.

Ottawa confirmed in November the Digital Technology Supercluster would have $153 million at its disposal to stoke industry and post-secondary collaborations on digital products, platforms and companies.

Telus, Microsoft and the University of British Columbia were among the 60 organizations that participated in the initial bid for funding in 2017. The number of participants has since ballooned to more than 500.

Participants are required to make investments in collaborative projects pitched to the supercluster. Each project must include a minimum of three organizations,

WE KNOW [DATA] IS SEGREGATED, WE KNOW IT'S DISAGGREGATED AND WE DON'T LEVERAGE DATA VERY WELL. WHAT IF WE COULD HAVE A DATA PLATFORM WHERE WE CAN USE ANALYTICS AND DIGITALIZATION TO TRANSFORM HEALTH-CARE DELIVERY?

Sue Paish
CEO, Canada's Digital Technology Supercluster

at least one of which must be a small or medium-sized enterprise, and another must be a post-secondary institution.

The supercluster expects to see these consortia feature six to nine members on average.

As industry and post-secondary collaborators hit milestones for projects the supercluster signs off on, the supercluster in turn invests about 75 cents for every dollar of private-sector investment.

A November 2017 executive summary estimated that participants could eventually invest $1.4 billion to fund 100 collaborations involving 1,000 organizations over a decade.

"This is not a program where you have a good idea, you bring it forward, you put a proposal in, you get some funding and then we say, 'Have a good day. I hope it works out,'" Paish told the Greater Vancouver Board of Trade in November. "We must see outcomes that are commercially viable."

Because the projects are competitively structured, the supercluster will make funding evaluations based on the composition of any given consortium, its ability to execute and the breadth of capabilities it possesses.

"I firmly believe that it will be so successful that ... it will be irresistible for [the] private and public sectors to not continue to fund and expand the success that we're going to build," Paish says.

CEO Sue Paish heads Canada's Digital Technology Supercluster, with $153 million at its disposal to cultivate industry and academic collaborations on digital products, platforms and companies • ROB KRUYT

Bill Tam, the supercluster's vice-president of business development and partnerships, says the health-care sector is ripe for a digital shakeup.

"British Columbia has many of the core ingredients that are necessary to become a leader in precision health and the practices around using data to transform the delivery of health care and provide improved patient engagement along the way," he says.

"The key ingredient in the supercluster is really to provide a catalytic effect on the need to pull together disparate organizations and groups ... [and] perhaps have people think about outcomes that they could not have achieved independently."

Tam says he and his team have been working on facilitating ideation workshops ever since the November funding announcement in a bid to help different members discover opportunities they might pursue with each other.

Telus Health and LifeLabs are among the biggest names developing projects. Startups like DNAstack and MetaOptima Technology are also jumping on board.

"The question is not really about whether or not the technologies exist or whether or not people are eager or anxious to adopt them," Tam says. "It's 'How can we build a framework where everyone feels that we can advance the elements in somewhat of a collaborative manner?'"

THE BIOMARKER ADVANTAGE

Molecular You's disruptive technology aims to identify a person's potential health risks before diseases develop

WE GIVE PEOPLE A FULL PICTURE OF THEIR HEALTH AND THE RISKS THEY ARE FACING. WE THEN GIVE THEM THE PLAN TO KEEP THEM HEALTHY – ALL FROM ANALYZING A SINGLE SAMPLE OF BLOOD

Robert Fraser
CEO, Molecular You

CHUCK CHIANG

Imagine being able to run a diagnostic on your own body at a molecular level, seeing potential diseases developing years in advance and then making lifestyle changes or taking medication to prevent the problem from ever actually developing.

That's exactly what University of British Columbia-based Molecular You Corp. – the brainchild of several top Canadian researchers in the fields of molecular profiling and bioinformatics – is offering: a chance for a person to see his or her health report down to the minutest biological details over time, almost like viewing a personal health stock chart.

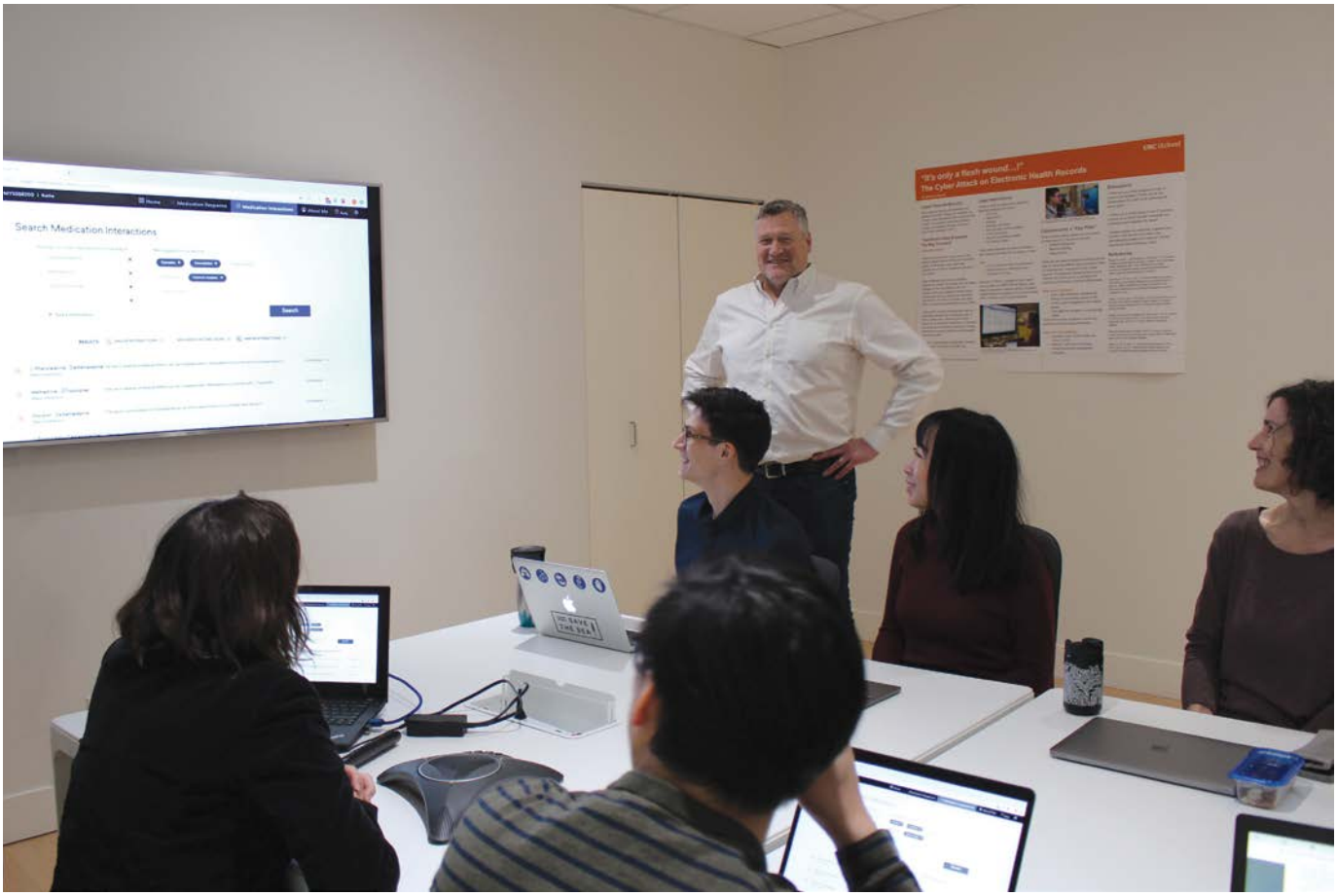
"We already do this with our cars now," says Robert Fraser, CEO of Molecular You. "When I was young, you waited for the car to break down to take it in; now, nobody does that. And you don't see cars breaking down now, because we have all these early warnings and regular maintenance. That's what we are trying to do, to take that logic and apply it to keeping people healthy."

Fraser co-founded the Personalized Medicine Initiative together with Dr. Pieter Cullis in 2011 to better apply technological advances in the molecular medical field to everyday use; that was when he began to realize the potential of molecular-based diagnostics versus the better-known genetic analysis model, he says. That, in turn, led to the founding of Molecular You in 2014. The team ran a pilot project in 2016 based on molecular health analysis – the first steps for the company now aiming to reach into markets across North America.

"I guess it was kind of a hypothesis, and the pilot project formulated the whole notion," Fraser says. "It was spellbinding how much information we can get.... We are still learning, and we hope we will continue learning as we implement the technology."

The key difference between molecular analysis and genetic methods, Fraser says, is that genes are simply the "source codes" from which come actual proteins that perform essential functions within human bodies. As such, genetics can identify certain variables within genes that may be more prone to certain conditions, but it cannot tell a person if those conditions are actually starting to develop.

By assessing the proteins that come from the genes – the actual processes happening in the body – in addition to the metabolites being produced as a byproduct of proteins interacting, molecular analysis can give an ongoing play-by-play of what's actually taking place in the body. This allows for more accurate pinpointing of biomarkers that can allow a person to take targeted actions to eliminate



the developing health risk before it becomes a disease.

"The best way to sum it all up is that we give people a full picture of their health and the risks they are facing," Fraser says. "We then give them the plan to keep them healthy – all from analyzing a single sample of blood."

Parallel to the development of the molecular testing technology is the visualization of the results. As part of its product, Molecular You lets users create profiles on an online platform through which they can then track their health progress. Each time a user visits a Molecular You lab and submits a sample, it is used to generate a new analysis of that user's health – creating a progressive chart that allows tracking and significantly reduces the need to go to the doctor for regular checkups or for treatment of diseases that may now never surface.

As part of the deal, Molecular You also provides users with an action plan – an easy-to-read document outlining what to do next to ameliorate or correct the health issues that are arising.

Currently, Molecular You has partnerships with Metro Vancouver-based Pure Integrative Pharmacy to deliver the company's product, and Fraser says groups like the Toronto Athletic Club clinic will soon adopt the technology into their own health-care offerings. In addition, five companies and two insurance groups are now testing the technology for potential use – an indication of where Molecular You's biggest potential market will be, Fraser says.

"The product still has a premium price to it, and we feel we can drive down that pricing with scaling," he says, noting the current offerings can cost anywhere from $430 for a baseline test to $1,395 for a diagnostic that includes metabolites, proteins and genetics. "But we feel that people are going to need some help with the cost of it, and we also think this will benefit corporations because this will keep their people healthy and productive. It should drive down the costs of other things, so we've found corporations and benefit providers with platforms are very interested in this. That adoption is starting to take off, and that's where we see the biggest uptake."

In addition, the company is now getting inquiries from states like New York, California and Wyoming (the latter highlighting the potential cost savings of using molecular testing systems to replace specialist care in rural regions, Fraser says) and says it aims to be established across North America in a couple of years – with an eye on international markets like Asia and Europe.

"We do see this as a globally applicable technology, and we are pretty excited about spreading the knowledge," Fraser says.

CEO Robert Fraser (standing) and the team at Molecular You aim to establish their product, which analyzes biomarkers in the body to provide in-depth scientific health assessments, across North America in the next couple of years • SUBMITTED

GETTING VERY PERSONAL

Ayogo Health looks to fill holes left by the health-care system with its patient-tailored behaviour intervention app

WE HAVE FOCUSED OURSELVES ON HOW TO HELP INNOVATE, ACTIVATE AND PERSIST IN THERAPIES, AND WE ARE PARTICULARLY INTERESTED IN SCENARIOS WHERE PATIENTS HAVE STRUGGLED

Michael Fergusson
Founder and CEO,
Ayogo Health

TYLER NYQUVEST

The diagnosis of an illness can be among the most difficult news to hear. As patients become introduced to their particular ailment, all sorts of realizations emerge that solidify the fact that life as they know it may be inexorably altered.

