

LIFE SCIENCES

2015

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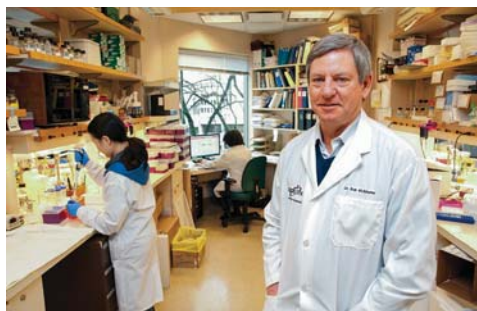


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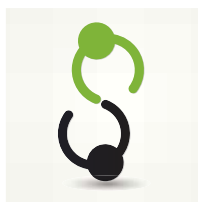
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Message from the chairman of the LifeSciences BC board of directors



Gordon McCauley, chair

The life science community in British Columbia is stronger today than it has been in a long, long time – certainly since 2008 and probably in the last decade.

We are a community boasting 8,500 direct jobs and 14,000 indirect ones. This community is responsible for \$1 billion of direct gross domestic product in British Columbia and \$3 billion indirectly. It is clear life science companies in B.C. are attracting investment at a significant and impressive pace.

Over the course of the last year we saw \$400 million of direct capital investment in life science companies and their programs in our province. This capital is being used to drive globally competitive programs in innovative therapeutics, medical technology and/or devices. Interestingly, we are seeing an increasing emphasis on the nexus between drugs and technology, drugs and devices, and devices and technology.

Certainly, this investment renaissance is due to similar trends happening in the United States. We are witnessing the maturation of the life science investment landscape in the U.S., with an unprecedented level of highly sophisticated investment. This trend is spilling over fortuitously, into Canada.

Yet that spillover is only part of the story. Over the last few years of investment drought, our community has focused closely on high-quality research, technology, and management. The fact that sophisticated investors

are returning is a testament to our quality and attention to science and innovation.

Of course these salubrious trends do not end our challenges. Indeed, they are changing into much more complex ones. For example, we continue to see early technology struggling, and sophisticated investors demanding that early technologies are either truly well developed or globally transformational.

This demand means that we need to redouble our efforts to assist young companies and researchers to meet the demands of these investors and, even more importantly, embrace groundbreaking and highly risky research endeavours.

Most importantly, one lesson is clear from the mature life science communities around the world like San Francisco, Boston or Cambridge. That is, in addition to what we have – outstanding scientists doing great research, vibrant research institutes and funding agencies, highly competitive hospitals, sophisticated investors, and a management class to develop businesses – there is one ingredient we need. That key ingredient is repeated commercial products generated out of businesses that stay in this community.

Certainly we can take great pride in the dozen or so commercial products that have been developed by LifeSciences BC companies. Yet most of these are now being exploited by companies elsewhere. We need to find the mechanisms to encourage companies, once they have survived the outrageously difficult journey to approval, to actually stay, grow and consolidate here in B.C. There are simple reasons why companies leave that require complex solutions to keep them here. Yet keep them here we must.

The long-term sustainability of this community rests squarely on our capacity to achieve this goal. We look forward to working with each of our stakeholders – great scientists, agencies, investors and business people – to build a sustainable community that will last not only for the moment, but well into the future. 🐾



We are a community boasting 8,500 direct jobs and 14,000 indirect ones [and are] responsible for \$1 billion of direct gross domestic product in British Columbia and \$3 billion indirectly

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Message from the president and CEO



Paul V. Drohan,
president and CEO

The December 2014 Science and Innovation Strategy from the U.K. government's Department for Business, Innovation & Skills noted "... the clustering of resources and industries in specific locations can provide conducive – and, in some cases, essential – context for success. Cities, like universities, exist to bring people together so that they collaborate with each other and make advances that would not be possible in isolation." This is certainly the case in British Columbia, where our active life sciences community continues to make advances through collaboration while creating value across the province. Despite our successes, life sciences research and development and industrial pursuits are part of the global enterprise, and the B.C. life sciences community cannot succeed in isolation; our community must be globally focused and engage with willing and able partners around the world.

The United States has been a welcoming jurisdiction with significant human and capital resources for our companies. Our collaborations with our American neighbours have provided value and growth to our community and this is expected to continue. Our proximity to Asia represents a significant opportunity to access both new capital and growth-oriented markets. With the Canada-Hong Kong tax treaty and the recent Canada-Korea Free Trade Agreement, our companies have good reason to look to Asia and vice versa. At LifeSciencesBC we will continue to explore opportunities as we did in October 2014, when we welcomed 20 Chinese CEOs from medical device companies to investigate and survey our supportive business climate. Finally, with the pending Canada and European Union Comprehensive Economic and Trade Agreement, the 17-trillion-euro market will be accessible in a new way. It is for this very reason that LifeSciencesBC organized a "mini-mission to the U.K." to explore the possibilities for our companies to use the United Kingdom as their European base. The reception from the life sciences community in London and Cambridge was one of interest and enthusiasm.

Here at home, our community continues to grow with "rising tides lifting all boats," and in the case of B.C. biotechnology and medical technology, 2014 was certainly a lift for the industry. Value creation in the B.C. life sciences community had much to celebrate with two IPOs: Aquinox (\$53.1 million) and Xenon (\$41.4 million), both listing on Nasdaq. Each of these public offerings was the result of years of research and development, passion for patient care, a commitment to success and community support. In addition, there was significant public market capital and private capital invested in B.C. life sciences companies, including Tekmira (\$14.5 million), Aurinia (\$52 million), Cardiome (\$30 million), Neovasc (\$25.2

million) and Zymeworks (\$19 million). There was also a large number of significant partnership agreements established, and continued, including Zymeworks and Lilly, MedGenesis and Pfizer, PHEMI and Merck, Xenon and Genentech/Roche, and Augurex and LifeLabs, to name just a few. New companies were formed with CDRD/CVI spinning out Kairos and Sitka. The Centre for Drug Research and Development continues to establish itself in the innovation space by establishing collaborations with innovation institutes and large pharma including Pfizer, GSK, J&J and Roche. Genome BC's leading-edge genomics development continues to advance personalized and precision medicine in B.C.

The momentum of 2014 is carrying through to 2015. Whether it is the excellent basic research leading to translation, with the work carried out at the University of British Columbia, Simon Fraser University, University of Victoria and the British Columbia Institute of Technology; the preclinical work that gives way to clinical research, with 799 open/active clinical trials (21 per cent of all active/open trials in Canada) in B.C., work within Vancouver Coastal Health Research Institute, Providence Health Care Research Institute, Prostate Centre, PROOF, Centre for Heart Lung Innovation, HIV-AIDS CoE, UBC's Life Sciences Institute, and the Brain Institute; or the energetic entrepreneurs that start and grow companies with the support of advisers, institutions and corporations, it is clear our B.C. community's reliance on collaboration results in value.

To continue growing value, LifeSciences BC will maintain the focus on three key priority areas; (1) access to capital, (2) access to health data and (3) IT-life sciences convergence. Through the development of policies and activities toward achieving these goals we will in fact grow our collaboration and our community. LifeSciences BC will also continue to gather our community through networking events like Blake's Breakfast and McCarthy Showcase.

New to the 2015 LifeSciences BC agenda will be Access to Innovation: Part 1, Investing in B.C. (May 21, 2015) and Part 2, Outcome-Based Innovation (October 15, 2015). The Part 1 objective is to attract further investment into the province (capital) and recognize the significance of the investment in R&D that our pharma and biotech partners continue to place in the province. Part 2 will be an opportunity to examine the critical drivers of health-care spending over the next three years while providing our industry partners the opportunity to showcase outcome-based innovation. These two events are also intended to change the narrative between government, the health-care system and industry. Our desired outcome is to permanently change the depth and breadth of collaboration between the public and private sectors to the benefit of all British Columbians.

LifeSciences BC looks forward to celebrating its accomplishments and critical successes of this past year at its 17th annual awards dinner, presented by Farris on April 16. We are a community of many, but on this special night, we are the voice of life sciences in British Columbia, recognizing our peers and supporting our common efforts. 🐾



To continue growing value, LifeSciences BC will maintain the focus on three key priority areas: (1) access to capital, (2) access to health data and (3) the IT-life sciences convergence



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Hector MacKay-Dunn, senior partner at Farris, Vaughan, Wills & Murphy LLP: "I get to coach and mentor as well as give the pure legal answer" | RICHARD LAM

ABOVE THE BAR

MacKay-Dunn makes a strong case for curiosity

PETER DEVRIES

There is much more to Hector MacKay-Dunn, senior partner at Farris, Vaughan, Wills & Murphy LLP, than what appears on his resumé.

On the books, he's a corporate lawyer, by all accounts a profession punctuated by predictability. But MacKay-Dunn is a man defined more by what piques his sense of curiosity

than by what merely asks for his legal insight.

"I really don't have an average day," confesses MacKay-Dunn with a chuckle that suggests glee rather than apprehension. Always on the lookout for a novel idea to support, he makes sure to leave room in his day for the unforeseen.

"There's never a day that goes as planned – most days, an important part of my day is dictated by the unexpected."

Not that he blithely flies by the seat of his pants. On the contrary. His discipline and assiduousness underscore his many accolades, among them being recognized by Lexpert as one of the top 100 Canada-U.S. cross-border corporate lawyers in Canada and repeatedly being included as one of the leading 500 lawyers in the country.

MacKay-Dunn is also rated by Martindale-Hubbell at 5 out of 5 for legal ability and is recognized among Canada's leading lawyers in mergers and acquisitions, technology and biotechnology. In 2003 he was appointed as Queen's counsel, a designation conferred upon members of the legal profession by the Province of British Columbia in recognition of exceptional merit and contribution.

When it comes to life sciences, his expertise leaves him well equipped to walk among giants. He led LifeLabs' purchase of BC Biomedical in 2013, and in January of this year he led a team of 14 that secured a merger between Tekmira Pharmaceuticals and OnCore Biopharma. The implied market value of the combined company is approximately US\$1 billion. He has also served as an adviser to a number of other life sciences companies, including QLT and Aspreva Pharmaceuticals. Last year LifeSciencesBC awarded MacKay-Dunn the Milton Wong Award for Leadership.

It comes as a bit of a surprise then that a lawyer elbow-deep in such legal heavy lifting stays on top of market trends and news by using a source as pithy as Twitter.

"Twitter is an aggregator for me," he says. He follows various news services including the *Wall Street Journal* and *The Economist*, but harbours an interest in current events and international affairs.

And there it is again: his curiosity. He finds it a bit difficult to explain exactly how he does his job, but the effort is run through with a vein of excitement.

"People come to me with an idea and ask my opinion on its viability," he says. "At the same time, they want to know how they take the first steps, which is usually through a business corporation, and how to raise the early stage of financing."

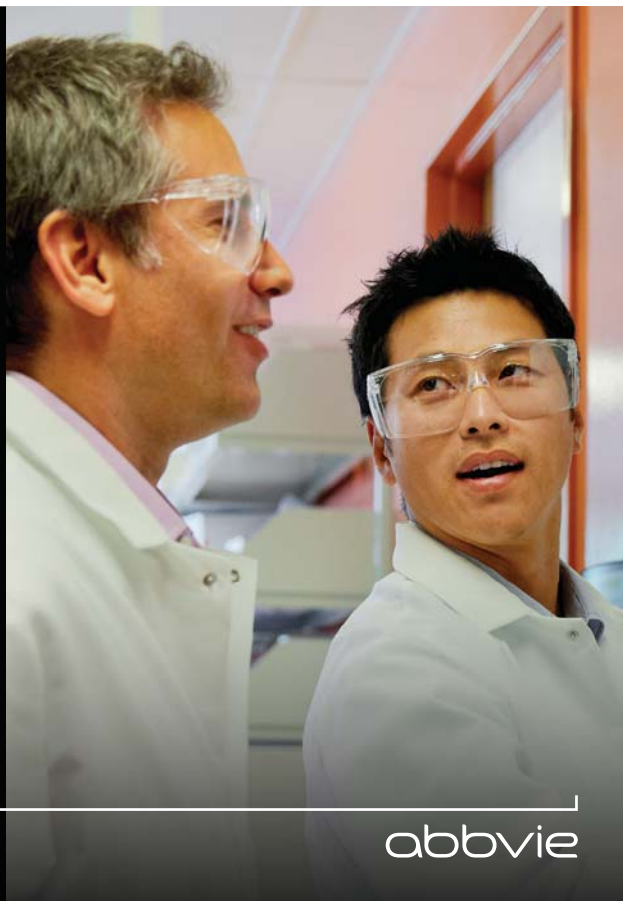
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Above the bar

Usually, he says, the idea is not yet fully formed. Often these clients don't have the resources to get started, so he helps them strategize.

It's much more than just legal advice, he says. "That's what makes it all the more rewarding and gratifying. I get to coach and mentor as well as give the pure legal answer."

His confidence as a mentor wasn't always thus. "I was an insecure, shy and scared young boy." At school, he says, he learned to believe in himself. Sports was a big part of that, though the lesson came at the cost of a few matches.

"We would compete against U.S. schools in Washington and Oregon. I always wondered why they were better than us."

Realizing that it was most often because the American teams simply had a belief in, and expectation of being better, he consciously adopted the same belief: that he could do anything he put his mind to.

"I believe if I can accomplish something seemingly impossible, then I really believe anyone can do it," he says.

It's the challenge of trying to achieve a high goal that makes him feel alive, and he finds equal value in success as he does in failure. "The joy when you achieve a small success as well as the disappointment of failure, both make you feel very alive."

That theme, insists MacKay-Dunn, is perhaps best embodied by sports. MacKay-Dunn is a director at Tennis Canada and chair of the Tennis Matters campaign for BC. "If I had my way, everyone would play sports," he says. "Team sports especially, for the social aspect and learning to co-operate and work together."

He knows that a good teammate has understanding and empathy, skills he believes become critically important in life. "Working together toward a common goal, the work ethic, internal discipline. Sport is life's great teacher." 🐾



HECTOR MACKAY-DUNN | SENIOR PARTNER AT FARRIS, VAUGHAN, WILLS & MURPHY LLP

The joy when you achieve a small success as well as the disappointment of failure, both make you feel very alive

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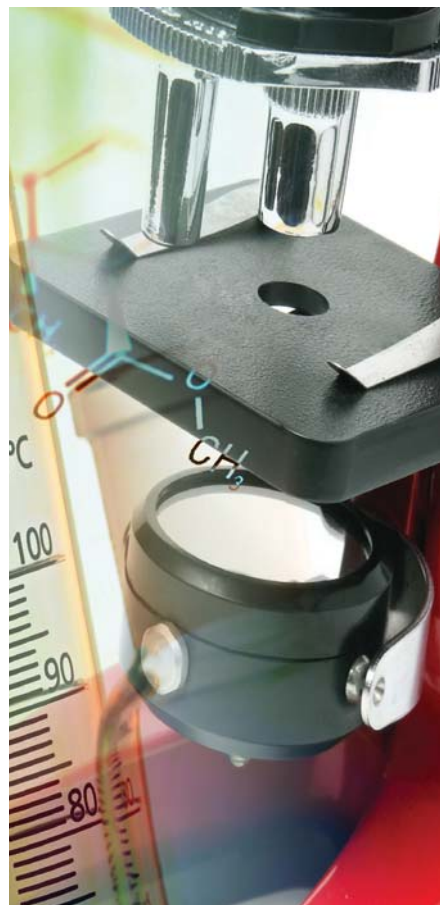
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B.C. MEDICAL DEVICE COMPANIES' SUCCESSES PUMP NEW LIFE INTO SECTOR

From smartphone apps that diagnose a potentially fatal condition in pregnant women to 3D printing of human tissue, B.C. medical device companies are exploiting new technology in novel ways



Neovasc's Reducer product is implanted in a large vein in the heart using a catheter and is intended to treat refractory angina | DOMINIC SCHAEFER

NELSON BENNETT

Investors who dumped Neovasc stock back in 2008 – when the company's shares dropped from \$3 to \$0.07 per share – may have been regretting it at the end of January.

That's when the B.C. medical device company's stock hit an all-time high of \$11.90 per share, following a series of major milestones that has made it a star performer in the B.C. life sciences space.

Earlier this year, the company celebrated the first successful patient implant of its Tiara heart valve in European clinical trials, had clinical trial results of its device for treating angina published in the *New England Journal of Medicine* and in February raised US\$75 million through a public offering that was oversubscribed.

That's a very different kind of story from a couple of years ago, when the life sciences sector was still coming out of a prolonged slump.

"The general feeling on the street, and particularly south of the border, is that there's a lot of interest in life sciences," says Neovasc founder and CEO Alexei Marko. "There's a lot of IPOs and a lot of financings in the works."

Formed in 2008, when Medical Ventures Corp. acquired two Israeli medical device companies, including Neovasc, the company had its first commercial success with its pericardial tissue – made from cow and pig tissue – for use in artificial heart valves.

"It was our lifeblood and really was what kept us going," Marko says. "It's still a great business. We did about \$16 million in revenues from it last year. It's a cash-flow-positive business and underwrites a lot of our activities."

But the company is now more focused on its other heart devices: the Reducer, which is used to treat refractory angina, and the Tiara, which is aptly named, since the artificial heart valve promises to be the company's crown jewel.

Six years in development, the Tiara was used last year for the first time in human trials. A total of five patients

(four in Canada, one in Belgium) have received Tiara implants to date.

With a head count of 160, Neovasc has risen to become one of B.C.'s most successful life sciences companies.

STARFISH MEDICAL ■ Another local life sciences success story is also a medical device company – Victoria-based StarFish Medical.

Unlike other medical device companies, StarFish is not in the business of inventing devices itself. It provides design, engineering and manufacturing expertise to other device makers and biotechs.

Founded in 1999, the company has grown to a head count of 65 highly specialized engineers. To date, StarFish has helped build roughly 100 devices, from surgical catheters used in precision heart surgery to ultrasound eye scanners.

When Boreal Genomics was developing a desktop device for extracting DNA – the Aurora – it turned to StarFish to handle the design and engineering. So did Stemcell Technologies when developing the RoboSep, which automates the tedious process of stem cell separation.

"It's more than just the engineering," says StarFish vice-president of product development John Walmsley. "We're helping them define and develop their product from a technical point of view."

For the most part, StarFish works strictly on a paid-for-service basis. It takes no equity stake in the companies it works for and holds no intellectual property in the devices it designs and manufactures. The one exception is ViVitro Labs, which StarFish bought in 2009. It developed testing equipment for makers of cardiovascular devices.

The company's facility is ISO 13485 certified and



registered with the U.S. Food and Drug Administration (FDA). Being ISO certified means it meets international standards for quality management for the design and manufacture of medical devices.

"When your device gets developed, you'll get clearance with the FDA," Walmsley says.

That's one of the reasons LionsGate Technologies turned to StarFish to develop one of the sensors it has built for use with smartphones.

"They have all the quality systems in place and the capability to build prototype sensors for us," says LionsGate CEO Tom Walker. "They're the go-to people in British Columbia, if you want to build a medical device."

LIONSGATE TECHNOLOGIES AND REFLEX WIRELESS INC.

■ LionsGate is one of two local medical device makers that have been harnessing smartphone and wireless technology to develop low-cost devices for reading vital signs. The other is ReFlex Wireless Inc.

"Everything we do depended on – and continues to depend on – the growth of smart devices," says ReFlex Wireless founder Andy Tsai.

In 2011, when ReFlex Wireless took part in an accelerator program through Wavefront, it employed four people and had a single device it was trying to commercialize: a sensor worn by the elderly to measure and analyze their gait to predict a potential fall.

Neovasc CEO Alexei Marko holds a 3D printed model of a potential patient's heart. Implanted in the model is the Tiara transcatheter mitral valve | DOMINIC SCHAEFER

B.C. medical device companies' successes pump new life into sector

Now the company employs a team of 15 and has developed 10 devices, all of which are based on measuring and analyzing behavioural data transmitted wirelessly to a smartphone or tablet.

Based on sales (\$750,000 last year), the most popular device is a food scale used by diabetics and people with the enzyme deficiency phenylketonuria to analyze things like caloric intake and protein content in food. Another popular device – the SleepAngles monitor – is a sensor worn by people with sleep apnea to measure and analyze their sleep patterns.

Like ReFleX Wireless, LionsGate has also harnessed the computing power of the smartphone. The company's core technology – Kenek Core – was developed by engineers at the University of British Columbia (UBC).

Its two-way audio process uses the computing power of a smartphone not just to receive information from the sensor (an oximeter, for example) but to power the sensor itself.

"We're using the processing power of the phone to drive the sensor," says LionsGate CEO Walker.

The idea is to develop low-cost but effective vital signs monitoring that can be used by community health workers in developing countries. One device is an oximeter that can be used to read oxygen saturation levels in pregnant women to detect pre-eclampsia, a pregnancy disorder.

"It will cost you \$50 and you have an oximeter that I used to sell for \$5,000," Walker said.

ASPECT BIOSYSTEMS ■ Another startup that is harnessing new technology is Aspect Biosystems. Based at UBC, Aspect's small team of researchers is using 3D printing to build human tissue.

The Aspect team isn't exactly buying off-the-shelf 3D printers to print out human hearts or lungs – the technology isn't quite there yet.

The startup has developed a special 3D bioprinting system, housed in a sterile cell culture cabinet, to grow "microtissues" for use by pharmaceutical companies to test new drugs.

Apart from the fact that it may help address the ethical issues surrounding the use of animals for drug testing, real human tissue is simply a more precise way to test drugs developed for human diseases.

As Aspect co-founder Sam Wadsworth points out, modern drug development has become highly targeted to specific populations, age groups and genetic types. Bioprinting would allow microtissue to be grown for more precise testing.

"At the moment, the pharmaceutical industry relies on animal models to test their drugs, and 70 per cent of drugs that work in animal models fail to work in humans," he says. "They need to find really tailored solutions, and that's a complicated problem and you're not going to solve those problems by doing your testing in mice."

Aspect is currently developing its first tissue samples for an undisclosed pharmaceutical company. 🐼

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FINANCING LIFE SCIENCES COMPANIES REQUIRES CREATIVITY

Going public is just one way to raise cash

PETER CAULFIELD

Growing a successful life sciences company is difficult, and many good enterprises fall along the wayside. In addition to getting the science right, companies need to be creative in how they finance themselves.

Xenon Pharmaceuticals Inc. went public with an initial public offering (IPO) on the Nasdaq exchange in November 2014, 14 years after it had been founded and eight years after it had received its last venture capital (VC) financing.

"Xenon grew up in a difficult financing environment," says president and CEO Simon Pimstone. "Because of the large amounts of time and capital that are needed to develop new drugs, companies need to be very nimble."

Chief financial officer Ian Mortimer says the IPO's proceeds of about \$41 million will go towards developing drugs that are at early stages of development.

Xenon has an approved product to combat pain that will be sold by a pharmaceutical partner and that will

earn royalties for the company. It also has two drugs in the clinical testing stage.

"We expect to have a third drug in the clinical testing stage in the second half of 2015," Mortimer says.

Along with Aquinox Pharmaceuticals Inc., which raised \$53 million, Xenon was one of two B.C. life sciences companies that went public in 2014, says Ken Galbraith, managing director of VC management company Five Corners Capital Inc.

About 20 percent of B.C. life sciences companies have gone public, he says.

About two-thirds of B.C.'s life sciences sector is located in Greater Vancouver, says LifeSciences BC president and CEO Paul Drohan.



PAUL DROHAN | PRESIDENT AND CEO, LIFESCIENCES BC

Fortunately, there is a well-developed network of angel investors in B.C.



Simon Pimstone of Xenon Pharmaceuticals, which raised \$41.4 million in an initial public offering in 2014 | ROBKRUVT

“The biggest concentrations of companies are at [the University of British Columbia], the area around Vancouver General Hospital and the Discovery Parks,” he says. “The main focus of most of them is biopharmaceutical and medical device research, although between 10 per cent and 15 per cent manufacture products.”

Drohan says the degree of difficulty of a company’s obtaining financing depends partly on its stage of development.

“At the earliest stage, there is government funding available,” he says.

There are also private sources, such as Accel-Rx Health Sciences Accelerator and CDRD Ventures Inc., a private for-profit company launched in 2012 by the Centre for Drug Research and Development.

Drohan says the next stage – the seed round of financing – is more difficult.

“Fortunately, there is a well-developed network of angel investors in B.C.,” he says. “Many successful entrepreneurs who have made money are investing it in new ventures.”

The third stage, the first round of VC financing, is the most challenging in B.C. “Here a larger injection of cash – between \$5 million and \$15 million – is needed,” Drohan

says. “B.C. used to have an extensive network of venture capitalists, but that source of funding has diminished since the financial crisis.”