That's certainly how Clare Hooper, research lead at Ayogo Health Inc., felt when she was diagnosed with diabetes.

"I was diagnosed with Type 1 diabetes back when I was 24," she says. "I'm a very analytical person, so it was natural to me to do a lot of reading. I absorbed drier, more objective material from patient information leaflets, but I was also scouring corners of the internet to try and understand people's personal experiences.

"I'd go to appointments with my consultant with long lists of questions, but I was simultaneously asking a bunch of questions of strangers on the internet – I had different questions for my peers, more about day-to-day things."

Diagnosis is always difficult, but as Hooper knows, the management and control of any particular illness is really where the challenge lies. And that is what the team at Ayogo Health is trying to fix.

Hooper is part of Ayogo's mixed bag of scientists and software developers who have created an app-based intervention software that aims to counteract negative behaviour patterns when dealing with a chronic condition and to decipher how in control patients are of their illness.

The Ayogo app is tailored to each individual and measures the likelihood of his or her commitment to various therapies and health upkeep through a series of psychosocial profiling questionnaires and surveys. The app uses the data to categorize patients and employs varying methods of interaction to help ensure patients maintain their health responsibilities.

To briefly explain how the system works, Hooper references the category of gay men using HIV-combative pre-exposure prophylaxis, or PrEP, which requires daily medication intake and relatively frequent visits to a lab for blood work.

"Typically, on a Friday night or Saturday night, if people are out and partying or having fun, they might forget to take their medication," says Hooper. "On the server end of things, Saturday morning is shaky – a break in the routine. If we see that happen, we will automate sending a message."

The Ayogo app can operate through WhatsApp and other messaging apps to ensure that patients are being reminded to take the medication they need. Hooper also states that the app tries to encourage "habit backing" so that, even if patients' phones die or become unavailable, they are already set up for success.

"If every morning, [patients] grind their coffee beans before they head out and go about their day, then put the pills next to the beans or put it next to [their] toothbrush, for example," says Hooper.

This is just one of many examples. The app also provides

Clare Hooper, research lead, and Michael Fergusson, founder and CEO, at Vancouver-based Ayogo Health • CHUNG CHOW

users with resources, up-to-date industry information and a connection to a support network should patients feel they are slipping.

"We have focused ourselves on how to help innovate, activate and persist in therapies, and we are particularly interested in scenarios where patients have struggled," says Michael Fergusson, CEO of Ayogo Health.

Fergusson founded the company in 2011 and spent the greater part of four years collecting information and researching the market before focusing on being primarily product driven.

"Social patterning effects are very powerful, and social peer groups are a good way for people to be mindful and a way for people to receive intrinsic motivation to act."

While Fergusson acknowledges the tireless professionals working to serve the health-care system, he understands that the ideal doctor-patient relationship isn't always possible, and patients are often left feeling confused.

"That approach is rooted in consolable realities.... You can't take the time to understand each patient individually; you can't take the time to tailor a specific program to each individual patient, but in the digital space, we have a lot more power," Fergusson says.

"We can apply a range of instruments and simply ask the questions and take the kind of time that a doctor or a nurse simply cannot take, and we can reach them at home, in their own time, whenever is convenient for them."

Fergusson has noticed that those who suffer from conditions such as Type 1 diabetes, obesity and substance abuse disorder benefit from the tech most often. Yet, by employing these measures to a wide range of illnesses, the company hopes to end stigmas regarding more severe health conditions.

"Essentially, if there is any incentive to not seeking treatment, then that can play a role," says Steven Taylor, a professor of psychiatry at the University of British Columbia.

"If you have postpartum depression and you reveal you are feeling depressed or suicidal or have intrusive thoughts of harming the baby, the person might not seek treatment out of fear of having their children taken away from them.

"If you have someone who is depressed or suicidal who is in the armed forces or RCMP, they might not seek treatment for fear of stigma or ... the shame of having their weapon taken away from them."

On the other end of the spectrum, those who are vigilant about their condition and seek to consume as much content as possible might find themselves accessing information that might impede their knowledge base.

"One of the challenges we have had is that right now there is no barrier to people putting information out there and calling it health," says Dr. Eric Cadesky, president of Doctors of BC.

"Sometimes it is well-meaning people who are incorrect or outdated with their information ... and unfortunately, we've seen sometimes people put out purposely misleading or incorrect information that is actually harmful to people."

While Cadesky believes no digital form of interaction will replace face-to-face consultation, any technology that can connect users to useful, reliable resources is encouraged.

"As long as there is a technology that is accessible to people and the content is correct and updated frequently, then that has the potential to allow people to play a more central role in their lives and prepare the questions they do have when they access their doctor or other health-care provider."

FINDING THE SOURCE

Prenuvo's full-body scan detects cancer in a more profound way

BEING ABLE TO TAKE A VERY DETAILED SNAPSHOT USING MRIS IS SUPER HELPFUL FOR DIAGNOSING CONDITIONS. BUT WHAT'S EVEN MORE HELPFUL ... IS TO SEE HOW THE BODY CHANGES OVER TIME, BECAUSE IT INCREASES THE DIAGNOSTIC ACCURACY OF THE [SCAN] ITSELF

Andrew Lacy
CEO, Prenuvo

TYLER ORTON

A typical MRI machine takes about half an hour to scan a portion of a patient's spine for cancer. At the AIM Medical Imaging clinic in Vancouver, custom-engineered MRI technology is making that pace the equivalent of using a dial-up modem in the age of broadband internet. "We've been able to speed up that MRI tremendously to the point where in just over an hour we can do the entire body," says Dr. Rajpaul Attariwala, creator of the Prenuvo scan. "With it we can detect nine of the top 10 cancers in Stage 1."

While Attariwala is now a radiologist, he cut his teeth earning a PhD in engineering before returning to school to study medicine. A self-described "hard-core engineer," he developed the Prenuvo scan through customized hardware and proprietary software.

"The benefit I have is I can talk as well with engineers and physicists as I can with physicians and therefore know exactly what physics technology needs to be modified to be able to be applied to the clinical realm," Attariwala says.

The Prenuvo scanner has attracted patients ranging from Grammy winners to tech executives for radiation-free checkups.

Prenuvo was incorporated last summer, and CEO Andrew Lacy says the company plans to start commercializing the made-in-B.C. technology this year.

He says MRI remains a niche business owing in part to the limited number of radiologists available to administer the scans.

But swifter technology opens up the market to more scans, according to Lacy, a Silicon Valley veteran by way of Australia.

The company planned to begin fundraising in 2019's first quarter and aims to open a total of five clinics in California, New York and Finland by 2020. Meanwhile, Lacy says, Prenuvo's benefits will be further realized as patients increase the number and regularity of their scans.

"Being able to take a very detailed snapshot using MRIs is super helpful for diagnosing conditions. But what's even more helpful, frankly, is to see how the body changes over time, because it increases the diagnostic accuracy of the [scan] itself," he says. "This is going to pave the way, of course, for personalized preventive health plans that are customized to each person."

And the potential for personalized medicine is significant for B.C., according to a June 2017 report from PwC Canada. The field focuses on customized treatments for patients – often based on genetic profiling – based on their personal medical histories.

"Approximately 50 per cent of prescribed drugs do not help the person they are prescribed for partly due to genetic differences between patients. This is estimated to cost B.C. $1.5 billion annually," states *Roadmap 2.0: The Time is Now for Personalized Medicine in British*

Dr. Rajpaul Attariwala (left), Prenuvo chief medical officer, and Andrew Lacy, the company's CEO, with Prenuvo's MRI technology at their West Broadway offices in Vancouver • ROB KRUYT/ *BIV* FILES

Columbia. "Adverse drug reactions to prescribed drugs cost B.C. approximately $0.5 billion annually in hospital care."

But the report concludes that personalized medicine in B.C. largely remains an "unco-ordinated effort" among clinical centres, government agencies, universities and startups. The report urges the province to establish a non-profit umbrella organization to represent stakeholders in the field.

James Taylor, a director at industry association LifeSciences BC, says the region still holds a number of advantages in terms of emerging as a hub for personalized medicine. Its history in genomics science, antibody drugs and recent launch of the interdisciplinary Digital Technology Supercluster are the right ingredients for a solid ecosystem, he says. But Taylor adds that challenges remain if B.C. is to compete against regions like San Francisco or Boston.

"The world is seeing these megatrends of certain areas gaining more and more resources, including talent and capital," says Taylor, who is also CEO of Vancouver-based Precision NanoSystems Inc.

He says the region shouldn't expect to unseat a city like San Francisco, but it can still capitalize on inherent strengths such as a solid positioning to participate in Asian markets.

Meanwhile, local advances in personalized medicine are also attracting support from notable names in business and technology from outside the province. The Paul G. Allen Frontiers Group, named for the late co-founder of Microsoft Corp., made a US$1.5 million grant last October to Dr. Christian Steidl to fund his lymphoid cancer research. Steidl, research director at the BC Cancer Agency's Centre for Lymphoid Cancer, is focused on merging cancer genome sequencing with cancer imaging, a field that he hopes will lead to more precise diagnostic tools and treatments.

"You can really think about it as unique funding to bridge two fields that stand on their own," Steidl told *Business in Vancouver* in October. "Now we have the opportunity to give it the boost that we need to really elevate it to the next level – and not only doing incremental research, but doing a quantum leap with what we are proposing."

The economic potential is also expanding into manufacturing and other sectors of B.C.'s economy. Vanrx Pharmasystems Inc. specializes in robotic technology for the manufacturing of injectable drugs, replacing outdated filling equipment in the pharmaceutical industry. It's grown from six workers in 2013 to a staff of about 70.

"Personalized medicine is happening right now," CEO Chris Procyshyn says.

SAVING THE ATHLETE

HeadCheck Health is using data to help post-concussion health

GOING AND TALKING TO CUSTOMERS AND HAVING PEOPLE USING IT AND GETTING FEEDBACK, THAT'S WHAT REALLY CHANGED IT FOR US. WE COULD HAVE STAYED IN A LAB AND DONE RESEARCH FOR 30 YEARS AND WE WOULD HAVE NEVER COME THIS FAR

Harrison Brown
CEO and co-founder, HeadCheck Health

ALBERT VAN SANTVOORT

Sport-related concussions have been the subject of significant public concern in recent years, particularly after some high-profile incidents involving National Football League players who have become violent or suicidal as a result of traumatic brain injuries. While many organizations have implemented concussion policies, the tools needed to help prevent, diagnose and treat these injuries, as well as effectively monitor policy adherence, have been inadequate, at least until now.

Vancouver-based HeadCheck Health has created a digital platform that allows sports organizations to test, document, assess and monitor the head trauma incidents of their athletes and make better, data-driven decisions. It provides the data necessary to monitor a player's concussion recovery and ensure that players who have suffered a concussion are not put at risk of sustaining another one. In addition, the platform works to ensure that organizations are compliant with their own concussion-prevention policy.

"It also provides them with a way to audit their compliance," says Harrison Brown, CEO and co-founder of HeadCheck Health. "Inevitably what we find is large portions of leagues have teams that are not compliant with their policy, which leaves them at risk not only of a lawsuit but, more importantly, a risk of serious injury."

Organizations adopt HeadCheck Health's platform for multiple reasons. Keeping people safe and providing people with the tools to do so is one, but the less benevolent reason is to avoid lawsuits, which Brown says definitely drives demand.

An increasing number of regulations, particularly in the U.S., requiring organizations to develop a concussion policy are also contributing to HeadCheck Health's customer growth.