Later financings, once a company is more established, are easier and can be financed by more venture capital or by an IPO, as in the case of Xenon and Aquinox.

Another financing source is a partnership with a large pharmaceutical company. Zymeworks Inc., a privately held biotherapeutics company, is working with Celgene Corp., Merck & Co. Inc. and Eli Lilly and Co. The latter companies gain access to Zymeworks’ technologies and Zymeworks receives upfront payments, development and commercial milestones, and sales royalties.

David Poon, Zymeworks’ senior director of external R&D and alliances, says the company will use the proceeds to continue the advancement of an internal pipeline of therapies primarily for the treatment of various cancers.

Incorporated in 2003, Zymeworks’ research has also been funded by a VC firm, a Quebec-based development capital fund and a large number of private angel investors.

Zymeworks is currently preparing for a mezzanine venture round with a potential plan for an IPO later this year or early next year. 🐦



HEALTHY COLLABORATIONS

Research institutes improve the world's health

PETER MITHAM

Clusters of researchers and startups underpin many economic hubs. In the case of B.C.'s life sciences sector, Vancouver Coastal Health – the province's largest health authority – supports two key institutes where researchers are collaborating to improve the health of B.C. and the world.

With \$118 million in research funding annually, Vancouver Coastal Health Research Institute (VCHRI) and Providence Health Care Research Institute (PHCRI) represent more than 900 researchers working at 11 major research centres investigating everything from hips to hearts.

"We're conducting leading-edge translational research – taking the knowledge from research and implementing it in practice and commercialization," says Robert McMaster, executive director of VCHRI and vice-president, research, for the Vancouver Coastal Health authority.

With approximately \$80 million in annual funding and 350,000 square feet of research space at Vancouver General and UBC hospitals, VCHRI is by far the larger of the two institutes.

Of the seven research centres it encompasses, McMaster identifies the Vancouver Prostate Centre and the Djavad Mowafaghian Centre for Brain Health as key research centres.

The prostate and brain centres each have extensive tissue libraries that serve as a foundation for research. Prostate researchers can draw on 20 years' worth of tissues that patients have donated following surgery, while the Djavad Mowafaghian centre supports significant research into Parkinson's and multiple sclerosis.

Coupled with patient histories associated with the tissues, genomics and other new methods of analysis often reveal how a disease manifested in its earliest stages. This allows researchers to develop new ways to diagnose disease, to do so earlier, and to improve patient treatment and prognosis.

"[Researchers] are really taking the excellence of research into adult clinical care," McMaster says.

VCHRI also takes particular pride in innovation, with more than 80 new invention discoveries since 2008 and six spinoff companies in the past five years. OncoGenex Pharmaceuticals Inc., spawned from the prostate centre, is among the latest.

But if VCHRI has successfully commercialized its research, PHCRI, which was launched in 2005, focuses on public service. In fact, PHCRI can trace its roots to the Sisters of Providence, a Catholic religious order that provided medical care in Vancouver as early as the 1890s. Like its predecessor, the institute focuses on investigating and caring for the ills of the city and its residents.

"Providence Health Care has a vision, and that vision is that it's driven by compassion and social justice," says Robert Sindelar, president of PHCRI and a professor in the University of British Columbia (UBC) faculty of pharmaceutical sciences. "Enquiry is important. ... Since so many of our researchers have clinical responsibilities, we're finding ways for our scientists and caregivers to ensure that their knowledge is really translated into better care for patients."

Of the four research centres PHCRI oversees, none represents this better than the BC Centre for Excellence in HIV/AIDS. Overseen by Julio Montaner, the centre has set the pace for AIDS care around the world and helped give patients a future.

"There's few things we can [point to] from B.C. that leads the world as this does," Sindelar says, noting that

Dr. Robert McMaster, executive director of Vancouver Coastal Health Research Institute, which implements research into practice in areas such as prostate and brain health | CHUNG CHOW



ROBERT MCMASTER | EXECUTIVE DIRECTOR,
VANCOUVER COASTAL HEALTH RESEARCH INSTITUTE

[Researchers] are really taking the excellence of research into adult clinical care

Healthy collaborations



Dr. Robert Sindelar (right), president, Providence Health Care Research Institute, and Dr. Pascal Bernatchez, researcher, Centre for Heart Lung Innovation | CHUNG CHOW

PHCRI conducts its research with just \$45 million in annual research funding.

The achievements – and the researchers who made them possible – were a drawing card for Pascal Bernatchez, an associate professor in the UBC department of anesthesiology, pharmacology and therapeutics, who was recruited for the Centre for Heart Lung Innovation seven years ago.

“I benefit from having access to a great pool of colleagues, and also technical resources that are pretty much essential to my daily operations here at Providence,” he says. “PHCRI is definitely interested in providing fertile ground for research programs and investigators interested in not only heart and lung and blood vessel research, but also HIV and other research fields.”

The combination of talent, access to equipment and a track record of success allows Bernatchez to pursue research with greater ease – and confidence – than might be possible elsewhere.

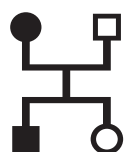
“You basically have to offer researchers a good research environment, and PHCRI has clearly stepped up to the plate,” he says.

And there’s more to come: redevelopment of the St. Paul’s Hospital site on Burrard Street, where PHCRI bases most of its work, will provide the institute with a much-needed makeover of its facilities.

“We’re very excited about it,” Sindelar says. “It creates tremendous opportunities and will only enhance the research culture and capability of what we currently have in the institute.”

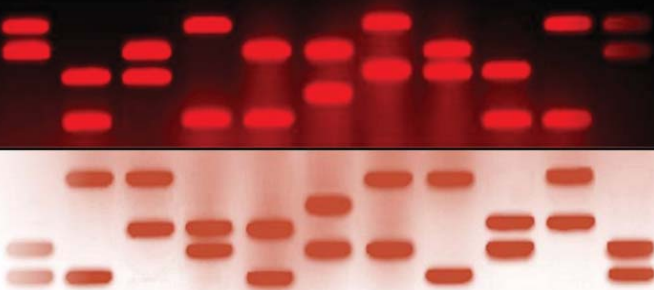
Coupled with an affiliation with UBC and regular discussions with the leadership of VCHRI, the work of PHCRI occurs in a collaborative ethos that supports life sciences research across the region.

“We look at them as sister institutions,” Sindelar says of PHCRI and VCHRI. “We’re committed to working toward a unified vision of an academic health science centre.”



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A NEW UNDERSTANDING OF THE PROHIBITION ON PATENTING METHODS OF MEDICAL TREATMENT IN CANADA



Jennifer Marles



Christina Kwok

JENNIFER MARLES
AND CHRISTINA KWOK

It is a well-established principle of Canadian law that methods of medical treatment are not patentable subject matter. Courts have consistently held that claims directed to methods of medical treatment do not fall within the definition of “invention” in the Patent Act because such claims are not vendible products with real economic value. The courts’ rationale behind this prohibition is that a patent should not interfere with a physician’s ability to exercise his or her skill and judgment in treating patients.

Many new inventions in the field of medicine pertain not to new drugs, but rather to improved dosage regimes for administering known drugs. Claims that include dosage ranges or directions as to how frequently a drug is administered are typically objected to by the Canadian Intellectual Property Office (CIPO) as being unpatentable methods of medical treatment. In June 2013, the CIPO issued a practice notice respecting medical uses. The CIPO interprets the jurisprudence as establishing a broad prohibition against the patenting of any claims that include details of “how and

when” a drug is administered. In fact, in the recent case of *AbbVie Biotechnology Ltd. vs. Canada* (Attorney General), 2014 FC 1251 (“*AbbVie*”), the Commissioner of Patents argued before the Federal Court that the inclusion of any dosage and dosage interval, no matter how specific, in a patent is fatal.

In that case, the Federal Court effectively held that the CIPO’s approach to assessing the patentability of dosage claims was not correct in law. The court held that claims which recite fixed dosages and schedules may constitute patentable subject matter, provided there is no evidence to suggest that the claimed fixed dosages and schedules would require skill and judgment to make further adjustments.

The claims at issue in *AbbVie* were directed to the use of a preloaded syringe containing 40 milligrams of anti-human TNF antibodies (Humira) for the treatment of an arthritic disease or an inflammatory bowel disease administered subcutaneously for use on a biweekly dosing schedule. The court noted that the exercise of skill and judgment to decide whether such claimed dosage and schedule were appropriate for a particular patient did not automatically offend the methods of medical treatment prohibition.

If further skill and judgment were necessary or expected to vary the claimed way to use the invention, then the claims would fall under the methods of medical treatment prohibition. Since there was no evidence in *AbbVie* to suggest that the biweekly dosage is not fixed and that further skill and judgment would be necessary, the court overturned the CIPO’s refusal to grant the patent at issue and directed the CIPO to allow the claims.

The current state of the law with respect to dosage claims can be summarized as follows. Generally, claims that include a dosage range or interval are considered to be directed to methods of medical treatment because such claims would require a physician’s skill, judgment and knowledge of the particular patient to select the appropriate dosage for that patient. However, in light of *AbbVie*, it now appears that patent claims which specify a fixed dosage administered on a fixed schedule may not necessarily be considered a method of medical treatment and therefore might constitute patentable subject matter. However, this issue is likely to come before the courts again, and so *AbbVie* may not be the last word on this topic. 🐦

Jennifer Marles is an intellectual property lawyer and Christina Kwok is an articulated student at Oyen Wiggs Green & Mutala LLP. The contents of the article should not be taken as and are not intended to be legal advice. Readers should contact a registered patent agent for advice on their specific circumstances.



It now appears that patent claims which specify a fixed dosage administered on a fixed schedule may not necessarily be considered a method of medical treatment and therefore might constitute patentable subject matter

PARTNERSHIPS PLAY KEY ROLE IN DEVELOPMENT OF NEW DRUGS

Companies team up with bigger international firms to advance products

MICHAEL BERNARD

Science is famous for the role twists and turns play in discovery, everything from the apple dropping on Newton's head to Sir Alexander Fleming stumbling on the discovery of penicillin.

For Dr. Hal Gunn, co-founder of Qu Biologics, developing a new drug to treat Crohn's disease surprisingly started with a desire to develop drugs to fight cancer.

"In my clinical work at InspireHealth, I had three patients with advanced terminal cancer who went into remission following a severe acute infection," he says in a recent interview. "That got me very interested in how acute infection could potentially stimulate our body's immune system to clear cancer."

Gunn notes that there is actually a significant body of medical literature supporting the theory that "the more flus and colds you get, the less your risk of getting

cancer." That literature includes an Italian study going back hundreds of years that found that when deaths from infectious diseases declined, the rates of cancer and inflammatory diseases such as Crohn's disease actually increased.

Gunn explains that Qu Biologics has developed a platform of immunotherapies called site-specific immunomodulators, or SSIs, which are derived from parts of inactivated bacteria that can restore normal immune function to fight cancer and inflammatory diseases.

The research got a boost when an opportunity arose to apply SSIs in a compassionate-use program in Austria.

"We treated 10 patients with Crohn's disease and two patients with ulcerative colitis. All 12 patients had improved symptoms. Nine of the 12 went into remission in treatment. And four of the 12 are still in sustained remission, off all of the medication, including SSIs."

Another trial in collaboration with the BC Cancer Agency is also underway with patients with recurrent lung cancer.

"We believe that exercise may be able to restore normal immune function and remove the underlying trigger for those diseases," he says.

Gunn says that the Crohn's trial has also utilized social media to connect with the Crohn's disease community, resulting in subjects being located in Australia and New Zealand among other locations.



ALI TEHRANI | CEO, ZYMEWORKS

What makes us stand out from the rest of the companies in the field is we not only have a pipeline of our own but external validation of the attention of the pharma world



ZYMEWORKS ■ For Dr. Ali Tehrani, who founded Zymeworks in 2003, last year was one where the company's teamwork paid off as never before.

He proudly rattles off the names of three global pharma giants – Celgene, Eli Lilly & Co. and Merck – and then fills in the details of each of the groundbreaking deals.

"Last year we raised more than we raised in the first 10 years of our life. We attribute it to robust science, a world-class team and the science to support the above," he says.

"The Eli Lilly deal was a \$375 million deal plus royalties, and it did come with an equity investment. Then you have

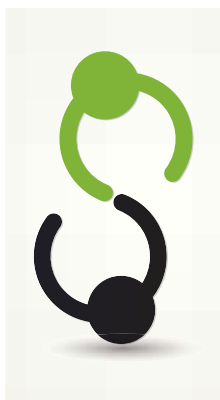
the Celgene deal, a multi-program deal with each deal valued at \$164 million. And Merck is a \$187 million deal.