Brown says that while regulations are helping to speed

Harrison Brown, CEO and co-founder of HeadCheck Health, says his company's concussion management software helps sports organizations keep athletes safe – and avoid lawsuits • ROB KRUYT

up the product's adoption rate south of the border, sales are not dependent on these legal requirements. Brown points to Canada, where the majority of the company's customer base is located and where no such laws exist.

"When we first started selling the product and even now, there is still a large portion of our customers who are buying it because they know it's the right thing to do," says Brown.

Increased social consciousness around concussions has also helped to attract customers to HeadCheck Health's software. Amateur and little leagues are able to adopt this software and demonstrate to players and parents that they take the health impact of concussions seriously and have the tools to properly monitor and assess head injuries.

Brown and his co-founder created the HeadCheck Health system at the University of British Columbia (UBC). That academic environment provided them the space to create their product and test their idea. However, it wasn't until they tried to bring the product to market that they learned how to truly develop it to meet a broader range of needs for a larger customer base.

While the product development time at UBC was essential to get the company off the ground, Brown says that commercialization was just as important and credits it for much of HeadCheck Health's growth.

"Going and talking to customers and having people using it and getting feedback, that's what really changed it for us," he says. "We could have stayed in a lab and done research for 30 years and we would have never come this far."

HeadCheck Health is illustrative of a trend that is taking root across various industries. B.C.'s newer industries, including health and life sciences, are taking cues from the province's more traditional sector: resources. Many mines, as well as oil and gas extractors, are relying on data to improve effectiveness and their bottom line. Data collection, aggregation and presentation offers a huge opportunity for the health-tech industry – an opportunity that companies ranging from HeadCheck Health to Fitbit Inc. are already capitalizing on.

"Data is becoming an asset," says Brown. "For us, we're looking at ways we can gain some sort of insight on our data."

Brown says HeadCheck Health and the health-tech industry in general use data differently than many other industries do, because the focus is on providing information to the consumer, as opposed to internet data companies like Facebook where data is used for the benefit of the company in order to sell more targeted advertisements.

PLANT AND RESCUE

Vancouver-made medical devices could provide a non-invasive solution to a heart condition

BASICALLY WHERE CARDIOVASCULAR MEDICINE IS GOING IS DELIVERING SERVICES THROUGH THE VEIN OR THE ARTERY IN THE LEG

Vincent Ledoux
COO, Vesalius Cardiovascular

GLEN KORSTROM

After performing countless open-heart surgeries, Vancouver General Hospital's head of cardiovascular surgery, Dr. Peter Skarsgard, in 2013 became convinced that there had to be a better, less invasive way to treat a common heart disorder: mitral regurgitation. One of Skarsgard's specialties was repairing mitral valves, and he had seen many times what it was like when blood backed up and went in an unintended direction through the mitral valve, instead of staying on a forward course in one direction to provide oxygen to the body.

Mitral regurgitation causes sufferers to be out of breath and is estimated to affect about five per cent of the population, including about 10 per cent of people who are more than 70 years old.

The bad news for many who suffer from the disorder is that they are unable to undergo surgery, either because of old age and general frail health or because of diseases such as diabetes.

Skarsgard knew there had to be a way to help these people.

He reflected on medical procedures that have long enabled medical devices to be implanted into different parts of the heart to treat different conditions, and on using catheters.

Skarsgard filed a patent in 2015 to protect his idea while he mulled over how to bring his concept to reality. He

met and discussed his thoughts with Vincent Ledoux, who has a business background; the two co-founded Vesalius Cardiovascular Inc. and set out to create a viable medical device.

To get a better sense of how the device works, here is a bit more on the problem that Skarsgard and Ledoux intended to fix.

The crucial part of the heart that malfunctions in cases of mitral regurgitation is a set of leaflets that open and close, like French doors. Oxygenated blood comes from the lungs and sits in a heart chamber that is known as an atrium. The blood then flows through the leaflets to the left ventricle, which has a role of pumping the blood to circulate it throughout the human body.

When the ventricle squeezes or contracts, the force closes the mitral valve and another valve opens to let the blood continue in a forward direction.

Mitral regurgitation takes place if support of the leaflets breaks down and the leaflets are unable to tightly restrict blood from flowing in a reverse direction.

During open-heart surgery, the problem can easily be fixed with sutures, which provide the leaflets with the equivalent of new support.

Vesalius' device provides a net to backstop the leaflets and provide sufficient support to keep the leaflets strong enough to keep blood from leaking where it is not supposed to go.

The Vesalius executives foresee being able to implant medical devices into a catheter that is inserted into a vein in a person's leg.

"We are using a vein," explains Ledoux. "Some other devices use arteries, but basically where cardiovascular medicine is going is delivering services through the vein or the artery in the leg."

Doctors puncture the skin in the leg and insert a thin tube, or catheter, which can be manipulated from outside the body.

The medical device that goes inside the catheter is made from a nickel-titanium alloy known as Nitinol. That compound is perfect for this task, Ledoux says, because it is elastic and has the capacity to snap back into a predetermined shape as though it had a memory of its own.

As such, the device acts somewhat like a flower with petals. It contracts as it gets stuffed into the catheter, and then, after being pushed along to the appropriate place in the heart, it can expand.

"Remember the catheter is a thin tube, but whatever you need to fix inside may be bigger than the catheter diameter, so whenever you deploy the device, it takes back a shape that is bigger than the diameter," explains Ledoux.

Skarsgard and Ledoux each pumped considerable sums of money into the company to get it off the ground. They then raised $200,000 from one investor in 2017 and $1.2 million from five separate investors in 2018.

They spent one year being helped by the University of British Columbia's Hatch incubator program, which provided office space and mentorship.

The company then moved to a 500-square-foot office at Vancouver General Hospital so its burgeoning operations could be closer to Skarsgard, whose day job is still conducting surgeries.

Dr. Peter Skarsgard (right), president of Vesalius Cardiovascular, and COO Vincent Ledoux are developing a less invasive way to treat mitral regurgitation using catheters – like the ones pictured on the table – inserted in a leg vein to implant medical devices • ROB KRUYT

The next step, according to Ledoux, is for the team to find a venture capitalist willing to provide an unspecified amount of capital necessary to provide the momentum for Vesalius to navigate future experiments and potential human trials.

The company has six engineers perfecting the medical device, and experiments are ongoing with pig and sheep hearts.

Some testing, for example, has been done using frozen sheep hearts. Workers defrost the hearts at room temperature and set about implanting devices.

"You can use it for several hours at room temperature," Ledoux says. "With time, it becomes a different colour and doesn't function well, but for the first two hours, it functions like a living creature."

Last October, Vesalius started to conduct experiments on living sheep, simulating mitral regurgitation and then fixing it with the device.

Ledoux expects that testing on animals at unnamed local laboratories will continue well into 2020.

Vesalius' goal is to be able to start human trials by 2021 – a major evolution in testing that will require the labs currently being used to provide documentation. An application to Health Canada will also need to be approved.

Dr. Donald Ricci, an interventional cardiologist and CEO of the medical device company Evasc, has known Skarsgard for years and believes the idea behind Vesalius has merit.

There are, however, obstacles.

"This looks good in a model, but one won't know its true success until it gets a chance to be used in human problems," Ricci says.

"You can develop models, and animal models, and all of that, but the risk is that those successes are not transferable to treatment of the human condition."

LEADING THE RX REVOLUTION

Inappropriate prescribing is a 'hidden epidemic,' says GenXys chief scientific officer

IT'S BIGGER THAN THE OPIOID CRISIS

Dr. Martin Dawes
Co-founder and chief scientific officer, GenXys Health Care Systems

BRIGITTE PETERSEN

Combining its cutting-edge software with pharmacogenetics, GenXys Health Care Systems is rewriting the way drugs are prescribed. Calling itself a software company, GenXys focuses on helping clinicians apply the right medicine. Its main goal is ambitious: to have every prescription around the globe powered by its software.

"It's high time that prescribing gets a lot more precise and less trial and error," says Karl Pringle, the company's CEO since May 2018. "The very cornerstone of precision medicine has to be precision prescribing."

Recently relocated from the University of British Columbia (UBC) to Gastown, GenXys addresses the global problem of inappropriate prescribing. In 2018, adverse drug reactions were the fourth-largest cause of death in the U.S., with similar statistics in Canada, the U.K. and other developed countries.

GenXys is not in the business of disease prediction, prognosis or ancestral research, according to Pringle, who wants to see pharmacogenetic testing – the interaction between an individual's genetics and medications – on every baby at birth.

"We're focused on the right medications for the right person at the right time," he explains.

HOW IT WORKS

The precision-prescribing software TreatGx uses algorithms to identify safer, more effective drug options, resulting in fewer drug interactions. The pharmacogenetic service starts with a testing kit called TreatGxPlus. After purchasing the kit for $499, patients use a swab connected to a tube to gather DNA from inside their mouths, which is sent to LifeLabs Genetics for testing. The test identifies more than 65 genetic markers in individual patients, and more than 115 drugs, to find the right medication for them. So far, 600 clinicians and patients across Canada have used the software.

Testing looks at more than 250,000 drug-to-drug interactions, focusing on 35 health conditions mostly involving mental health, cardiovascular issues and pain.

"Those are the three conditions where you see most adverse drug reactions," says Dr. Martin Dawes, the

GenXys' co-founder and chief scientific officer, Dr. Martin Dawes (left), and CEO, Karl Pringle, are working to fix the global problem of inappropriate drug prescribing • ROB KRUYT

company's co-founder and chief scientific officer.

In Canada, kits are currently available at health clinics, London Drugs, Pharmasave and Pure Integrative Pharmacy and online through LifeLabs. Both patients and physicians can order the tests, and results are available in seven to 10 days.

With the press of a button, the software acts as a clinician's assistant and takes the hard work out of prescribing, says Dawes, who developed the software at UBC with his physiotherapist wife, Diana Dawes, co-founder and chief operating officer at GenXys.

PRESCRIPTION PROBLEM

While a medication may work for one patient, it may show no benefit or cause harmful side effects in another. GenXys developed its pharmacogenetic service, in partnership with LifeLabs, to address the problem and help physicians personalize medication plans.

Using the software for every prescription improves patient safety and drug efficacy while reducing health-care costs by cutting back on emergency room visits, says Pringle. According to test trials, up to 40 per cent of adverse drug reactions are preventable with TreatGxPlus.

For clinicians, precision prescribing replaces the way medication has been provided to patients for centuries – through trial and error. About half of all prescriptions are currently ineffective, causing deaths and unnecessary drug costs for patients and the health-care system.

"The size of the problem is vast," says Pringle. "It's almost like it's the best worst-kept secret."

Dawes agrees, calling inappropriate prescribing a "hidden epidemic."

According to Canadian research, inappropriate prescriptions affect about 44 per cent of women and 32 per cent of men over 65, while more than one in nine emergency visits is due to drug-related adverse events.

"It's bigger than the opioid crisis," says Dawes, head of UBC's department of family practice. "But it's every year, not just in the last two or three years."

GenXys is part of Canada's Digital Technology Supercluster, which includes a focus on precision health. Launched in 2014, the company has since formed Canadian partnerships with LifeLabs, the sole distributor of its products in Canada, and Telus, which is also an investor. With the service offered across Canada since March 2018, GenXys secured funding to enter the U.S. market last October.

USING ARTIFICIAL INTELLIGENCE

More work is needed when it comes to precision prescribing, according to Dawes. Once they reach about 50,000 patients, GenXys plans to use a machine-learning approach to refine trial evidence algorithms and tweak them based on individual experiences. Through the supercluster, the aim is to get up to 450,000 patients tested through a phased approach in the next four years.

"A lot of the evidence we're getting right now is from big trials, but they tend to be very limited to people with one or possibly two conditions," says Dawes. "By using this technology and evaluating the outcome of patients, we hope to use artificial intelligence to make the algorithms more precise, so over the next five to 10 years we'll be more accurate in our ability to prescribe safely and effectively."

BIGGEST LIFE SCIENCES COMPANIES IN B.C.

RANKED BY | Number of R&D employees in 2018

Rank '19	Company	Top local executive(s)	Areas of research	Ownership	Year founded	No. staff globally '18/'17	No. B.C. staff '18/'17	No. R&D staff '18/'17
1	**Stemcell Technologies Inc** 1618 Station St, Vancouver V6A 1B6 P: 604-877-0713 F: 800-567-2899 **stemcell.com**	**Allen Eaves**, president and CEO	Provides cell culture media, cell separation tools and accessory reagents for cell biology research, including stem cell biology, regenerative medicine, immunology and cancer research	Privately held	1993	1,202 1,030	898 786	**231** 197
2	**Zymeworks Inc** 1385 8th Ave W Suite 540, Vancouver V6H 3V9 P: 604-678-1388 F: 604-737-7077 **zymeworks.com**	**Ali Tehrani**, president and CEO	Antibody and protein therapeutics development with a primary focus in oncology	TSX, NYSE:ZYME	2003	187 147	139 127	**116** 77
3	**Arbutus Biopharma Corp** 8900 Glenlyon Pky Suite 100, Burnaby V5J 5J8 P: 604-419-3200 F: 604-419-3201 **arbutusbio.com**	**Mark Murray**, president and CEO, **David Hastings**, CFO	Discovering, developing and commercializing a cure for patients suffering from chronic hepatitis B infection with a pipeline consisting of multiple drug candidates with complementary mechanisms of action	Nasdaq:ABUS	1992	NP 130	130 130	**90** 90
3	**Kardium Inc** 8518 Glenlyon Pky Suite 155, Burnaby V5J 0B6 P: 604-248-8891 F: 604-304-3478 **kardium.com**	**Doug Goertzen**, CEO	Cardiovascular	Privately held	2007	120 115	120 115	**90** 85
5	**AbCellera Biologics Inc** 2215 Yukon St, Vancouver V5Y 0A1 P: 604-559-9005 F: NP **abcellera.com**	**Carl Hansen**, president and CEO	Therapeutic antibody discovery	Privately held	2012	71 47	47 43	**56** 39
5	**Xenon Pharmaceuticals Inc** 3650 Gilmore Way Suite 200, Burnaby V5G 4W8 P: 604-484-3300 F: 604-484-3450 **xenon-pharma.com**	**Simon Pimstone**, CEO	Central nervous system, epilepsy, pain	Nasdaq:XENE	1996	89 NP	85 79	**56** 52
7	**Amgen British Columbia Inc** 7990 Enterprise St, Burnaby V5A 1V7 P: 604-415-1800 F: 604-676-8349 **amgen.ca**	**John Delaney**, director of research	Antibody therapeutics for the treatment of cancer, inflammation and infectious diseases	Nasdaq:AMGN	1980	19,000 19,000	NP NP	**50** 50
8	**ABM Applied Biological Materials Inc** 3671 Viking Way Unit 1, Richmond V6V 2J5 P: 604-247-2416 F: 604-247-2414 **abmgood.com**	**Peter Li**, CEO, **Lisa Young**, CFO, **Vivian Gao**, vice-president, corporate development	Products span everything from CRISPR gene editing tools and viral vectors/viruses to the world's largest collection of unique cell lines and the most advanced polymerase chain reaction and next-generation sequencing technologies and services	Privately held	2004	150 132	83 80	**39** 48
9	**Artron BioResearch Inc** 3938 North Fraser Way, Burnaby V5J 5H6 P: 604-415-9757 F: 604-415-9795 **artronbio.com**	**Nilgun Demir**, vice-president	Antigen and antibody manufacturer	Privately held	2002	NP NP	115 125	**30** NP
10	**Burrard Pharmaceuticals** 1021 Hastings St W Suite 900, Vancouver V6E 0C3 P: 604-281-2762 F: NP **burrardpharma.com**	**Kayhan Moayeri**, CEO	Drug development, manufacturing and formulation	Privately held	2005	40 NP	8 NP	**25** NP
11	**Aspect Biosystems Ltd** 1781 75th Ave W, Vancouver V6P 6P2 P: 604-263-0502 F: NP **aspectbiosystems.com**	**Tamer Mohamed**, president and CEO, **Simon Beyer**, chief technology officer, **Sam Wadsworth**, chief scientific officer	Develops proprietary 3D bioprinting and human cell culture technology	Privately held	2013	NP NP	20 18	**20** 14
11	**Neovasc Inc** 13562 Maycrest Way Suite 5138, Richmond V6V 2J7 P: 604-270-4344 F: 604-270-4384 **neovasc.com**	**Fred Colen**, president and CEO	Develops, manufactures and markets innovative vascular devices offering pericardial tissue processing, vascular product development and design and manufacturing solutions to industry partners	TSX:NVC; Nasdaq:NVCN	2000	88 110	NP NP	**20** 25
13	**GenomeMe Canada** 3691 Viking Way Unit 1, Richmond V6V 2J6 P: 604-244-9962 F: NP **genomeme.ca**	**Mohammad Tabesh**, CEO	Molecular pathology and molecular diagnostics	Privately held	2015	20 15	19 15	**14** 10
13	**Qu Biologics Inc** 4475 Wayburne Dr Suite 305, Burnaby V5G 4X4 P: 604-734-1450 F: 604-676-2235 **qubiologics.com**	**Hal Gunn**, CEO	Treatment of cancer and immune-related diseases such as Crohn's disease and ulcerative colitis	Privately held	2007	19 19	19 19	**14** 14
15	**GenXys** 5950 University Blvd Suite 320, Vancouver V6T 1Z3 P: 604-827-4185 F: NP **genxys.com**	**Karl Pringle**, CEO, **Martin Dawes**, chief scientific officer, **Mark Gelfer**, chair	Comprehensive precision prescribing software that improves medication safety, increases drug efficacy and reduces health-care costs	Privately held	2014	NP 10	10 10	**12** NP
16	**Alectos Therapeutics** 8999 Nelson Way, Burnaby V5A 4B5 P: 604-628-7129 F: 604-628-0137 **alectos.com**	**Ernest McEachern**, president and CEO	Neuroscience	Privately held	2007	NP NP	12 12	**11** 10
16	**BioLytical Laboratories Inc** 13351 Commerce Pky Suite 1108, Richmond V6V 2X7 P: 604-204-6784 F: 604-244-8399 **biolytical.com**	**Robert Mackie**, chairman, **Livleen Veslemes**, CEO	HIV test kit	Privately held	2002	72 55	66 50	**11** 10
18	**Biolux Research Ltd** 825 Powell St Suite 220, Vancouver V6A 1H7 P: 604-669-0674 F: 604-608-5558 **orthopulse.com**	**Kevin Strange**, president and CEO	Develops and markets light accelerated orthodontics technology and products for use in orthodontics, implantology and other dentistry markets	Privately held	2003	45 NP	19 19	**10** 6
18	**Kinexus Bioinformatics Corp** 8755 Ash St Suite 1, Vancouver V6P 6T3 P: 604-323-2547 F: 604-323-2548 **kinexus.ca**	**Steven Pelech**, president and chief scientific officer	Proteomics and bioinformatics products and services	Privately held	1999	NP 13	13 13	**10** 10
20	**DelMar Pharmaceuticals Inc** 999 Broadway W Suite 720, Vancouver V5Z 1K5 P: 604-629-5989 F: NP **delmarpharma.com**	**Saiid Zarrabian**, president and CEO	Cancer therapeutics	Nasdaq:DMPI	2010	13 15	5 5	**2** 5

Sources: Interviews with representatives of the above biotech firms and *BIV* research. Other firms may have ranked but did not respond to information requests by deadline. NP Not provided

Business in Vancouver makes every attempt to publish accurate information in the List, but accuracy cannot be guaranteed. Researched by Anna Liczmanska, *aliczmanska@biv.com*.


Patents
Trademarks
Copyrights
Related Litigation
Seed IP
Seed Intellectual Property Law Group LLP
Science is in
our DNA.
Seed IP Law Group provides Custom Crafted Intellectual Property Solutions™ to clients pursuing patents, trademarks, copyrights and other IP protection. With expertise in cell and molecular biology, immunology, chemistry, biochemistry and pharmacology, Seed IP helps clients patent biotechnology inventions by offering a team of scientists who also understand the legal and business sides of biotechnology.
206.622.4900 www.SeedIP.com 701 Fifth Avenue, Seattle, WA 98104

2018

Clinical milestones in British Columbia's life sciences sector

Date	*Company/organization*	*Clinical milestone*
January	CannaRoyalty Corp. and Aequus Pharmaceuticals Inc.	CannaRoyalty and Aequus announce joint venture to develop and commercialize cannabis-based therapies targeting neurological disorders
January	Innovative Targeting Solutions Inc.	Innovative Targeting Solutions announces research agreement with Lilly
February	Ondine Biomedical Inc.	Ondine announces appointment of Vicente Fox, former president of Mexico (2000-06), to board of directors
March	Aequus Pharmaceuticals Inc.	Aequus expands market in Quebec for tacrolimus IR
May	Aequus Pharmaceuticals Inc.	Aequus receives positive U.S. Food and Drug Administration (FDA) regulatory guidance for anti-nausea patch
May	Innovative Targeting Solutions Inc.	Innovative Targeting Solutions announces antibody research collaboration with Sanofi
May	WAT Medical	EmeTerm anti-nausea and vomiting wristband is FDA cleared
June	Michael Smith Foundation for Health Research (MSFHR)	MSFHR-funded researcher discovers new drug that could stop prostate cancer in its tracks
July	RepliCel Life Sciences	RepliCel announces signed licensing and co-development deal for Greater China
August	Arbutus Biopharma Corp.	Arbutus' LNP licensee Alnylam announces FDA approval of ONPATTRO (patisiran) for treatment of ATTR amyloidosis
September	WAT Medical	Anti-migraine head patch HeadaTerm receives FDA clearance
September	Aspect Biosystems Ltd.	Aspect Biosystems announces liver tissue collaboration with JSR Corp.
October	Molecular You	Pure Pharmacy Group to offer Molecular You's preventive health assessments across all Lower Mainland locations
November	TRIUMF	Prime minister of Canada announces establishment of premier centre for advanced medical isotope research and development at TRIUMF
November	BioLytical Laboratories Inc.	INSTI HIV self-test earns World Health Organization pre-qualification status for home testing
November	Precision NanoSystems Inc.	Precision NanoSystems and Entos Pharmaceuticals sign licence agreement for use of NanoAssemblr platform for scale-up and Good Manufacturing Practice manufacturing of nanomedicines