"One [deal] is luck, two is no longer luck, and three is definitely not luck when you look at the dollar values involved," says Tehrani.

"What makes us stand out from the rest of the companies in the field is we not only have a pipeline of our own but external validation of the attention of the pharma world. We are in the top one per cent having achieved this. What these deals do is position us as a major player in the global market."

Dr. Hal Gunn is the co-founder of Qu Biologics, which is developing a new drug to treat Crohn's disease | ROB KRUYT

Partnerships play key role in development of new drugs



While Zymeworks shares an interest in addressing different forms of cancer with its counterparts in the life sciences field in B.C., it parts ways with them on the approaches it is taking, says Tehrani.

One of the dividing lines is the tool set that companies adopt: addressing small and large molecules.

The small-molecule approach used by Zymeworks' counterparts is non-immune system-based and focuses on synthetically developed and plant-based drugs and therapies to take on bacteria and viruses, anything that is not normally found in the body.

Zymeworks, on the other hand, has adopted the large-molecule or biologics approach, which has a direct relation to the body's immune system.

"What we are focusing on is how to better tune people's immune systems to go after cancer cells," Tehrani says. One of the strengths of Zymeworks' research has been its progress in developing what Tehrani calls the "super-soldier" antibody, which uses two points of specification in going after cancer cells.

He uses the analogy of identifying humans. A single ID technique might be fingerprints while a second could be a retinal scan. "Our antibodies have dual recognition capabilities. They recognize the cancer cells or whatever they are targeting so they can really mitigate the risk of going after healthy cells or getting it wrong, or all the things that people are worried about in drug development today."

Tehrani says all of this should ultimately lead to what he calls "personalized medicine" in which therapies can be custom-designed to be most effective in recognizing not only our commonalities as humans but our individual and group differences as well.

"There is no one magic bullet. There are several differences in different groups of people. The subsets of populations is something that makes a huge difference in how a particular drug works for them or in the drug design.

"Everything makes a difference, from your daily routine to your genetic makeup, to the genetic traits within your family, to what you eat, what environment you live in as you grow up and get old.

"All these make a huge difference. In our jobs as drug developers, we cannot look at all subjects as just one. We can't treat someone 65 [years old] with breast cancer the same way we treat someone 25 with breast cancer."

XENON ■ Xenon Pharmaceuticals Inc. has struck collaboration deals with Merck & Co. and Teva Pharmaceutical Industries Ltd.

"Platform companies certainly are seeing greater investor and pharma interest than in the recent past," Xenon CEO Simon Pimstone told *LifeSciences* magazine last year. "I think the concept of platforms being able to generate deals in a tough financial environment, as a business strategy – that has been hugely important for us."

Last year Xenon had eight drug candidates in the pipeline, based on its Extreme Genetics platform – a novel approach that identifies rare phenotypes to help tailor potential drug targets.

One of those drugs – an analgesic for treating a rare neurovascular pain disorder – was identified after Xenon studied people with a rare condition that makes them immune to pain, as well as people with an equally rare disorder that causes spontaneous pain. It is now being tested in clinical trials in partnership with Teva. 🐦

Briefs

Aequus planning to list on TSX Venture Exchange

A private life sciences company that is developing a transdermal patch for an anti-psychotic drug used to treat a variety of mental disorders will soon be listing on the TSX Venture Exchange.

Aequus Pharmaceuticals is planning a direct registration on the TSX-V, as opposed to an initial public offering. The company's shares will trade under the symbol AQS.

"To begin trading on the TSX-V is a major milestone for Aequus, and becoming a reporting issuer is a significant step toward achieving that milestone," Aequus CEO Doug Janzen, former CEO of Cardiome Pharma Corp., says in a press release.

"Once we are publicly traded, we will be able to access larger pools



of capital, which will enable us to aggressively grow our business."

Aequus is developing an adhesive transdermal patch – called AQS-1301 – for the delivery of aripiprazole, which is used to treat schizophrenia, bipolar disorder, manic depression and autism spectrum disorder.

Janzen said transdermal drug delivery is especially useful in children, who may have to take several pills per day and may forget to take them while they are at school.

Aequus' AQS-1301 transdermal patch is still in the preclinical phase.

NSERC Brockhouse Canada Prize honours medical isotope team

An interdisciplinary research team including doctors and scientists from the University of British Columbia and UBC's TRIUMF laboratory were awarded the NSERC Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering in February, presented by Canada's Governor General.

Paul Schaffer (TRIUMF), François Bénard (UBC), Anna Celler (UBC), Michael Kovacs (Western University), Thomas J. Ruth (TRIUMF) and John Valliant (McMaster University) jointly received the prize for their work as part of a team called CycloMed99.

What drew research physicists and medical



doctors together in the TRIUMF achievement was a critical shutdown in November 2007 of Canada's Chalk River nuclear reactor, which produces a majority of the world's supply of radioisotopes for diagnosis and medical treatment of cancer and heart disease.

That shutdown caused the multidisciplinary team to find ways to avoid such critical shortages in future. The result was to make use of a type of cyclotron that is readily available in hospitals and radio pharmacies.

CORPORATE PROFILES

2015

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GROWING BRITISH COLUMBIA'S BIO-ECONOMY

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Accel-RX – Canada's Health Sciences Accelerator

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Maximizing New Health Sciences Company Creation

The Accel-Rx Health Sciences Accelerator is a national organization focused on maximizing new health sciences company creation, and ensuring start-ups have the resources they need to enable them to stay and grow in Canada and give rise to a new generation of strong health sciences anchor companies. Accel-Rx therein brings together five of Canada's leading health sciences Centres of Excellence for Commercialization and Research (CECRs) to foster pan-Canadian cooperation, and directly address the health science company creation challenge in Canada. These CECRs include:

- The Centre for Drug Research and Development (CDRD);
- MaRS Innovation (MI);
- The Vancouver Prostate Centre's Translational Research Initiative for Accelerated Discovery and Development (PC-TRIADD);
- The Centre for Commercialization of Regenerative Medicine (CCRM); and,
- The Centre for Probe Development and Commercialization (CPDC).

CDRD Ventures Inc. (CVI), the commercialization vehicle of The Centre for Drug Research and Development is providing the initial management to launch Accel-Rx's operations.

Accel-Rx will work towards its vision of a well-anchored and vibrant Canadian health sciences industry by building on and leveraging the strengths of existing research and commercialization centres such as the existing health-related CECRs, and then providing the critical complementary capacity and resources to specifically support new company creation including:

- Seed capital through the Business Development Bank of Canada;
- A new national network of entrepreneurs to drive and guide company creation;
- Partnerships with the venture capital community to facilitate follow-on financings as well as provide early business feedback;
- Access to and commercial input from strategic industry partners;
- Access to business/finance/development expertise, technical capabilities and specialized infrastructure;
- Specialized entrepreneurial training to enable young, driven individuals to become the next generation of company creators and bio-entrepreneurs;
- Regular meetings and events to bring together these investors, entrepreneurs, researchers, industry partners, and technology developers.

Accel-Rx will deliver five key Program Pillars: Business Planning and Investment Strategy Development, Funding, Technology Development Planning, Mentorship, and Access to Infrastructure (through preferred partnerships with the five founding CECR



organizations noted above).

Accel-Rx Health Sciences Accelerator Partners with BDC Venture Capital to Help Create up to 20 Leading Canadian Companies....

At the BIO International Conference in San Diego last June, BDC Venture Capital and Accel-Rx announced a collaboration to provide critical seed funding to new and

emerging Canadian health sciences companies. The seed funding partnership with BDC Venture Capital is the main funding mechanism for companies created at Accel-Rx, with the intent to invest in up to three to four companies annually, with that number potentially increasing as the partnership progresses. Selected companies will each receive up to \$1,000,000 in convertible debt funding from BDC Capital and Accel-Rx -- which will then allow companies to attract similar, if not greater investments from the private sector.

Natalie Dakers, President and CEO of CVI, and Centre Director of Accel-Rx commented, "With the new resources it brings to the table, Accel-Rx will provide Canada with a more well-informed, well-resourced, and effective approach to company creation; and will result in the launching of a critical mass of robust companies based on exceptional innovative, pre-validated (scientifically and commercially) technologies."

Dominique Bélanger, VP, Strategic Investments and Partnerships at BDC Capital added "From our work with accelerators in different sectors, we've learned a lot about what works, what doesn't and how to overcome pitfalls," he says. "We've developed a highly disciplined model that significantly increases the likelihood of success for the companies involved in this program."

Dr. Raphael Hofstein, MI's President and CEO remarked, "Creating companies around our most promising early-stage technologies allows for investment and is a crucial step in advancing them to market. The collaboration between Accel-Rx and BDC Venture Capital will provide new opportunities to address seed-stage funding rounds for health sciences companies prior to Series A financings or other strategic alliances."

Karimah Es Sabar, President and CEO of The Centre for Drug Research and Development (CDRD) concluded, "Now with the addition of Accel-Rx, we are delighted to have new financing options/vehicles for the most innovative and novel technology opportunities. We are also excited to be building this national nexus for health sciences commercialization right here alongside CDRD/CVI."

Dr. Patricia Beckman
Chief Technology Development
Officer, CDRD Ventures Inc.
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The Centre for Drug Research and Development (CDRD) and CDRD Ventures Inc. (CVI)

Translating Discovery into Opportunity...and Opportunity into Value

The Centre for Drug Research and Development (CDRD) together with its commercialization vehicle, CDRD Ventures Inc. (CVI) (together, the CDRD/CVI Enterprise) addresses one of the biggest challenges facing the global life sciences sector today: how to translate commercially promising health research conducted at the university level into new therapies that improve and save lives. Canada, as well as other countries around the world, invests billions of dollars in medical research each year, and our universities and research institutes have achieved impressive results in terms of scientific discoveries. Yet it is extremely difficult to translate these discoveries into commercial products. The main reason is risk. That's where CDRD/CVI comes in. CDRD/CVI is Canada's national, not-for-profit drug development and commercialization centre. **Our mandate is to de-risk discoveries stemming from publicly funded research to create viable investment opportunities for the private sector**—thereby bridging the commercialization gap between early-stage academic research and industry. CDRD/CVI is the only fully-integrated centre of its kind in the country — and one of a handful in the world — with the full expertise and infrastructure to source, evaluate, develop and commercialize both small molecule and biologic innovative technologies in virtually any therapeutic area.

CDRD/CVI was born of a shared vision between government, industry and academia. We were founded in 2007 as an independent, not-for-profit organization by a group of renowned academic investigators and business people with proven track records in creating new medicines. Just one year later, we were recognized by the Government of Canada as a national **Centre of Excellence in Commercialization and Research (CECR)**. Since then, CDRD/CVI has leveraged public and private sector funding to create a state-of-the-art drug development and commercialization platform with the infrastructure, scientific and business expertise and professional project management skills to develop innovative health technologies in virtually any therapeutic area through the pre-clinical stage.

We collaborate with our network of over 10,000 principal investigators from more than 50 affiliated research institutions across Canada and around the world to identify commercially promising discoveries, provide the state-of-the-art specialized drug development facilities, scientific and business expertise, and professional project management needed to advance the technologies to a stage where they are sufficiently de-risked for private sector consideration.

CDRD Ventures Inc. (CVI) then steps in to drive drug development and technology commercialization further. CVI in-



licenses selected intellectual property generated from CDRD projects directly from the affiliated institution or inventor, and forms strategic partnerships with pharmaceutical and biotechnology companies and third-party investors to transform promising drug research into much-needed medical therapeutics. Profits from CVI flow back to CDRD to support future drug

development projects.

To support its innovative drug development projects, CDRD/CVI has established partnerships with some of the world's top pharmaceutical companies including Pfizer, Johnson & Johnson, GlaxoSmithKline (GSK), MERCK, and Roche. In total, the Enterprise has now undertaken 134 technology development projects; and the results are promising: we have out-licensed three novel therapies, supported 33 new patent families with CDRD data, launched five new start-up companies and attracted over \$40 million in international pharmaceutical sector investment.

In November 2014, **new federal funding also enabled CDRD/CVI to expand its support to Canadian entrepreneurs.** Health sciences researchers, entrepreneurs, and companies alike now have the opportunity to collaborate with CDR/CVI, and thereby access its full suite of expertise, infrastructure, and broad partnerships and networks. This support includes....