2018

Investments into British Columbia's life sciences sector

Month	*Company/organization*	*Type of investment*	*Amount (CAD)*
January	Arbutus Biopharma Corp.	Arbutus announces closing of second tranche of $116 million strategic investment from Roivant Sciences	$154 million
January	AbCellera Biologics Inc.	CQDM and Brain Canada inject $1 million in AbCellera to advance discovery platform for next-generation antibody therapeutics	$1 million
April	Zucara Therapeutics Inc.	Zucara Therapeutics secures US$3.9 million from the Helmsley Charitable Trust to advance diabetes lead drug candidate to clinical trials	$5.2 million
April	Aspect Biosystems Ltd.	Genome BC invests $1 million in top Canadian 3D bioprinting company Aspect Biosystems	$1 million
April	Stemcell Technologies Inc.	Stemcell Technologies announces $45 million in government funding for advanced manufacturing facility	$45 million
May	Centre for Drug Research and Development (CDRD)	CDRD and Pfizer Canada partner to establish the CDRD Life Sciences Executive Institute	$1 million
May	Canary Medical Inc.	Global Health Sciences Fund invests US$10 million in Canary Medical's proprietary "smart" implant technology designed to improve outcomes in post-surgical patients	$13.3 million
June	Zymeworks Inc.	Zymeworks closes previously announced public offering	$130 million
June	InMed Pharmaceuticals Inc.	InMed Pharmaceuticals announces closing of $14.95 million bought-deal financing including full exercise of underwriter's over-allotment option	$14.95 million
June	Precision NanoSystems Inc.	Precision NanoSystems raises US$6 million to accelerate product innovation and global expansion	$8 million
July	Accel-Rx	Accel-Rx portfolio companies secure follow-on funding	$40 million
July	Accel-Rx	Accel-Rx adds Inversago Pharma to investment portfolio	$7 million
July	Zymeworks Inc.	Zymeworks reports Investigational New Drug submission milestone achieved in Lilly collaboration	$2.66 million
September	Xenon Pharmaceuticals Inc.	Xenon Pharmaceuticals announces closing of its US$63 million public offering of common shares	$83 million
September	GenXys Health Care Systems	GenXys Health Care Systems raises $1.5 million seed round to launch leading precision prescribing software in the U.S. market	$1.5 million
September	AbCellera Biologics Inc.	Financing will accelerate AbCellera's therapeutic antibody discovery business	$13.3 million
September	Phoenix Molecular Designs	Phoenix Molecular Designs raises $2.7 million to develop PMD-026 for triple-negative breast cancer	$2.7 million
October	Sitka Biopharma Inc.	Sitka Biopharma announces new investment from Global Health Sciences Fund	$1.9 million
November	Aspect Biosystems Ltd.	Aspect Biosystems receives $2.7 million investment from the Government of Canada	$2.7 million
Total			**$528.2 million**

LIFE SCIENCES COMPANIES AT A GLANCE

BIOPHARMACEUTICALS & BIOTECHNOLOGY

PLEASE REFER TO **LIFESCIENCESBC.CA** FOR FURTHER INFORMATION ON THESE COMPANIES

	Stage of development						Fields of study						Tools							Diseases						
	Drug discovery	Preclinical studies	Phase 1 clinical studies	Phase 2 clinical studies	Phase 3 clinical studies	On market	Bioproducts	Bioinformatics	Diagnostics	Environmental	Therapeutics	Vaccines	Bioprocessing	Drug delivery	Gene therapy	Genomics	High-throughput screening	Lab reagents	Proteomics	Autoimmune diseases	Cancer	Cardiovascular diseases	Infectious diseases	Inflammatory diseases	Metabolic diseases	Neurological diseases
Abbvie			•	•	•	•	•				•			•						•	•		•	•		•
AbCellera	•							•			•	•				•	•			•	•	•	•	•	•	•
Aequus Pharmaceuticals		•	•			•					•			•												•
Alectos Therapeutics																										•
Anandia Labs	•						•		•				•			•										
Aquinox Pharmaceuticals Inc.					•						•													•		
Arbutus Biopharma Corp.	•	•	•	•							•			•									•			
Aspect Biosystems	•	•				•	•																			
Augurex Life Sciences Corp.	•								•		•								•	•						
Aurinia Pharmaceuticals Inc.				•							•									•				•		
Boreal Genomics									•							•					•					
Celator Pharmaceuticals				•	•						•			•												
The Centre for Drug Research & Development	•	•							•		•	•		•			•			•	•	•	•	•	•	•
Contextual Genomics Inc.						•		•	•							•					•					
DelMar Pharmaceuticals				•					•		•										•					
ESSA Pharma Inc.			•																		•					•
Eupraxia Pharmaceuticals Inc.	•	•	•	•							•			•									•	•		
Fujifilm Diosynth Biotechnologies		•	•	•	•	•				•	•	•		•	•											
GenomeDx Biosciences Inc.						•		•	•							•					•					
Immunomind																										
ImStar Therapeutics Inc.	•	•									•															•
Inception Sciences	•	•									•										•			•		
Inmed Pharmaceuticals		•	•								•													•		
Innovative Targeting Solutions	•	•									•									•	•		•	•	•	
iProgen Biotech Inc.	•										•			•						•	•	•	•	•	•	•
Janssen Inc.																				•	•	•		•	•	•
ME Therapeutics Inc.	•	•									•										•					
MedGenesis Therapeutix Inc.																										•
Methylation Sciences		•	•	•							•															•
Microbiome Insights Inc.						•		•	•							•								•		ID
Microbion Pharma Corp.		•		•																			•			
Microdermics Inc.		•									•	•		•						•	•	•	•	•	•	•
MSI Methylation Sciences Inc.																										•
National Laboratory Services														•					•							
Neurodyn Life Sciences Inc.	•	•	•								•															•
New B Innovation	•	•	•								•										•	•				•
Novartis Pharmaceuticals Canada Inc.	•	•	•	•	•	•	•				•				•					•	•	•		•	•	•
Novateur Ventures Inc.		•	•	•	•	•	•	•	•		•	•		•	•	•				•	•	•	•	•	•	•
Novelogics Biotechnology Inc.	•	•									•										•					
Ondine Biomedical Inc.		•	•	•	•	•					•												•			
Pfizer																		•	•	•	•	•	•	•	•	•
Phoenix Molecular Designs		•	•						•		•										•					
Precision Nanosystems Inc.	•										•			•	•	•		•		•	•	•	•	•	•	•
Qu Biologics Inc.																				•	•		•	•		•
RepliCel Life Sciences Inc.			•	•							•															
Response Biomedical Corp.																						•	•			
Sierra Oncology				•							•										•					
Signal Chem Life Sciences Corp.	•	•	•				•		•		•						•	•		•	•			•		•
Sirona Biochem	•	•					•				•													•	•	
Sitka Biopharma	•	•									•			•							•					
SOHO Biotech Inc.																		•								
StarFish Medical														•			•					•	•	•		
STEMCELL Technologies Inc.		•				•	•						•					•		•	•	•	•	•		•
Symvivo Corp.	•	•									•			•	•											
Tel-Array Diagnostics Inc.									•												•	•	•			
ViroGin Biotech Canada Ltd.																					•					
Vitaeris					•						•									•				•		
WEX Pharmaceuticals Inc.																					•					•
Xenon Pharmaceuticals Inc.	•	•	•	•		•		•	•		•			•	•	•						•			•	•
Zymeworks Inc.	•	•	•	•			•	•			•									•	•			•		

ID: IN DEVELOPMENT

CONTRACT RESEARCH ORGANIZATIONS & SCIENTIFIC/HEALTH SERVICES

PLEASE REFER TO **LIFESCIENCESBC.CA** FOR FURTHER INFORMATION ON THESE COMPANIES

	Preclinical sevices						Clinical services						General services							
	Drug discovery	Bioinformatics	Bioanalytical services	Analytical services	Pathology services	Toxicology	Phase 1 clinical studies	Phase 2 clinical studies	Phase 3 clinical studies	Phase 4 clinical studies	Study monitoring and reporting	Data management and statistics	Strategic consulting	Regulatory	Contract manufacturing	Product development	cGMP/GLP compliance	Quality assurance	Teaching and training	Communications
American Preclincal Services	•		•	•	•	•										•				
Anandia Labs				•														•		
BC Innovation Council													•						•	•
Biofilm MEDIA																			•	•
The Clinical Trial Co.							•	•	•	•		•	•							
Discovery Parks																				•
Emergo Group													•	•			•	•	•	
Emmes Canada		•		•			•	•	•	•	•	•	•	•			•	•	•	
Fujifilm Diosynth Biotechnologies		•	•				•	•	•					•	•		•	•		
Health and Technology District							•	•	•	•	•	•						•	•	•
Immunomind	•	•				•					•	•	•			•	•	•	•	•
IonsGate Preclinical Services Inc.	•					•											•			
LifeLabs			•	•	•	•														
Microbiome Insights Inc.	•	•	•				•	•												
MotionHall													•							•
National Laboratory Services				•							•			•	•	•	•	•	•	
Northview Lifesciences													•							
Novateur Ventures Inc.						•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Phyton Biotech LLC															•	•				
PI Pharma Inventor Inc.	•			•											•	•	•			
University of British Columbia Pre-Clinical Services	•				•	•														
VWR International Ltd.																				
Wax-it Histology Services Inc.					•	•														
Wex Pharmaceuticals Inc.									•											

MEDICAL TECHNOLOGIES & DEVICES

PLEASE REFER TO **LIFESCIENCESBC.CA** FOR FURTHER INFORMATION ON THESE COMPANIES

	Fields of study							Company type		
	Dental device	Medical equipment	Medical supplies	Testing instruments	Imaging	Device design	Other(s)	Manufacturer	Distributor	Developer
ARC Medical Devices Inc.			•					•		•
Biolux Research Ltd.										
BioLytical Laboratories Inc.				•				•	•	•
Boreal Genomics								•		•
Change Healthcare		•			•	•	Imaging, workflow and care solutions	•	•	•
Clarius Mobile Health Corp.		•			•	•		•	•	•
Contextual Genomics Inc.		•					Genomic-based molecular diagnostics			•
Equicare Health							Care co-ordination software			•
Evasc Medical Systems Corp.		•				•	Medical devices for cerebral aneurysms	•		•
Farabloc Development Corp.			•					•	•	•
GenomeMe							Molecular pathology and molecular diagnostic	•	•	•
GenXys Health Care Systems Inc.							Digital health (precision prescribing software and pharmacogenetics)			•
Health and Technology District		•	•	•	•	•				•
Immunomind										
Innovatek Medical Inc.				•				•		
Kardium Inc.								•		•
LightIntegra Technology Inc.				•				•		•
LivaNova Canada Corp.	•	•			•		•	•	•	•
Lungpacer Medical Inc.		•				•		•	•	•
McKesson Medical Imaging Co.					•		Medical imaging and clinical information software systems	•	•	•
Medident Technologies	•	•				•	Technology development	•	•	•
Microbiome Insights Inc.							Microbiome health testing			•
Microdermics Inc.						•	Intradermal platform for drug delivery	•		•
National Laboratory Services				•					•	
Neovasc Inc.						•	Cardiovascular devices	•		•
Novateur Ventures Inc.	•	•			•	•				•
Ondine Biomedical Inc.	•	•	•					•		•
Phyton Biotech LLC	•	•	•	•	•	•	•			
Predictive Health Analytics						•	Mobile vital signs, risk assessment			•
RepliCel Life Sciences Inc.		•								•
Response Biomedical Corp.								•		•
Rostrum Medical Innovations Inc.		•				•		•		•
Sonics Insytes					•					•
StarFish Medical	•	•		•	•	•	Product and technology development	•		•
Tel-Array Diagnostics Inc.			•			•	Multi-protein biomarker point-of-care platform	•		•
ViewsIQ Inc.					•					•
ViroGin Biotech Canada Ltd.				•					•	
Wex Pharmaceuticals Inc.							Therapeutics			•

LIFESCIENCES BC MEMBERSHIP DIRECTORY

ACADEMIC & RESEARCH INSTITUTIONS

BC Cancer Agency
675 W. 10th Ave., Vancouver, BC V5Z 1L3
604-877-6000 bccancer.bc.ca

BCIT – School of Health Sciences
3700 Willingdon Ave., School of Health Sciences, Burnaby, BC V5G 3H2
604-451-7112 bcit.ca/health

British Columbia Centre for Excellence in HIV/AIDS
608 – 1081 Burrard St., Vancouver, BC V6Z 1Y6
604-806-8477 cfenet.ubc.ca

The Centre for Drug Research and Development (CDRD)
2405 Wesbrook Mall, 4th Floor, Vancouver, BC V6T 1Z3
604-827-1147 cdrd.ca

Centre for Heart Lung Innovation
166 – 1081 Burrard St., St. Paul's Hospital, Vancouver, BC V6Z 1Y6
604-806-8346 hli.ubc.ca

entrepreneurship@UBC
604-822-0600 entrepreneurship.ubc.ca

Genome British Columbia
400 – 575 W. 8th Ave., Vancouver, BC V5Z 0C4
604-738-8072 genomebc.ca

Icord
Blusson Spinal Cord Centre, 818 W. 10th Ave., 3rd Floor, Vancouver, BC V5Z 1M9
604-675-8810 icord.org

Jackson Laboratory
600 Main St. , Bar Harbour, ME 04609
207-288-6000 jax.org

Michael Smith Foundation for Health Research
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604-730-8322 msfhr.org

Providence Health Care Research Institute
1190 Hornby St., 10th Floor, Vancouver, BC V6Z 2K5
604-806-9464 providenceresearch.ca

Research Universities' Council of British Columbia
400 – 880 Douglas St., Victoria, BC V8W 2B7
250-480-4859 rupc.bc.ca

Rick Hansen Institute
Blusson Spinal Cord Centre, 6th Floor, 6400 – 818 W. 10th Ave., Vancouver, BC V5Z 1M9
604-827-2421 rickhanseninstitute.org

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250-391-2511 royalroads.ca

Simon Fraser University
Room 3195 Strand Hall, 8888 University Dr., Burnaby, BC V5A 1S6
778-782-4152 sfu.ca

Simon Fraser University – Innovation Office
8900 Nelson Way, MTF Room 230, Burnaby, BC V5A 4W9 sfu.ca/io/

Thompson Rivers University
805 TRU Way, Kamloops, BC V2C 0C8
250-828-5000 tru.ca

Trinity Western University – Biotechnology Program
7600 Glover Rd., Langley, BC V2Y 1Y1
604-888-7511 twu.ca/academics/faculty-natural-applied-sciences/biotechnology

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University of British Columbia – Faculty of Pharmaceutical Sciences
3309 – 2405 Wesbrook Mall, Vancouver, BC V6T 1Z3
604-827-2673 pharmsci.ubc.ca

University of British Columbia – Sauder School of Business
2053 Main Mall, Vancouver, BC V6T 1Z2
604-822-8555 sauder.ubc.ca

University of British Columbia – UILO
103 – 6190 Agronomy Rd., Vancouver, BC V6T 1Z4
604-822-8580 uilo.ubc.ca

University of British Columbia – Pre-Clinical Services
4145 Wesbrook Mall, Vancouver, BC V6T 1W5
604-827-5792 bcprc.ca

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3333 University Way, Prince George, BC V2N 4Z9
250-960-5555 unbc.ca

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Vancouver Coastal Health Research Institute (VCHRI)
2365 Laurel Street, 6th Floor, Vancouver, BC V5Z 1M9
604-875-4372 vchri.ca

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777 Dunsmuir St., PO Box 10426, Vancouver, BC V7Y 1K3
604-691-3000 kpmg.ca

PricewaterhouseCoopers LLP
1400 – 250 Howe St., Vancouver, BC V6C 3S7
604-806-7000 pwc.com

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604-683-5852 acetech.org

AdvantageBC
Three Bentall Centre, 3093 – 595 Burrard St., PO Box 49067, Vancouver, BC V7X 1C4
604-683-6626 advantagebc.ca

Ag-West Bio Inc.
101 – 111 Research Dr., Saskatoon, SK S7N 3R2
306-975-1939 agwest.sk.ca

BC Tech
101 – 887 Great Northern Way, Vancouver, BC V5T 4T5
604-683-6159 wearebctech.com

BioAlberta
314 Ledgeview Business Centre, 9707 110 St. NW, Edmonton, AB T5K 2L9
780-425-3804 bioalberta.com

BioTalent Canada
300 – 130 Slater St., Ottawa, ON K1P 6E2
613-235-1402 biotalent.ca

BioteCanada
600 – 1 Nicholas St., Ottawa, ON K1N 7B7
613-230-5585 biotech.ca

DigiBC – The Digital Media and Wireless Association of BC
750 – 1333 W. Broadway, Vancouver, BC V6H 4C1 digibc.org

E-Fund
Vancouver, BC e-fund.ca

Greater Vancouver Board of Trade
World Trade Centre, 400 – 999 Canada Place, Vancouver, BC V6C 3E1
604-681-2111 boardoftrade.com

Innovate BC
900 – 1188 W. Georgia St., Vancouer, BC V6E 4A2
604-683-2724 innovatebc.com

Innovative Medicines Canada
1220 – 55 Metcalfe St., Ottawa, ON K1P 6L5
613-236-0455 innovativemedicines.ca

Life Science Washington
300 – 1551 Eastlake Ave. E., Seattle, WA 98102-3706
206-456-9567 lifesciencewa.org

MEDEC
900 – 405 The West Mall, Toronto, ON M9C 5J1
604-353-5233 medec.org

Student Biotechnology Network (SBN)
Box 13, 2386 East Mall, Gerald McGavin Building, Vancouver, BC V6T 1Z3
604-767-4712 thesbn.ca

Vancouver Economic Commission
2480 – 1055 W. Georgia St., Vancouver, BC V6E 3P3
604-632-9668
vancouvereconomiccommission.com

VANTEC (Vancouver Angel Technology Network)
Vancouver, BC vantec.ca

BIOINFORMATICS

GenomeDx Biosciences Inc.
1038 Homer St., Vancouver, BC V6B 2W9
888-792-1601 genomedx.com

Reflux Wireless
1055 W. Hastings St., 14th Floor, Vancouver, BC V6E 2E9 refluxwireless.com

BIOPHARMACEUTICALS

AbCellera
2215 Yukon St., Vancouver, BC V5Y 0A1
604-827-2128 abcellera.com

Acuitas Therapeutics Ltd.
402 – 6190 Agronomy Rd., University of British Columbia, Vancouver, BC V6T 1Z3 acuitastx.com

Aequus Pharmaceuticals
2820 – 200 Granville St., Vancouver, BC V6C 1S4
604-336-7906 aequuspharma.ca

Alectos Therapeutics Inc.
8999 Nelson Way, Burnaby, BC V5A 4B5
604-628-7129 alectos.com

Amgen British Columbia
7990 Enterprise St., Burnaby, BC V5Z 1V7
604-415-1800 amgen.ca

Anandia Labs
322 – 2259 Lower Mall, Vancouver, BC V6T 1Z4
778-874-6923 anandialabs.com

Aqua Mergers + Acquisitons
100 – 8900 Glenlyon Pky., aquamma.com

Aquinox Pharmaceuticals Inc.
450 – 887 Great Northern Way, Vancouver, BC V5T 4T5
604-629-9223 aqxpharma.com

Arbutus Biopharma Corp.
100 – 8900 Glenlyon Pky., Burnaby, BC V5J 5J8
604-419-3200 arbutusbio.com

Augurex Life Sciences Corp.
125-1 887 Great Northern Way, Vancouver, BC V5Y 4T5
778-839-3319 augurex.com

Biopep Solutions Inc.
220 – 13071 Vanier Pl., Richmond, BC V6V 2J1
604-276-0020 biopeps.com

BlueRock Therapeutics ULC
101 College St., Suite 15-701, Toronto, ON M5G 1L7 bluerocktx.com

Bold Therapeutics
500 – 666 Burrard St., Vancouver, BC V6C 2P6 bold-therapeutics.cm

Boreal Genomics Inc.
302 – 2386 East Mall, Vancouver, BC V6T 1Z3
604-822-8268 borealgenomics.com

Celator Pharmaceuticals Inc.
250 – 887 Great Northern Way, Vancouver, BC V5T 4T5
604-708-5858 celatorpharma.com

Cuprous Pharmaceuticals Inc.
PO Box 33814, STN D, Vancouver, BC V6J 4L6 cuprous.ca

DelMar Pharmaceuticals Inc.
720 – 999 W. Broadway, Vancouver, BC V5Z 1K5
604-629-5989 delmarpharma.com

Emerald Health Therapeutics Inc.
PO Box 24076, 4420 W. Saanich Rd., Victoria, BC V8Z 7E7
800-757-3536 emeraldhealth.ca

ESSA Pharma Inc.
720 – 999 W. Broadway, Vancouver, BC V5Z 1K5
778-331-0962 essapharma.com

Eupraxia Pharmaceuticals Inc.
201 – 2590 Cadboro Bay Rd., Victoria, BC V8R 5J2
250-590-3968 eupraxiapharma.com

Genevant Sciences Corp.
8900 Glenlyon Pky., Burnaby, BC V5J 5J8
778-800-2363 genevant.com

iCo Therapeutics Inc.
760 – 777 Hornby St., Vancouver, BC V6Z 1S4
604-602-9412 icotherapeutics.com

ImStar Therapeutics Inc.
600 – 1285 W. Broadway, Vancouver, BC V6H 3X8
604-551-6782 imstartx.com

Inception Sciences Canada
210 – 887 Great Northern Way, Vancouver, BC V5T 4T5
604-343-1552 inceptionsci.com

InMed Pharmaceuticals Inc.
340 – 200 Granville St., Vancouver, BC V6C 1S4
604-669-7207 inmedpharma.com

Innovative Targeting Solutions Inc.
290 – 2985 Virtual Way, Vancouver, BC V5M 4X7
604-433-6779 innovativetargeting.com

iProgen Biotech Inc.
126 – 11782 River Rd., Richmond, BC V6X 1Z7
415-800-4392 iprogen.com

Lipont Pharmaceuticals
1203 – 4464 Markham St., Victoria, BC V8Z 7X8
250-708-4272 lipontpharm.com

Me Therapeutics Inc.
5520 – 2350 Health Sciences Mall, Vancouver, BC V6T 1Z3
604-505-2083 metherapeutics.com

MedGenesis Therapeutix Inc.
730 – 730 View St., Victoria, BC V8W 3Y7
250-386-3000 medgenesis.com

Medipure Pharmaceuticals
302 – 267 Esplanade, North Vancouver, BC V7M 1B5
877-264-0345 medipurepharmaceuticals.com

Microbion Pharma Corp.
430 – 887 Great Northern Way, Vancouver, BC V5T 4T5 micobioncorp.com

MSI Methylation Sciences Inc.
108 – 4475 Wayburne Dr., Burnaby, BC V5G 4X4
604-435-5155 methylationsciences.com

Naegis Pharmaceuticals Inc.
720 – 999 W. Broadway, Vancouver, BC V5Z 1K5
604-235-1682 naegispharma.com

Neurodyn Life Sciences Inc.
439 Helmcken St., Vancouver, BC V6B 2E6
604-619-0990 neurodyn-inc.com

New B Innovation Ltd.
168 – 8508 Glenlyon Pky., Burnaby, BC V5J 0B6
604-421-7308 newbinnovation.ca

Novelogics Biotechnology Inc.
2900 – 550 Burrard St., Vancouver, BC V6C 0A3 novelogics.com

Onco Genex Pharmaceuticals
400 – 1001 W. Broadway,
Vancouver, BC V6H 4C1
604-736-3678 oncogenex.com

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604-669-0555 ondinebio.com

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604-674-1796 ext. 43700 phoenixmd.ca

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250 – 887 Great Northern Way,
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877-764-3131 qltinc.com