- **Incubator Activities:** primarily undertaken by CDRD, which support entrepreneurs and small and medium-sized enterprises (SMEs) through the identification, evaluation, validation, advancement, and de-risking of their commercially/therapeutically promising early-stage technologies/assets to make them investable;

- **Accelerator Activities:** primarily undertaken by CVI, which provide entrepreneurs with the support, resources and connections required to actively start and grow strong new Canadian health sciences companies founded on pre-validated technologies incubated within CDRD; and offering existing SMEs access to these same resources to enable their growth and success.

Ultimately through the work of CDRD/CVI, health research discoveries have a much greater prospect of being developed into new medicines; the life sciences industry is fuelled with a robust pipeline of new pre-validated technologies, and has the support they need to become robust Canadian anchor companies; and the societal returns on public research investment are maximized.

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DNA: A blueprint for better health

Genomics provides a new type of “microscope” that helps to understand the role of DNA and related molecules in health and disease. Genome BC is looking to a future where patient care in this province will be tailored for the individual versus a one-size fits all approach. For close to fifteen years Genome BC has played an important and catalytic role in the application of genomics to health research (discovery, applied and translational) and working with others in the personalized medicine movement.

Genome BC is focused on delivering sustainable social and economic benefits to BC by identifying and investing in the best projects in areas of unmet medical needs where short and long term impacts can be made. In addition to human health, Genome BC continues to invest in key sectors including agri-food, fisheries and aquaculture, forestry, energy, mining and environment.

Genomics & health: bringing benefits to BC

The potential for genomic knowledge, tools and technologies to positively inform our strategies for disease prevention, diagnosis and treatment, as well as approaches to wellness, nutrition and public health are vast. The impact of these applications includes:

- Improving health outcomes
- Delivering efficiencies to the healthcare system
- Stimulating economic growth
- Fueling further scientific discoveries

Investment in key areas

Genome BC has identified three disease areas with strong potential for genomics to deliver near term benefits: cancer, infectious diseases and rare diseases. There is also a substantial opportunity to use pharmacogenomic tests to guide medication dosing and avoid adverse reactions across a wide range of diseases. In all of these areas, applying genomics on a large scale, whether for discovery, validation, or clinical implementation, across all patients will be critical for realizing maximal benefits.

A disease of unstable genomics

Genome BC has continued to make significant investments in cancer genomics research, with the goal of developing new ‘tailored’ personalized medical treatments to improve cancer patient outcomes. One Genome BC-supported team is applying the newest and most cutting-edge sequencing technology available in BC to develop a strategy for rapidly identifying mutations in hereditary cancers – breast, ovarian, colorectal – with the goal of improved strategies for cancer screening. As genomics and proteomics become more sophisticated and knowledge of tumour biology becomes more



advanced, Genome BC-funded researchers are beginning to find answers. This knowledge is already leading to new strategies for studying cancer and new interventions to help save lives.

In the public's best interest

Genome BC has been engaged with public health issues since its inception. Genome

BC's funding for genome sequencing of the SARS and H1N1 viruses facilitated the development of rapid strategies for investigating outbreaks of novel pathogens. A tuberculosis outbreak on Vancouver Island was also illuminated by Genome BC-funded research. Major investment into HIV/AIDS is contributing towards the development of an improved HIV drug-resistance test, real-time drug resistance surveillance and better methods for personalizing treatment of HIV based on each patient's unique DNA. Significant strides have been made through genomic research in the management of infectious disease in BC.

Ending the genetic odyssey of rare diseases

The complexity of rare genetic diseases, of which there are over 7,000, is being made much more accessible thanks to genomics. A Genome BC-funded team discovered the gene for Weaver's Syndrome and enabled several families to accurately diagnose their children. For families dealing with an unknown medical condition a diagnosis is often the Holy Grail: diagnosis means that families can better understand the impact and treatment options. Better diagnoses will allow Canadian healthcare teams to reduce or prevent patient complications and to develop tailored treatments. In the long term, identification of disease genes is an essential step toward the development of drugs that will one day improve the lives of affected children.

A big vision: from disease-centric to patient-centric clinical care

The next five years will demonstrate the benefits of genomics at the level of populations; not just for the few, but a much broader and inclusive use of genomic tools. These five years are crucial in Genome BC's 10-year vision for genomics to catalyze a transition from disease-centric to patient-centric clinical care. In this new paradigm, the patient's genome and other molecular data will provide information that effectively guides care. Genomic tools and technologies will be applied to the continuum of patient care from prevention, through screening, to diagnosis and treatment of diseases.

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SUPPLIED BY

Michael Smith Foundation for Health Research

www.msfhr.org

MSFHR: Igniting the potential of BC's health research community

Creating an environment that allows creative minds to flourish and supporting the people and projects that drive BC's health research innovation are at the core of our work at the Michael Smith Foundation for Health Research (MSFHR). Inspired by the memory and passion of Nobel Laureate Dr. Michael Smith, we work province-wide to empower and support BC's best and brightest to pursue world-class innovation and stretch the bounds of what health research can achieve.

Since 2001, we have been enhancing the national and international competitiveness of BC's health research enterprise. We do this by:

- **Investing in people.** Our awards nurture the research careers of BC's most exceptional trainees and emerging scholars.
- **Being responsive to BC's research needs.** We are committed to supporting research that addresses key health priorities identified by the BC government.
- **Building coherence.** We work to ensure the right infrastructure is in place to support health research, maximize our available funding through partnerships, and eliminate duplication in the system.

Through these activities, we're proud to have played a role in growing BC's health research sector into a vibrant community that ranks among the world's leaders in developing new treatments and responding to emerging health threats.

Every day, made-in-BC solutions are transforming the way we diagnose and treat major health issues – including HIV/AIDS, breast cancer, and Alzheimer's disease – and many of these innovations are led or supported by MSFHR-funded researchers.

People

Since 2001, we have directly supported the career development of a generation of BC researchers by granting more than 1,500 individual salary awards. The influence of these awards is felt in many ways.

For individual researchers, MSFHR awards represent an opportunity for career progression that opens doors and builds invaluable connections. For universities and research institutes, this support allows them to retain top talent and recruit high-quality researchers from abroad. For BC as a whole, provincial investment have been multiplied 10-fold as MSFHR-funded scholars have attracted more than \$1.1 billion in additional funding from national, international, non-profit, and private-sector sources.

Responsiveness

By working together with the BC government and other health research funders, we are able to identify urgent priorities and fast-track the development of solutions. Our targeted programs have



helped BC build capacity for nursing research, evaluate the HPV vaccine, and respond rapidly to health emergencies such as SARS and H1N1.

In 2013, the BC government gave us targeted funds for research into Alzheimer's disease. By taking advantage of our reputation as a trusted convenor, we assembled a network of national and provincial partners to address this growing health challenge. The resulting partnership created a total investment of \$7.5 million, multiplying BC's initial investment by five times and greatly increasing the scope of what we can

achieve. In late 2014, five research teams were funded and their innovative research projects offer hope for new cures and treatments for dementia.

Coherence

MSFHR is uniquely placed to provide leadership and unite diverse stakeholders for province-wide planning and action.

We have invested in coherence in numerous ways over the past decade. We supported a data platform that helps researchers access data to enable population health research and we helped establish a nursing health research network. We continue to work to streamline the research ethics review process to reduce duplication and remove barriers to doing research in BC.

We spearheaded the development of a provincial health research strategy – published as *Directions for Health Research in BC* – that will leverage BC's strengths and encourage integration across sectors and disciplines.

Through our continued work to promote coordination and coherence province-wide, we play a vital role in maximizing health research for the benefit of all British Columbians.

Looking forward

In an era of finite resources, increased accountability, expectations of leverage, and new ways of doing and using health research, MSFHR is positioned to strike the balance between building capacity for health research across the province, and supporting its application to address priority issues in both the health-care system and in prevention and population health. It will do so by supporting discovery, connecting knowledge with its use to address key priorities, and engaging all stakeholders to ensure the health research system continues to thrive in BC.

To learn more, visit www.msfhr.org

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SUPPLIED BY

Providence Health Care Research Institute

www.providenceresearch.ca

PHCRI: Building an innovative and collaborative system of research and care to solve BC's health challenges

Founded in 2005, Providence Health Care Research Institute (PHCRI) is the research enterprise of Providence Health Care (PHC) and research partner to the University of British Columbia and Simon Fraser University. We facilitate research for PHC's populations of emphasis. Our vision is to cultivate a healthcare culture where all levels of research scientists, care providers and the patient public collaborate to address our province's health priorities, and to achieve a healthcare system that proactively responds to our rapidly evolving healthcare landscape.

In under a decade, PHCRI researchers have garnered nearly \$300 million in funding from external agencies thanks to the work of over 200 researchers and our renowned research centres: BC Centre for Excellence in HIV/AIDS (BC-CfE), Centre for Heart Lung Innovation (HLI); Centre for Health Evaluation and Outcome Sciences (CHÉOS), Centre of Excellence for Prevention of Organ Failure (PROOF Centre) and Centre for Heart Valve Innovation. Our research discoveries have a lasting impact on health and policy, positioning BC as an ardent participant in the quest for innovation and sustainable health.

Global impact: Treatment as Prevention®

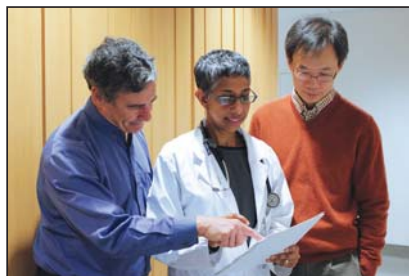
Pioneered at the BC-CfE, the Treatment as Prevention® (TasP®) strategy is a life-saving approach to combating HIV and AIDS. TasP® consists of widespread HIV testing and the immediate offer of highly active antiretroviral therapy (HAART) to those who test positive. This approach has greatly improved patient quality of life and longevity, while drastically lowering the risk of HIV transmission. In BC, implementation of TasP® has reduced HIV morbidity and mortality, and in new cases of the disease. TasP® has been internationally recognized and adopted by countries such as China, France, Brazil, and forms the basis of the UNAIDS 90-90-90 strategy to eliminate HIV worldwide by 2030.

Advancing Personalized Medicine to Treat All Patients

Since 1999, the BC-CfE have used DNA sequencing to identify specific virus variants in patients to tailor HIV drug therapies. Such methods of testing have since been adopted by laboratories around the world. A similar approach is now used to screen Hepatitis C patients to determine individual response to treatment.

PROOF Centre's biomarker programs develop clinically relevant, -OMICS-derived diagnostic, prognostic and monitoring blood tests for early detection of serious conditions including chronic heart failure, transplant rejections, chronic kidney and lung disease.

The HLI Centre, in collaboration with PROOF, adopts a



multi-OMICS systems biology approach to develop highly translatable personalized medicine solutions for heart, lung and blood vessel research. Such research has placed PHCRI and UBC in the top 3 institutions worldwide for impact on Chronic Obstructive Pulmonary Disease (COPD).

CHÉOS evaluate drugs and surveillance tools that incorporate genetic information, as well as barriers to the uptake of

personalized medicine in clinical practice. They support a fellowship in personalized medicine, training future generations in this increasingly important area of focus.

Translating Knowledge to Practice for Better Patient Outcomes

We are committed to improving patient outcomes through knowledge translation. Driven by this notion, the Practice-Based Research Challenge program provides point-of-care clinicians with the tools to design and conduct research in a mentored environment. This initiative has increased practitioner knowledge of research methods and led to improved practice and real health results.

Patients with severe heart conditions have benefited from the research conducted at the Centre for Heart Valve Innovation. The minimally invasive Transcatheter Aortic Valve Implantation (TAVI) procedure, pioneered at the centre, has saved patients with complex heart conditions and reduced recovery time.

eHealth: Stretching Boundaries of Care

eHealth in practice and administration of health care has increased accessibility to efficient and timely care. Programs such as the Rapid Access to Consultative Expertise (RACE) connect family physicians and patients directly to specialists across the region, leading to a reduction of emergency room visits. Web-based programs such as the Virtual Heart Function Clinic allow patients to self-manage their health and nurses to remotely monitor patient statistics.

Supporting Research Excellence

We encourage interdisciplinary collaboration at PHCRI. Researchers receive methodological, statistical, health economics and clinical trial logistics support through CHÉOS, whose dual role as an academic research organization and service provider helps ensure our researchers achieve success.

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Communications Coordinator
research@providencehealth.bc.ca



**PROVIDENCE HEALTH CARE
Research Institute**

Pursuing real life health solutions.

SUPPLIED BY

STEMCELL Technologies Inc.

www.stemcell.com

STEMCELL Technologies Inc – Advancing the Pursuit of Scientific Knowledge

Even in the early days of his career as a cancer researcher and hematologist at Vancouver's Terry Fox laboratories, which he had recently founded with his wife Connie, Allen Eaves recognized that, just like gourmet cooking requires the best ingredients, quality science requires the best reagents. In this sense, it was out of necessity that their research group started producing their own cell culture media using the purest, most reliable components they could find. There was simply no equivalent product available for purchase.

By 1990, colleagues around the world had caught on, and were lining up to buy any excess media to grow blood-forming stem cells. Thus, in 1993, with a loan from Western Economic Diversification and a second mortgage on Eaves' house, STEMCELL Technologies Inc. was born. With only eight employees and one product line, the company reached \$1 million in revenue that year, and has since grown rapidly and steadily. This year, STEMCELL is projected see sales reach \$100 million through its offering of over 2000 products. The company now conducts business in 80 countries and employs 650 people, 500 of whom are in Vancouver.

STEMCELL remains the largest biotech company in Canada, and continues to strive to make Vancouver a science hub by attracting world class scientists and supporting the careers of local science graduates. Last spring, STEMCELL was the platinum sponsor for the International Society for Stem Cell Research's annual meeting, helping to draw this large, prestigious conference to the Vancouver Convention Centre.

Since its inception, STEMCELL has supported the burgeoning cell biology, immunology and stem cell research fields by diversifying and expanding its product lines. In the mid-1990s, the company licensed a platform that provided an efficient and robust technology for isolating cells from whole blood, which led to a full line of novel cell separation products (StemSep™, RosetteSep™, SpinSep™ and EasySep™). Today, STEMCELL's cell separation products account for almost half of the company's annual revenue.

STEMCELL's success with cell isolation tools spawned the development of RoboSep™ – the first totally automated cell separation system. Subsequently, the instrumentation line was expanded with STEMVision, which enables automated and standardized counting of mature blood cell colonies produced by growing human hematopoietic stem and progenitor cells in the company's pioneering methylcellulose-based media (MethoCult™).

STEMCELL next focused on producing media to grow embryonic and induced pluripotent stem cells. Still made using rigorously pre-screened materials to ensure the highest levels of batch-to-batch consistency and experimental reproducibility, the TeSR product family offers a suite of cell maintenance and reprogram-



ming media, including mTeSR-1™, which is the most published media for culturing human pluripotent stem cells. STEMCELL has since begun offering standardized media for growing stem and progenitor cells from other tissue types, including neural, pancreatic, intestinal, lung, breast, prostate, muscle, mesenchymal and endothelial tissues.

In 2008, STEMCELL achieved ISO 13485:2003 certification for its research, manufacturing and shipping facilities in Vancouver, Seattle, and Grenoble. The company is always increasing levels of regulatory compliance, and now has the capacity to produce specific products under cGMP. Currently, its media is being used in 20 different clinical trials.

Continuously working to advance basic and clinical health sciences research, STEMCELL has launched several spin-off services to support scientists away from the bench. STEMSOFT Software Inc. provides software for managing data in bone marrow transplant programs, cord blood centers, cell processing facilities and tissue repositories. Similarly, Malachite Management Inc., a society and meeting management company, helps connect biomedical professionals with the resources needed to move their areas forward. Finally, Connexon Creative Inc., a free online science communications service, keeps the scientific community current with the latest research and industry news in their fields by publishing 15 weekly science newsletters with more than 60,000 subscriptions combined.

In providing the highest quality reagents and tools, STEMCELL is able to take a substantial burden off of researchers by simply helping to ensure that their experiments work. That's why the tagline "**Scientists Helping Scientists™**" fits so perfectly. From the knowledgeable Sales team and industry-leading R&D scientists, to the expert Manufacturing, QC, QA, Technical Support and Education groups, the entire company shares the genuine passion for the uncompromising pursuit of scientific knowledge that drove Allen Eaves to make his first batches of homemade cell culture media so many years ago. The goal now is to have STEMCELL products in every lab throughout the world, helping researchers understand and cure diseases using cellular therapies such as immunotherapy, regenerative medicine, tissue engineering and gene therapy.

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604-675-7973



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Life sciences companies at a glance

BIOPHARMACEUTICAL COMPANIES

Please refer to www.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	•										•						•			•	•		•			
Accel-Rx		•	•						•		•	•		•	•	•	•			•	•	•	•	•	•	•
Aequus Pharmaceuticals	•										•			•												•
Alectos Therapeutics	•	•									•										•					•
Amgen British Columbia	•	•	•	•	•	•					•															•
Aquinox Pharmaceuticals Inc.				•							•													•		
Aspect Biosystems Ltd.							•				•										•	•		•		
Augurex Life Sciences Corp.	•								•		•								•	•						
Aurinia Pharmaceuticals Inc.				•							•									•				•		
BioMark Diagnostics Inc.					•				•								•	•			•					
Boehringer-Ingelheim Inc. Canada	•	•	•	•	•	•	•				•									•	•	•	•	•	•	•
Bovacor Pharmatech Inc.				•							•												•			
Cardiome Pharma Corp.		•	•	•	•						•											•				
CDRD and CVI	•	•							•		•			•		•	•			•	•	•	•	•	•	•
Celator Pharmaceuticals				•	•						•			•												
Contextual Genomics				•	•	•		•	•							•		•			•					
DelMar Pharmaceuticals	•	•	•	•							•										•					
ESSA Pharma Inc.		•																								
Eupraxia Pharmaceuticals	•	•	•																							
Genzyme Canada (a Sanofi company)		•	•	•	•	•	•													•	•				•	•
iCo Therapeutics Inc.		•		•							•			•									•	•		
ImStar Therapeutics Inc.	•	•									•															•
Inception Sciences Canada	•	•									•															•
InMed Pharmaceuticals	•	•	•								•									•	•			•	•	•
Innovative Targeting Solutions Inc.	•	•									•									•	•		•	•	•	
iProgen Biotech Inc.	•										•			•						•	•	•	•	•	•	•
MedGenesis Therapeutix Inc.				•							•			•												•
Merck & Co.	•	•	•	•	•	•					•	•								•	•	•	•	•	•	•
MRM Proteomics Inc.	•	•					•		•		•						•	•	•	•	•	•	•	•	•	•
MSI Methylation Sciences Inc.		•		•							•															•
Network Immunology Inc.	•	•									•	•							•	•			•	•		
Neurodyn Life Sciences Inc.	•	•	•								•															•
Novartis Pharma	•	•	•	•	•	•					•	•		•	•					•	•	•	•	•	•	•
OncoGenex Pharmaceuticals Inc.	•	•	•	•	•						•			•		•					•					
Ondine Biomedical Inc.		•	•	•	•	•					•										•		•	•		
Patheon		•	•	•	•	•	•				•		•	•			•			•	•	•	•	•	•	•
Pfizer Canada	•	•	•	•	•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•		•	•	•
Phyton Biotech LLC						•															•					
Precision NanoSystems Inc.	•										•			•	•	•		•		•	•	•	•	•	•	•
ProNAi Therapeutics Inc.				•							•										•					
Qu Biologics Inc.	•	•	•	•							•									•	•			•		

BIOPHARMACEUTICAL COMPANIES

Please refer to www.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
RepliCel Life Sciences Inc.			•	•							•				•					•				•		
Sirona Biochem Corp.	•	•					•				•													•	•	
SOHO Biotech Inc.									•																	
Stemcell Technologies Inc.		•				•	•						•					•		•	•	•	•	•		•
Symvivo Inc.	•	•									•			•	•											
Tait Laboratories Inc.	•					•	•				•		•			•			•	•				•	•	•
Tekmira Pharmaceuticals	•	•	•	•							•			•							•		•		•	
viDA Therapeutics		*									*									*				*		
Xenon Pharmaceuticals Inc.	•	•	•	•		•		•	•		•		•	•	•							•			•	•
Zymeworks Inc.	•	•					•	•			•									•	•			•		

CONTRACT RESEARCH ORGANIZATIONS

Please refer to www.lifesciencesbc.ca for further information on these companies

	Preclinical services						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	Sterilization	Communications		
Aurora Biomed Inc.	•		•	•		•									•								
BioPharma Solutions													•										
BRI Biopharmaceutical Research Inc.	•		•	•		•						•	•			•	•	•					
Bridge Solutions Group													•				•						
Canadian External Quality Assessment Laboratory (CEQAL)	•			•			•	•	•	•													
Emergo										•	•	•	•	•				•	•				
Emmes Canada		•					•	•	•	•	•	•	•	•				•	•				
IonsGate Preclinical Services Inc.	•					•																	
Iotron Industries Canada Inc.																				•			
MPI Research Inc.	•		•	•	•	•					•							•					
Northern Lipids Inc.	•			•									•		•	•	•						
Northview Ventures													•										
Patheon				•											•	•	•	•					
PI Pharma Inventor Inc.	•														•	•	•	•					
Reva Solutions (Canada) Ltd.														•		•	•	•					
Samuel Mercer Consulting													•			•							
Tantalus Medical Communications																						•	
The Clinical Trial Company (Canada) Ltd.							•	•	•	•	•	•	•	•			•	•	•				
True North Synergy Inc.													•	•		•							
Viable Healthworks Corp.							•	•	•	•	•	•	•	•	•	•	•	•	•				
Wax-it Histology Services Inc.	•					•	•						•				•						

Life sciences companies at a glance

MEDICAL DEVICES

Please refer to www.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.	•									•
Boreal Genomics		•						•		•
Conquer Mobile							Simulation tools to educate clinicians and patients			***
DTG Partners							Medical product development and quality/regulatory consulting			
Farabloc Development Corp.			•					•	•	•
Innovatek Medical Inc.				•				•		
Kardium Inc.		•				•		•		•
LightIntegra Technology				•		•	Transfusion			•
LionsGate Technologies Inc. (LGTmedical)		•						•	•	•
Lungpacer Medical Inc.		•	•			•	Implantable, transvascular, stimulation			•
MetaOptima Technology Inc.					•	•	Dermoscopy			•
Neovasc Inc.		•	•			•	Contract manufacturing	•		•
Novadaq Technologies Inc.					•			•		•
ReFlex Wireless Inc.		•	•			•	Health data hosting services	•	•	•
Response Biomedical Corp.		•		•			Cardiac, infectious disease, biodefence, environmental	•	•	•
Sorin Group Canada Inc.		•	•	•	•	•	Medical device, contract manufacturing	•		•
StarFish Medical	•	•	•	•		•	Airway management	•		•
Tel-Array Diagnostics Inc.		•					Point-of-care diagnostic device			•
Verisante Technology Inc.		•						•	•	•
ViewsIQ Inc.		•			•			•	•	•

Qu Crohn's Trial



Do you have **Crohn's** disease?
Are you aged 19 or older?

Qu Biologics is recruiting for a Phase 1/2 clinical research trial for people living with moderate to severe Crohn's disease.

Qu Biologics is working to develop a new platform of immunotherapeutic treatments. Our novel Site Specific Immunomodulators (SSIs) are being designed with the goal of **activating the body's immune system to reverse the chronic inflammation** underlying many conditions such as Crohn's disease.

To learn more about the trial and complete an online pre-screening questionnaire to assess your eligibility, visit www.qucrohnstrial.com.



Scan here
to visit website

The clinical research trial takes place in Vancouver, BC.

For more information, call **1.855.209.9680**
or email qucrohnstrial.aa@gmail.com

Don't miss your opportunity to learn more about this fresh approach to better health.



Blood
travels
through
100,000
miles of
blood
vessels
in the
average
human
body.



Is it any wonder that blood carries important information about the body's vital organs?

The Centre of Excellence for Prevention of Organ Failure (PROOF Centre) specializes in extracting high value information contained in blood. By analyzing molecular signatures from the blood of patients, those at risk for disease, and healthy individuals, the PROOF Centre develops much needed blood tests that clinicians use to better manage heart, lung and kidney disease. Patients further benefit as diagnostic and pharmaceutical companies use PROOF-patented molecular signatures to develop new and better laboratory tools and medicines.

Partner with us on our quest to improve the lives of patients afflicted with organ failure. Call 604-682-2344 ext 63729.

www.proofcentre.ca



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EXCELLENCE

*Biomarqueurs
– Solutions en soins
de santé.*

*Biomarker
solutions for
health care.*

Biggest life sciences companies in B.C.