Qu Biologics Inc.
138 – 887 Great Northern Way,
Vancouver, BC V5T 4T5
604-734-1450 qubiologics.com

RepliCel Life Sciences Inc.
900 – 570 Granville St., Vancouver, BC V6C 3P1
604-248-8730 replicel.com

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2150 – 885 W. Georgia St.,
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604-558-6536 sierraoncology.com

SignalChem LifeSciences Corp.
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604-232-4600 signalchem.com

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595 Burrard St., Vancouver, BC V7X 1L4
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4650 Beverly Cres., Vancouver, BC V6J 4E6
778-776-8565 vesaliuscardio.com

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Vancouver, BC V6S 2L9
604-720-8981 virogin.com

Vitaeris
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844-440-2580 vitaeris.com

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Xenon Pharmaceuticals Inc.
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604-484-3300 xenon-pharma.com

Zucara Therapeutics Inc.
1300 – 661 University Ave.,
Toronto, BC M5G 0G7 zucara.ca

Zymeworks Inc.
540 – 1385 W. 8th Ave., Vancouver, BC V6H 3V9
604-678-1388 zymeworks.com

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604-909-1265 emergogroup.ca

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604-684-1428 goldbeck.com

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888-477-3374 gouletassociates.com

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Malachite Management Inc.
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604-874-4004 malachite-mgmt.com

MotionHall
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604-343-8875 motionhall.com

Northview LifeSciences
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2218 Bowker Ave., Victoria, BC V8R 2E4
250-884-7774 sammercer.com

Tian'en Consulting Group
246 – 3800 Wesbrook Mall,
Vancouver, BC V6S 2L9
604-669-1236 vitalic.cn

True North Synergy
5371 Kew Cliff Rd., West
Vancouver, BC V7W 1M3
604-922-1045 truenorthsynergy.com

WestPAR Consultancy Inc.
2613 E. 21st Ave., Vancouver, BC V5M 4E8
604-319-9449 westpar.ca

World Courier of Canada Ltd.
S170 – 3751 Shell Rd., Richmond, BC V6X 2N2
604-232-9444 worldcourier.com

COMMUNICATIONS

Biofilm MEDIA
100 – 8900 Glenlyon Pky.,
604-724-3233 biofilmmedia.com

Business in Vancouver
303 W. 5th Ave., Vancouver, BC V5Y 1J6
604-688-2398 biv.com

Metaphase Health Research Consulting Inc.
1879 Knox Rd., Vancouver, BC V6T 1S4
604-224-5925 metphase-consulting.com

PR Associates
600 – 890 W. Pender St., Vancouver, BC V6C 1J9
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8945 Evergreen Blvd. NW,
Minneapolis, MN 55433
763-717-7990 americanpreclinical.com

Augurex Life Sciences Corp.
125-1 887 Great Northern Way,
Vancouver, BC V5T 4T5
778-839-3319 augurex.com

Aurora Biomed Inc.
1001 E. Pender St., Vancouver, BC V6A 1W2
800-883-2918 aurora-instr.com

BRI Pharmaceutical Research Inc.
101 – 8898 Heather St., Vancouver, BC V6P 3S8
604-432-9237 bripharm.com

Burrard Pharmaceuticals Enterprises Ltd.
1021 W. Hastings St., 9th floor,
Vancouver, BC V6E 0C3
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CEQAL Inc.
307 – 2083 Alma St., Vancouver, BC V6R 4N6
604-336-3695 ceqal.com

Chinook Contract Research Inc.
381 Montcalm Ave., Victoria, BC V8Z 6R3
ccr01.com

The Clinical Trial Company (Canada) Ltd.
203 – 91 5th Ave., Pincourt, QC J7V 5K8
438-257-1161 theclinicaltrialcompany.com

Emmes Canada
200 – 4664 Lougheed Hwy.,
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778-806-4626 emmes.ca

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101 J Morris Commons Lane,
Morrisville, NC 27560
919-337-4400 fujifilmdiosynth.com

GenomeMe Lab Inc.
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Immunomind
9 – 3776 11th St. NW, Calgary, AB V3M 4A8
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LifeLabs Medical Laboratory Services
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604-412-4539 lifelabs.com

Microbiome Insights
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microbiomeinsights.com

National Laboratory Services Inc.
989 Garrow Dr., Port Moody, BC V3H 1H8
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604-532-8711 pacificrimlabs.com

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202, 215 – 3800 Wesbrook Mall,
Vancouver, BC V6S 2L9
604-339-3244 pharmainventor.com

Wax-it Histology Services Inc.
202 – 2386 East Mall, Vancouver, BC V6T 1Z3
604-822-1595 waxitinc.com

World Courier, an AmerisourceBergen company
170 – 3751 Shell Rd., Airport Executive Park,
Building B, Richmond, BC V6X 2W2
604-232-9444 worldcourier.com

DIGITAL HEALTH

Curatio
1200 – 555 W. Hastings St,
Vancouver, BC V6B 4N4
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Equicare Health
201 – 2020 Yukon St., Vancouver, BC V5Y 3N8
604-708-9075 equicarehealth.com

eTreat Medical Diagnostics Inc.
1400 – 1055 W. Hastings St.,
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778-373-5731 etreatmd.com

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320 – 5950 University Blvd. ,
Vancouver, BC V6T 1Z3
604-827-4185 genxys.com

Molecular You
5451 – 2350 Health Sciences Mall,
Vancouver, BC V6T 1Z3 molecularyou.com

New Hippo Health
250 25th St.,
West Vancouver, BC V7V 4K1 newhippo.com

Xccepted Technologies Inc.
201 – 13797 97th Ave., Building 1,
Surrey, BC V3V 0C6 xccepted.com

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604-669-9460 cta.bc.ca

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604-734-7275 discoveryparks.com

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888-477-3373 gouletassociates.com

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604-682-4211 canada.jlt.com

Lumira Capital
770 – 141 Adelaide St. W.,
Toronto, ON M5H 3L5
604-558-5156 lumiracapital.com

Northview LifeSciences
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604-428-4641 northviewventures.ca

OGEE Finance Solutions Corp.
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Vancouver, BC V6B 2W6 ogeecorp.com

PwC
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250-483-7011 pwc.com

Quark Venture
2500 – 1075 W. Georgia St.,
Vancouver, BC V6E 3C9
604-262-8818 quarkventure.com

VERSANT Ventures
3630 – 1 Sansome St., San Francisco, CA 94104
415-801-8100 versantventures.com

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Accel-Rx
301 – 1224 Hamilton St., Vancouver, BC V6B 2S8
604-602-5234 accel-rx.com

BC Innovation Council
900 – 1188 W. Georgia St.,
Vancouver, BC V6E 4A2
604-683-2724 bcic.ca

BC Ministry of International Trade
739 – 999 Canada Place,
Vancouver, BC V6B 3E1 britishcolumbia.ca

City of New Westminster
511 Royal Ave., New Westminster, BC V3L 1H9
604-521-3711 newwestcity.ca

Innovation Boulevard
295 – 13450 102nd Ave., Surrey, BC V3T 0A3
604-591-4011 surrey.ca

Ministry of Jobs, Trade and Technology
730 – 999 Canada Pl., Vancouver, BC V6C 3E1
604-660-2421 britishcolumbia.ca

National Research Council Canada
650 – 1185 W. Georgia St.,
Vancouver, BC V6E 4E6 nrc.ca

NSERC Pacific
407 – 1138 Melville St., Vancouver, BC V6E 4S3
604-666-8818 nserc-crsng.gc.ca

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604-639-3701 locksearchgroup.com

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+862425386000 3sbio.com

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905-277-7111 astrazeneca.ca

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877-923-5436 celgene.ca

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800-463-5800 gelifesciences.com

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Hoffmann-La Roche Ltd.
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Mississauga, ON L5N 5M8
800-561-1759 rochecanada.com

Janssen Inc.
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416-449-9444 janssen.ca

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Kirkland, QC H9H 4M7
514-428-8600 merck.ca

Novartis Pharmaceuticals Canada Inc.
385 Bouchard Blvd., Dorval, QC H9S 1A9
514-631-6775 novartis.ca

Novo Nordisk Canada Inc.
101 – 2476 Argentia Rd.,
Mississauga, ON L5N 6M1 novonordisk.ca

Pfizer Canada Inc.
17300 Trans-Canada Hwy.,
Kirkland, QC H9J 2M5
514-695-0500 pfizer.ca

Sanofi Canada
2905 Place Louis-R.-Renaud, Laval, QC H7V 0A3
514-956-6200 sanofi.ca

Takeda Canada Inc.
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904-469-9333 takedacanada.com

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Vancouver, BC V6B 0M3
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Christensen O'Connor Johnson Kindness
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206-682-8100 cojk.com

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604-684-9151 farris.com

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Vancouver, BC V6B 0M3
604-641-4846 nortonrosefulbright.com/ca/en/

Oyen Wiggs Green & Mutala LLP
The Station, 480 – 601 W. Cordova St.,
Vancouver, BC V6B 1G1
604-669-3432 patentable.com

Seed IP

Seed Intellectual Property Law Group LLP
5400 – 701 Fifth Ave., Seattle, WA 98104
206-622-4900 seedip.com

SMART & BIGGAR
Intellectual Property & Technology Law

Smart & Biggar/Fetherstonhaugh
Box 11115, 2300 – 1055 W. Georgia St.,
Vancouver, BC V6E 3P3
604-682-7780 smart-biggar.ca

Thomas J. Digby, Attorney, Global IP Asset Management
100 – 8900 Glenlyon Pky., Burnaby, BC V6R 2P7
604-362-9019 digbyglobal.com

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604-222-9577 arcmedicaldevices.com

Artron Bioresearch Inc.
3938 North Fraser Way, Burnaby, BC V5J 5H6
604-415-9757 artronbio.com

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230 – 825 Powell St., Vancouver, BC V6A 1H7
604-669-0674 bioluxresearch.com

BioLytical Laboratories Inc.
1108 – 13351 Commerce Pky.,
Richmond, BC V6V 2X7
604-204-6784 biolytical.com

Claris Healthcare
206 – 1099 W. 8th Ave, Vancouver, BC V6H 1C3
844-369-9977 clarisreflex.com

Clarius Mobile Health Corp.
350 – 3605 Gilmore Way,
Burnaby, BC V5G 4X5 clarius.me

Evasc Medical Systems Corp.
107 – 1099 W. 8th Ave., Vancouver, BC V6H 1C3
604-742-3811 evasc.com

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211 – 3030 Lincoln Ave., Coquitlam, BC V3B 6B4
604-941-8201 farabloc.com

Fusion Genomics Corp.
Discovery 1, Room 1450, 8888 University Dr.,
Burnaby, BC V5J 5H6 fusiongenomics.com

GenomeMe Lab Inc.
1 – 3691 Viking Way,
Richmond, BC V6V 2J6 genomeme.ca

GenXys Health Care Systems Inc.
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Vancouver, BC V5X 0B2
604-325-4609 genxys.com

Healthtech Connex Inc.
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604-576-2935 healthtechconnex.com

Innovatek Medical Inc.
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604-522-8303 innovatekmed.com

Kardium Inc.
155 – 8518 Glenlyon Pky., Burnaby, BC V5J 0B6
604-248-8891 kardium.com

LifeScan Canada Ltd.
210 – 4321 Still Creek Dr., Burnaby, BC V5C 6S7
800-663-5521 onetouch.ca

LightIntegra Technology
330 – 2285 Clark Dr., Vancouver, BC V5N 3G9
604-734-3548 lightintegra.com

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778-782-3141 lungpacer.com

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604-542-2223 medident.com

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Vancouver, BC V6T 1Z4 microdermics.com