RANKED BY | Number of R&D employees in 2014

Rank '15	Company	Top local executive(s)	Areas of research	Ownership	Year founded	No. staff globally '14/'13	No. B.C. staff '14/'13	No. R&D staff '14/'13
1	Stemcell Technologies Inc 570 7th Ave W Suite 400, Vancouver V5Z 1B3 P: 604-877-0713 F: 604-675-7830 www.stemcell.com	Allen Eaves , president and CEO	Stem cell biology focused on hematology, immunology, neurobiology, breast, prostate, pancreas, regenerative medicine and tissue engineering	Privately held; Allen Eaves	1993	496 485	482 380	188 141
2	Kardium Inc 8518 Glenlyon Parkway Suite 155, Burnaby V5J 0B6 P: 604-248-8891 F: 604-304-3478 www.kardium.com	Doug Goertzen , CEO	Cardiovascular	Privately held	2007	NP 86	89 86	77 75
3	Tekmira Pharmaceuticals Corp 8900 Glenlyon Pkwy Suite 100, Burnaby V5J 5J8 P: 604-419-3200 F: 604-419-3201 www.tekmira.com	Mark Murray , president and CEO	RNA interference (RNAi) therapeutics	TSX:TKM; Nasdaq:TKMR; widely held	1992	103 83	99 78	75 65
4	Amgen British Columbia Inc 7990 Enterprise St, Burnaby V5A 1V7 P: 604-676-8300 F: 604-676-8349 www.amgen.com	John Delaney , director of research	Antibody therapeutics for the treatment of oncology, inflammation and infectious diseases	Nasdaq:AMGN; Amgen Inc	1980	20,000 18,000	63 63	50¹ 50 ²
5	Xenon Pharmaceuticals Inc 3650 Gilmore Way Suite 200, Burnaby V5G 4W8 P: 604-484-3300 F: 604-484-3450 www.xenon-pharma.com	Simon Pimstone , president and CEO	Pain, epilepsy, dermatology	Nasdaq:XENE	1996	71 NP	71 NP	48 50 ¹
6	Zymeworks Inc 1385 8th Ave W Suite 540, Vancouver V6H 3V9 P: 604-678-1388 F: 604-737-7077 www.zymeworks.com	Ali Tehrani , president and CEO	Antibody and protein therapeutics development for oncology, autoimmunity and anti-inflammation applications	Privately held	2003	52 43	46 43	46 34
7	ABM Applied Biological Materials Inc 13520 Crestwood Pl Suite 8, Richmond V6V 2G2 P: 604-247-2416 F: 604-247-2414 www.abmgood.com	Peter Li , CEO, Lisa Young , chief operating officer, Jun Li , chief scientific officer	Expression libraries for ORF, siRNA and miRNA; lentivirus and adenovirus systems; cell immortalization; stem cells; next-generation sequencing	Privately held; Peter Li	2004	71 63	46 43	32 30
8	Neovasc Inc 13700 Mayfield Pl Suite 2135, Richmond V6V 2E4 P: 604-270-4344 F: 604-270-4384 www.neovasc.com	Alexei Marko , 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	133 145	132 140	25¹ 28
9	Response Biomedical Corp 1781 75th Ave W, Vancouver V6P 6P2 P: 604-456-6010 F: 604-456-6066 www.responsebio.com	Anthony Holler , interim CEO	Rapid immunoassay diagnostics for clinical cardiovascular applications, environmental infectious disease testing and biothreat identification	TSX:RBM	1991	66 67	65 63	15¹ 15
10	Aquinox Pharmaceuticals Inc 887 Great Northern Way Suite 450, Vancouver V5T 4T5 P: 604-629-9223 F: 778-331-4486 www.aqxpharma.com	David Main , president and CEO	Discovering and developing targeted therapeutics in disease areas of inflammation and immuno-oncology that target SH2-containing inositol-5'-phosphatase 1, or SHIP1, a key regulator of an important cellular signalling pathway in immune cells, known as the PI3K pathway	Nasdaq:AXXP	2006	23 12	23 12	11 7
11	Kinexus Bioinformatics Corp 8755 Ash St Suite 1, Vancouver V6P 6T3 P: 604-323-2547 F: 604-323-2548 www.kinexus.ca	Steven Pelech , president and CSO	Proteomics and bioinformatics products and services	Privately held; Steven Pelech	1999	14 15	14 15	10 11
12	Qu Biologics Inc 887 Great Northern Way Suite 138, Vancouver V5T 4T5 P: 604-734-1450 F: 604-676-2235 www.qubiologics.com	Hal Gunn , CEO	Treatment of cancer and immune-related diseases such as Crohn's disease and ulcerative colitis	Privately held; Hal Gunn	2007	16 9	14 9	9 7
13	CICTAN Health Group Corp 4238 Lozells Ave Suite 109, Burnaby V5A 0C4 P: 604-420-4999 F: 604-420-7072 www.cictanhealth.com	Fuchang He , president	Natural health products, personal skin care products, water devices, food and drink sciences	Privately held	NP	24 20	10 8	8 6
14	Alectos Therapeutics 8999 Nelson Way, Burnaby V5A 4B5 P: 604-628-7129 F: 604-628-0137 www.alectos.com	Ernest McEachern , president and CEO	Neuroscience, oncology	Privately held	2007	NP NP	NP NP	7 7
14	MSI Methylation Sciences Inc 4475 Wayburne Dr Unit 108, Burnaby V5G 4X4 P: 604-435-5155 F: 604-435-5110 www.methylationsciences.com	Barry Guld , CEO	Depression	Privately held	2007	NP 11	NP 10	7¹ 7
16	Celator Pharmaceuticals 1140 Pender St W Suite 810, Vancouver V6E 4G1 P: 604-708-5858 F: 604-708-5883 www.celatorpharma.com	Lawrence Mayer , president and chief scientific officer	Advanced cancer therapies	Privately held	2000	35 NP	18 ¹ NP	5¹ 5 ¹
16	Innovative Targeting Solutions Inc 4475 Wayburne Dr Suite 309, Burnaby V5G 4X4 P: 604-433-6779 F: 604-433-6779 www.innovativetargeting.com	Michael Gallo , president	NP	NP	2008	5 NP	5 NP	5 NP
18	MRM Proteomics Inc 4464 Markham St Suite 2108, Victoria V8Z 7X8 P: 604-800-2296 F: 604-800-2297 www.mrmproteomics.com	Christoph Borchers , chief scientific officer	Proteomics (large-scale study of proteins)	Privately held; Christoph Borchers	2010	6 3	6 3	3 1

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 1 - BIV estimate 2 - 2012 figure 3 - 2013 figure

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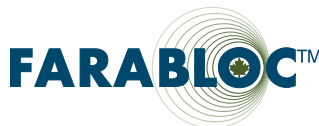
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604-669-0674 www.bioluxresearch.com

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604-522-8303 www.innovatekmed.com

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604-248-8891 www.kardium.com

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604-734-3548 www.lightintegra.com

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866-944-8607 www.lgtmedical.com

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778-782-3141 www.lungpacer.com

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www.aspectbiosystems.com



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2014

Investments into British Columbia's life sciences sector

<i>Date</i>	<i>Company/Organization</i>	<i>Type of investment</i>	<i>Amount (CAD)</i>
January 9	Zymeworks Inc.	Private placement	\$15 million
January 21	Tekmira Pharmaceuticals Corp.	Milestone payment from monsanto	\$14.5 million
January 21	CardioComm Solutions	Private placement	\$109,500
January 28	iCo Therapeutics Inc.	Equity financing	\$6.75 million
January 30	CardioComm Solutions	Private placement	\$178,740
February 18	Aurinia Pharmaceuticals Inc.	Private placement	\$56.9 million
March 6	Sirona Biochem Corp.	Private placement	\$1.2 million
March 11	Cardiome Pharma Corp.	Primary/secondary offering	\$30 million
March 12	Aquinox Pharmaceuticals Inc.	Initial public offering	\$53.1 million
March 18	Tekmira Pharmaceuticals Corp.	Public offering	\$60.56 million
March 20	Verisante Technology Inc.	Private placement	\$480,590
March 24	PHEMI Health Systems	Seed financing	\$2.8 million
March 26	Neovasc Inc.	Public offering	\$25.2 million
April 8	Nuva Pharmaceuticals	Private placement	\$375,000
May 9	RepliCel Life Sciences Inc.	Private placement	\$2.79 million
May 28	RepliCel Life Sciences Inc.	Private placement	\$552,750
June 20	RepliCel Life Sciences Inc.	Private placement	\$649,500
June 26	Verisante Technology Inc.	Private placement	\$300,000
June 26	OncoGenex Pharmaceuticals Inc.	Registered direct offering	\$24 million
July 9	Tekmira Pharmaceuticals Corp.	Milestone payment from monsanto	\$1.5 million
July 24	CardioComm Solutions	Private placement	\$165,000
July 30	CardioComm Solutions	Private placement	\$30,000
August 12	Sirona Biochem Corp.	No-interest loan from bpifrance	\$1.2 million
August 25	Accel-Rx (CDRD)	Federal funding	\$14.5 million
August 29	biOasis Technologies Inc.	Private placement	\$1.6 million
September 5	Eastwood Bio-Medical Canada Inc.	Initial public offering	\$783,850
September 8	T-Bird Pharma Inc.	Private placement	\$3 million
September 15	Michael Smith Foundation for Health Research	Provincial funding	\$11 million
September 17	Qu Biologics	Private financing	\$5.1 million
September 25	Stemcell Technologies	Western innovation initiative	\$950,000
October 8	Med BioGene Inc.	Private placement	\$200,000
October 17	Verisante Technology Inc.	Private placement	\$350,000
November 10	Xenon Pharmaceuticals Inc.	Initial public offering	\$41.4 million
November 25	Zecotek Photonics	Private placement	\$2.8 million
November 27	Zecotek Photonics	Private placement	\$1.75 million
December 2	CRH Medical	Private placement	\$5.7 million
December 2	BriaCell Therapeutics	Private placement	\$2.2 million
December 4	NeutriSci International	Private placement	\$4.3 million
December 10	Vanc Pharmaceuticals	Private placement	\$1.1 million
December 12	Response Biomedical	Private placement	\$2.2 million
December 19	Zymeworks Inc.	Private placement	\$4 million





17TH ANNUAL LIFESCIENCES BC AWARD RECIPIENTS

Presented by Farris, Vaughn, Wills and Murphy LLP

LIFESCIENCES COMPANY OF THE YEAR AWARD



Stemcell Technologies Inc.

Allen Eaves launched Stemcell Technologies Inc. in 1993 as a way of providing standardized, cost-effective cell culture media for growing blood-forming stem cells to the global hematology research community. In its first year, with only eight employees and one product line, the company generated \$1 million in sales. This year, after 22 years of rapid and steady growth, Stemcell is projected to see sales reach \$100 million. The company currently conducts business in 80 countries and employs 650 people, 500 of whom are based in Vancouver. Stemcell remains the largest biotech company in Canada and continues to strive to make Vancouver a science hub by attracting world-class scientists and supporting the careers of local science graduates.

Stemcell has expanded its catalogue to more than 2,000 products and now offers standardized media for growing embryonic and induced pluripotent stem cells, as well as stem and progenitor cells from non-blood-forming tissue types, including neural, pancreatic, intestinal, lung, breast, prostate, muscle, mesenchymal and endothelial tissues. The company's extensive array of cell separation reagents, tools and instruments allow immunology and other biomedical researchers to rapidly and efficiently separate and enrich most types of cells. The goal is to have Stemcell products in every lab throughout the world, helping researchers understand and cure diseases using cellular therapies such as immunotherapy, regenerative medicine, tissue engineering and gene therapy.

Each of Stemcell's products has been expertly developed by the company's team of R&D scientists and is produced using rigorously pre-screened materials to ensure the highest levels of quality and batch-to-batch consistency. This way, Stemcell is able to take a substantial burden off of researchers by increasing the efficiency and reproducibility of their work. Motivated by a genuine passion for the uncompromising pursuit of scientific knowledge and excellence, Stemcell sees itself simply as a company of Scientists Helping Scientists™.

MEDICAL TECHNOLOGY COMPANY OF THE YEAR



Kardium Inc.

Kardium is a medical device company in Vancouver, working on a revolutionary treatment for a heart rhythm disorder called atrial fibrillation.

Atrial fibrillation is a heart disease that is a growing epidemic affecting over 40 million people worldwide. The major risk associated with atrial fibrillation is a 500 per cent increased likelihood of stroke. Atrial fibrillation is primarily treated today by using a catheter with a single electrode to create lesions in the patient's atrium.

Kardium has assembled a world-class team of engineers, researchers and developers in Vancouver to develop the Globe mapping and ablation system, which will be used to treat atrial fibrillation. The Globe system is a sophisticated electromechanical catheter, driven by advanced software, all developed and manufactured by the Kardium team in Vancouver.

The Globe catheter has 275 electrodes that are deployed in an expanding array, into the patient's atrium. This array of electrodes allows the physician to easily create maps of the atrial anatomy and simultaneously map the complete electrical activity of the atrium. The physician can then use the electrodes to easily create all the necessary lesions, treating the atrial fibrillation with a single device.

The first human patients were recently treated with the Globe system in Zurich, Switzerland, by Dr. Hans Kottkamp, a world leader in the treatment of atrial fibrillation. This successful study represented a major milestone for Kardium. Further clinical studies are scheduled to take place in Europe later this year, with more of the global leaders in treating atrial fibrillation.

Kardium expects the Globe system will have a major impact on the diagnosis and treatment of atrial fibrillation in the future.

GROWTH-STAGE LIFE SCIENCES COMPANY OF THE YEAR



Qu Biologics Inc.

Qu Biologics is at the forefront of a paradigm shift in the way we treat cancer and other immune-related disease. Rather than blocking or stimulating a single specific receptor or pathway, the company's site specific immunomodulators (SSIs) aim to restore the body's normal immune response.

Qu Biologics has discovered how our body's immune response to acute infection helps our body clear cancer and other chronic inflammatory diseases. SSIs, which are derived from components of inactivated common bacteria, are designed to activate the body's innate immune response and restore normal immune function in the targeted organ or tissue to reverse the chronic inflammation underlying many chronic diseases including cancer, inflammatory bowel disease and other immune-related conditions. By restoring and empowering your own immune system, SSIs are designed to treat disease differently.

Qu Biologics is currently conducting a placebo-controlled clinical trial for Crohn's disease with primary end-point results anticipated in Q3 2015. A Phase 2A clinical trial in recurrent lung cancer is also currently underway to study immunological end points associated with SSI treatment. We are also planning to begin an ulcerative colitis clinical trial in Q2 2015.

Backed by a prestigious group of scientific advisers and board members, Qu Biologics is led by a management team that includes co-founder and CEO Dr. Hal Gunn, a physician and expert on the body's immune response to chronic disease, chief medical officer Dr. Simon Sutcliffe, former CEO of the BC Cancer Agency and a distinguished clinician, scientist and leader in cancer control internationally, and chief scientific officer Dr. David Mullins, assistant professor of microbiology and Immunology in the Norris Cotton Cancer Center at the Geisel School of Medicine at Dartmouth, and a recognized expert in immune cell trafficking to tumours. For more information, visit www.qubiologics.com.

LifeSciences BC is pleased to announce the recipients of the 17th Annual LifeSciences BC Awards. These awards are presented annually to recognize individuals and companies who have made a significant contribution to research and excellence in B.C.'s life sciences industry.

AWARD FOR CLINICAL RESEARCH EXCELLENCE



BRITISH COLUMBIA
CENTRE for EXCELLENCE
in HIV/AIDS

BC Centre for Excellence in HIV/AIDS

By 1990 it was globally recognized HIV represented a pandemic of catastrophic proportions and exceptional interventions would be needed to stem the growth of new HIV infections and AIDS deaths. As a result, in 1992 the B.C. Ministry of Health established the BC Centre for Excellence in HIV/AIDS (BC-CfE) to lead the fight against HIV and AIDS in the province.

Soon thereafter, in 1996 the BC-CfE, led by Dr. Julio Montaner, discovered a triple drug combination treatment known as highly active antiretroviral therapy (HAART). HAART was a game-changer: it virtually stopped progression of HIV infection to AIDS and AIDS-related premature death.

In 2006, under the leadership of Dr. Montaner, the BC-CfE introduced to the world Treatment as Prevention (TasP). This was based on the recognition that HAART not only prevented AIDS and premature death, but also fully prevented HIV transmission and represented a life saving and cost-saving strategy. It was a defining moment for the control of HIV and AIDS, in B.C. and Canada and worldwide. In September 2014, the UN secretary general formally embraced the made-in-B.C. strategy as the cornerstone of the global fight against HIV and AIDS.

Based on the lessons learned in the implementation of TasP for HIV and AIDS in B.C., the BC-CfE is currently exploring the potential impact of expanding TasP to other high-burden diseases. Indeed, we now view TasP as a strategy adaptable to achieving targeted disease elimination, particularly to other communicable infectious (e.g. hepatitis, TB, STIs) and non-infectious (e.g. addictions, obesity or smoking-related diseases) conditions. Expanded use of TasP as a means to achieve targeted disease elimination provides a unique opportunity to promote health care sustainability.

GENOME BRITISH COLUMBIA AWARD FOR SCIENTIFIC EXCELLENCE

Dr. Mel Krajden, medical head, hepatitis, BC Centre for Disease Control; associate medical director, BCCDC Public Health Microbiology and Reference Laboratory; professor of pathology and laboratory medicine, University of British Columbia.



Dr. Krajden's work on viral diseases such as HIV, human papilloma virus, influenza and especially hepatitis is known nationally and internationally. He has received over \$15 million in peer-reviewed and contract funding, with much of his research focused on translating scientific discoveries into tests that improve diagnosis, monitoring and treatment.

He has served on numerous organizations and is the author of 227 peer-reviewed publications.

Over the past 25 years he has witnessed how the power of genomics led to the identification of hepatitis C that infects about one per cent of Canadians. Modern drug design has now enabled the development of new, well-tolerated, short-course treatments that can cure greater than 95 per cent of hepatitis C infections.

As these drugs become available in the coming year, Dr. Krajden and his team are applying state of the art genomic tools to distinguish new infections from old ones and determine how hepatitis C is spread within transmission networks. He also spearheads a linked laboratory and administrative database initiative focused on the assessment of population level outcomes. This database initiative, involving the health authorities and the BC Centre for Excellence in HIV/AIDS, will enable British Columbia to design and evaluate hepatitis C prevention, care and treatment interventions. This lays the foundation for eliminating hepatitis C in B.C. over the next 10 to 15 years.

"It has been a long haul, and there is much more to be done – but I am grateful to be surrounded by so many dedicated people who really care about translating science into better health outcomes."

MILTON WONG AWARD FOR LEADERSHIP

Dr. Pieter Cullis, professor and director, Life Sciences Institute, UBC; chair and co-founder, Personalized Medicine Initiative (PMI)



Dr. Pieter Cullis is a highly regarded scientist, visionary and serial entrepreneur. He has been active in the development of several successful biotechnology and personalized medicine companies (nine total) and is recognized as a remarkable researcher (300 scientific articles) and innovator (47 patents).

Dr. Cullis and his lab pioneered the field of liposomal nanoparticulate (LNP) drug delivery systems, which led to three approved drugs in Canada, the U.S. and Europe for treatment of cancer and its complications, with another five drugs in various phases of clinical development. He was the founding scientific director of the Centre for Drug Research and Development (2004-10), a Centre of Excellence for Commercialization and Research (CECR), demonstrating his considerable ability in starting and leading a successful CECR.

Dr. Cullis has received many prestigious awards including the BC Science Council Gold Medal for Health Sciences (1991), the Alec D. Bangham Award for contributions to liposome science and technology (2000), the BC Biotechnology Association Award for Innovation and Achievement (2002), the Leadership Award of the Canadian Society for Pharmaceutical Sciences (2010), and the Prix Galien, Canada's premier prize for achievements in pharmaceutical R&D (2011). He was elected a fellow of the Royal Society of Canada in 2004.

17th Annual LifeSciences BC Award Recipients

CORPORATE PARTNER/ ADVISOR OF THE YEAR

Joseph Garcia, Director of Genome BC, Director Emeritus of LifeSciences BC and member of the BIOTEC Canada Legal Affairs Advisory Board, Partner, Blake, Cassels & Graydon LLP



Joseph Garcia is a partner who practises in the areas of corporate finance and mergers & acquisitions at Blake, Cassels & Graydon LLP. Joseph advises high growth public and private companies, underwriters, pension funds, private equity groups, and venture capital investors on complex domestic and cross-border private and public securities offerings, mergers & acquisitions, and international commercial transactions. He advises clients in a variety of industries, including life sciences, technology, retail, mining and clean technology.

Prior to his career in law, Joseph worked in corporate finance with a national underwriter and in clinical research with a large pharmaceutical company.

Joseph is a Director of Genome BC, Director Emeritus of LifeSciences BC and member of the BIOTEC Canada Legal Affairs Advisory Board. Joseph is featured as a leading lawyer in numerous publications including The 2014 Lexpert Guide to the Leading US/Canada Cross-Border Corporate Lawyers in Canada, The Canadian Legal Lexpert® Directory 2015, The Best Lawyers in Canada 2015, The 2011 Lexpert®/American Lawyer Guide to the Leading 500 Lawyers in Canada, Lexpert's Special Edition on Energy, November 2014, and LMG Life Sciences: The Definitive Guide to the Leading Life Sciences Firms and Attorneys in North America 2014.

Joseph has a BSc (Honours) in pharmacology and human biology from the University of Toronto, a BA in economics (health care) from McMaster University and a LLB from the University of British Columbia. He was admitted to the British Columbia Bar in 1997.

DR. DON RIX AWARD FOR LIFETIME ACHIEVEMENT

Dr. Simon Sutcliffe, Adjunct Clinical Professor, UBC, Associate Scientist, Michael Smith Genome Sciences Centre, BC Cancer Agency



A graduate of St. Bartholomew's Hospital, London, England in 1970, Dr. Sutcliffe's training encompassed internal medicine, scientific research, medical and radiation oncology in the UK, South Africa, US and Canada. Staff appointments have been held at St. Bartholomew's Hospital, Princess Margaret Hospital/Ontario Cancer Institute and the BC Cancer Agency.

He has been President and CEO of the Princess Margaret Hospital/Ontario Cancer Institute (1994-1996) and the BC Cancer Agency (2000-2009). He chairs the Board of the Institute for Health Systems Transformation and Sustainability; is President of the International Cancer Control Congress Association, the International Network for Cancer Treatment and Research-Canada Branch (Two Worlds Cancer Collaboration); is a Senior Advisor to the Terry Fox Research Institute and is Chief Medical Officer for QuBiologics Inc. and Omnitura Inc. He is a past Chair of the Board of the Canadian Partnership Against Cancer (CPAC, 2009-2012), the Michael Smith Foundation for Health Research (MSFHR, 2000-7) and has served on the Boards of CPAC, MSFHR, and Genome BC. He is an Adjunct Clinical Professor at the University of British Columbia and an Associate Scientist with the Michael Smith Genome Sciences Centre at the BC Cancer Agency.

Dr. Sutcliffe was awarded the Queen Elizabeth 50th Jubilee Gold Medal in 2003, and the Terry Fox Award of the BC Medical Association in 2009 for his lifetime services to cancer control.

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

Dr. Adeera Levin, Head, Division of Nephrology, UBC, and Executive Director, BC Provincial Renal Agency



Dr. Levin is a Professor of Medicine, Head of the Division of Nephrology at the University of British Columbia, and Consultant nephrologist at Providence Health Care/St. Paul's Hospital.

Within her mandate is her role as Executive Director of the BC Renal Agency which oversees the care, planning and budgets for kidney services in B.C. In this capacity, she has leveraged her epidemiological training, clinical knowledge and health outcomes research to develop an evidence-based transparent system which enhances the care of patients across the continuum of care (from identification of Chronic Kidney Disease through to dialysis, transplant and death).

Dr. Levin has served as Secretary General of the International Society of Nephrology (ISN), and is now President Elect of ISN.

Her major research areas include non-traditional risk factors for CVD in CKD patients (with particular focus on anemia, phosphate and vitamin D, and progression of CKD variability) and models of care. She has 268 peer reviewed publications and is co-editor of *Chronic Kidney Disease: a practical guide to understanding and management*.

In 2013, she was awarded the Canadian Society of Nephrology Outstanding Contributions to Canadian Nephrology and in 2014, the Kidney Foundation of Canada Research medal of Excellence. She was also awarded a fellowship of the Canadian Academy of Health Sciences. In 2015 she received the National Kidney Foundation's International Distinguished Medal which recognizes those who have made a significant contribution to the field of kidney disease.

She serves on numerous editorial boards and reviews for major kidney and medicine journals. She is the inaugural Editor-in-Chief of the new Canadian Journal of Kidney Health & Disease. She is the Principal Investigator on a large cohort study CAN-PREDDICT, and holds numerous peer reviewed grants.

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