Navigate Surgical Technologies
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Vancouver, BC V6J 1V6 navigatesurgical.com

NZ Technologies Inc.
202 – 1401 W. Broadway,
Vancouver, BC V6H 1H6 nztech.ca

Ondine Biomedical Inc.
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604-669-0555 ondinebio.com

Orello Hearing Technologies Inc.
115 – 887 Great Northern Way,
Vancouver, BC V5T 4T5 orellohearing.com

Predictive Health Analytics
600 – 1090 W. Georgia St.,
Vancouver, BC V6E 3V7
866-944-8607 lgthealth.com

Rapids Solutions Canada Ltd.
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Richmond, BC V6V 2E9 rapidsolutions.com

Response Biomedical Corp.
1781 W. 75th Ave., Vancouver, BC V6P 6P2
604-456-6010 responsebio.com

Rostrum Medical Innovations Inc.
3687 E. 1st Ave., Vancouver, BC V5M 1C2
604-439-3054 rostrummedical.com

SHEV Labs Nanotechnologies Ltd.
426 14th Ave., Burnaby, BC V3N 0E7
shevlabs.com

StarFish MEDICAL

StarFish Medical
455 Boleskine Rd., Victoria, BC V8Z 1E7
250-388-3537 starfishmedical.com

Tel-Array Diagnostics Inc.
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Vancouver, BC V6S 2L9
604-221-9227 telarray.com

Telus Health Solutions
107 – 5550 152nd St., Surrey, BC V3S 5J9
866-879-9653 telushealth.com

ViewsIQ Inc.
Airport Executive Park, Building 2, 40 – 10551 Shellbridge Way, Richmond, BC V6X 2W9
855-847-7226 viewsiq.com

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Richmond, BC V6V 2J7
604-270-4344 xccepted.com

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31 Marine Dr.,
Point Roberts, WA alliedbioscience.com

Aspect Biosystems Ltd.
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604-822-8838 aspectbiosystems.com

Change Healthcare
10711 Cambie Rd., Richmond, BC V6X 4A6
604-279-5422 changehealthcare.com

Contextual Genomics Inc.
204 – 2389 Health Sciences Mall, University of British Columbia, Vancouver, BC V6T 1Z3
778-379-2931 contextualgenomics.com

Health and Technology District
1500 – 13737 96th Ave.,
Surrey, BC V3V 0C6 healthandtechnologydistrict.com

Innotech Medical Industries Corp.
124 Garden Ave., North Vancouver, BC V7P 3H2
800-756-4204 imixray.com

McKesson Medical Imaging Co.
130 – 10711 Cambie Rd., Richmond, BC V6X 3G5
604-279-5422 mckesson.com

Medtronic of Canada Ltd.
99 Hereford St., Brampton, ON L0Y 0R3
778-772-1883 medtronic.com/ca-en

Mesentech
554 Clark Dr.,
Vancouver, BC V5L 3H7 mesentech.com

OneStep Laboratories Inc.
162 – 628 E. Kent Ave.,
Vancouver, BC V5X 0B2 1steplab.com

PHEMI Systems
180 – 887 Great Northern Way,
Vancouver, BC V5T 4T5 phemi.com

Sonic Incytes Medical Corp.
c/o Hatch, 25 – 2366 Main Mall,
Vancouver, BC V6T1Z4 sonicinctyes.com

Vital Engineering Inc.
4360 Agar Dr., Richmond, BC V7B 1A3 v-e.ca

WAT Medical Enterprise Ltd
170 – 422 Richards St., Vancouver, BC V6B 2Z4
604-385-0656 watmedical.com

Wellness Lifestyles
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888-618-0031 precisionnanosystems.com

Promega Corp.
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800-932-5000 vwrcanlab.com

21st ANNUAL LIFESCIENCES BC AWARDS

Inspiring Minds Advancing Science

About LifeSciences BC
LifeSciences BC is a non-profit industry association that supports and represents the life science community of British Columbia through leadership, investment, advocacy and promotion of our world-class life sciences community. LifeSciences BC undertakes numerous initiatives including local, national and international partnerships helping to facilitate investment and global partnering opportunities, while nurturing economic development in B.C. through the life sciences industry.

LifeSciences BC is pleased to announce the recipients of the 21st annual LifeSciences BC Awards, presented by Farris. These awards are presented annually in recognition of the significant achievements of talented individuals and organizations that embody the life sciences community of British Columbia. Our award winners exemplify the full spectrum from discovery to commercialization and underscore the full breadth and depth of knowledge that impacts the B.C. bio-economy.

The 2019 LifeSciences BC award winners	
Dr. Caroline Cameron	Genome BC Award for Scientific Excellence
Dr. Jerilynn Prior	Michael Smith Foundation for Health Research – Aubrey J. Tingle Prize
Anandia Laboratories	Deal of the Year
Creative Destruction Lab (CDL) – West	Strategic Life Sciences Partner of the Year Award
Aspect Biosystems	Growth Stage Life Sciences Company of the Year
Natalie Dakers	Milton Wong Award for Leadership
Terramera	Life Sciences Company of the Year
Dr. Marco Marra	Dr. Don Rix Award for Lifetime Achievement

GENOME BC AWARD FOR SCIENTIFIC EXCELLENCE

DR. CAROLINE CAMERON

Dr. Caroline Cameron is a professor and the graduate adviser in the department of biochemistry and microbiology at the University of Victoria and an affiliate professor in the department of medicine, division of allergy and infectious diseases, at the University of Washington in Seattle.

Dr. Cameron's research focus is on bacterial pathogens that cause globally prevalent sexually transmitted infections. She uses genomic, proteomic and bioinformatic approaches to identify bacterial protein targets that can be developed into novel diagnostic and vaccine candidates. Her research program is internationally funded by the National Institutes of Health, the Canadian Institutes of Health Research, and the Natural Sciences and Engineering Research Council of Canada. She is president of the International Society for Sexually Transmitted Diseases Research, president of the British Columbia Association for Sexual Health and chair of the STI & HIV 2019 World Congress, and serves on the executive board of the Canadian regional branch of the International Union against Sexually Transmitted Infections.

21st ANNUAL LIFESCIENCES BC AWARDS
Inspiring Minds Advancing Science

MICHAEL SMITH FOUNDATION FOR HEALTH RESEARCH – AUBREY J. TINGLE PRIZE

DR. JERILYNN PRIOR

Dr. Jerilynn C. Prior is a professor of endocrinology and metabolism at the University of British Columbia (UBC). She has spent her career studying women's menstrual cycles, perimenopause, menopause and the causes for and treatment of osteoporosis. She is the founder and scientific director of the Centre for Menstrual Cycle and Ovulation Research. She is also director of the BC Centre of the Canadian Multicentre Osteoporosis Study, an organization that is studying osteoporosis, fractures and bone mineral density.

Dr. Prior is an honorary alumna of UBC's faculty of medicine and was awarded its Distinguished Medical Research Lecturer Award in 2002. She has received numerous other honours, including the Ann Voda Lifetime Achievement Award in 2011 from the Society for Menstrual Cycle Research and the Knowledge Translation in Women's Health Research Award from B.C.'s Women's Health Research Institute in 2017.

Anandia

DEAL OF THE YEAR

ANANDIA LABORATORIES INC.

Anandia was established to provide the science, technical innovations and services that underpin the global cannabis industry. Voted the Top Testing Lab at the 2017 Canadian Cannabis Awards, Anandia provides the full suite of testing services required by Health Canada for licensed production of cannabis, and also develops and offers a number of other tools for breeding and product development. Anandia is focused exclusively on cannabis, with the aim of bringing the best of modern science to the cannabis industry for the benefit of cultivators and consumers. A stronger scientific foundation enables the company to maximize the full potential of the cannabis plant, developing new value-add products while ensuring safety, quality and improved cultivation efficiencies.

CREATIVE DESTRUCTION LAB WEST

STRATEGIC LIFE SCIENCES PARTNER OF THE YEAR AWARD

CREATIVE DESTRUCTION LAB (CDL) – WEST

The Creative Destruction Lab (CDL) is a seed-stage program for massively scalable, science-based companies. Launched in 2012 at the University of Toronto, the program has now expanded to five additional locations including CDL-West at the University of British Columbia (UBC) Sauder School of Business.

CDL-West provides participating ventures with access to milestone-based coaching from mentors who have participated in the founding, management and value creation of significant science-based tech companies, expert technical advice from scientists and technologists who are leaders in their respective fields, hands-on student support creating applied learning opportunities for UBC Sauder students, and growth resource access including network connections, referrals for key hires and investment. The goal is to transform enabling technologies into innovative companies, helping to narrow focus and to accelerate the trajectory of participating ventures – entrepreneurs tackling big problems.

Aspect biosystems

GROWTH STAGE LIFE SCIENCES COMPANY OF THE YEAR

ASPECT BIOSYSTEMS

Aspect Biosystems is a privately held biotechnology company pioneering microfluidic 3D bioprinting of living human tissue. The company's proprietary technology is enabling advances in understanding fundamental biology, disease research, development of novel therapeutics, and regenerative medicine.

In addition to its internal programs, Aspect is focused on strategically partnering with pharmaceutical and biotechnology companies, as well as academic researchers, to enable the creation of living human tissues for medical research, therapeutic discovery and regenerative medicine products.

MILTON WONG AWARD FOR LEADERSHIP

NATALIE DAKERS

Natalie Dakers is a leading figure in the Canadian biopharmaceutical industry and one of B.C.'s most influential women. With four successful startup companies and organizations to her credit, she's regarded as a life science industry visionary with an ability to get things done.

Dakers is currently president and CEO of Accel-Rx Health Sciences Accelerator Society, an organization that identifies and supports promising early-stage companies by providing seed-stage capital and expertise. She was also founding president and CEO of the Centre for Drug Research and Development (CDRD), a national centre of excellence for commercialization and research of biopharmaceutical products. She subsequently went on to create and run CDRD Ventures Inc., the commercial arm that supported company creation at CDRD, before building Accel-Rx. Prior to establishing CDRD, Dakers co-founded Neuromed Pharmaceuticals Inc., a private biopharmaceutical company developing drugs for chronic pain, anxiety, epilepsy and cardiovascular diseases, where she successfully raised $70 million in three rounds of venture financing.

LIFE SCIENCES COMPANY OF THE YEAR

TERRAMERA

Terramera is a leader in technology for clean food, with a mission to increase global yields while decreasing synthetic chemical loads, so we can grow affordable, clean food for everyone. The company combines its proprietary Actigate targeted performance technology with data science, machine learning and artificial intelligence to develop sustainable solutions and highly effective natural products for consumers and farmers. Terramera uses technology to unlock the power in nature, so we can live healthier, make clean food affordable and feed the world.

DR. DON RIX AWARD FOR LIFETIME ACHIEVEMENT

DR. MARCO MARRA

Dr. Marco Marra, OBC, PhD, FRSC, FCAHS, is director of Canada's Michael Smith Genome Sciences Centre at the BC Cancer Agency, professor and head of the department of medical genetics at the University of British Columbia and the BC Node leader for the Terry Fox Research Institute. He uses genome science to study cancers. His recognitions include member of the Order of British Columbia, the 2017 Canadian Cancer Research Alliance's Outstanding Achievements in Cancer Research Award, the 2015 Dr. Chew Wei Memorial Prize in Cancer Research and Fellow of the Royal Society of Canada. He has received honorary degrees from Simon Fraser University and from the University of Calgary.

Dr. Marra has spent much of his career working within and leading interdisciplinary teams seeking to study fundamental problems in cancer genome biology. His current research activities revolve around the interplay between the cancer genome and the epigenome, with particular focus on the evolution of treatment-resistant cancers.

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