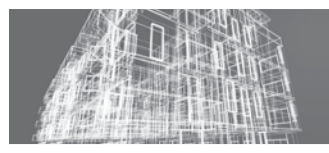




A new era
What is personalized medicine?



Facility funding
Why it's imperative to focus on infrastructure

MEDIA PLANET

December 2011

INVESTING IN LIFE SCIENCES

3
FACTS

ABOUT CANADA'S ROLE IN THIS VITAL INDUSTRY



AFFECTING EVERY SECTOR

From bright minds to the marketplace, innovation creates endless possibilities—and profits



Pierre Meulien
President, Genome Canada

"The life sciences engage research, development, technology transfer and innovation..."



GenomeCanada

Science that powers Innovation
that powers Canada

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CHALLENGES



What are the life sciences? They encompass a wide variety of biological activities. **Not only are they an industry vital to medical advancements, they're imperative to our economy as well.**

Implementing the 21st century solution

Human progress in the last century was marked by advances in science, engineering and technology. As futurist Alvin Toffler noted more than 30 years ago—we are children of the next transformation in the face of fantastic innovation.

The 20th century saw nuclear energy, space flight, telecommunications, medical advances and many extraordinary inventions spark a dynamic shift around the globe in economic and political power.

Waves of change are still surging across the planet. Our universal order has been shaken, however, by major challenges driven by an ever-growing world population that is straining resources of food and energy, and the environment.

The business of biology

Technology remains a great engine of growth but a new driving force has emerged to provide a dramatically different instrument of change. The life sciences, which encompass a vast panorama of biological activities, may well become the means to provide both economic growth and the ability to adapt to the challenges of a complex, troubled world.

Each of dozens of biological applications from regenerative medicine to biofuel production relies on significant investment for research, development, demonstration and deployment. As a result, innovation of this magnitude and intensity requires leadership from every quarter—government, industry, education, medicine—to strengthen the mechanisms necessary to advance sophisticated technologies for the benefit of the global community.

Biotechnology is but a single example of how the life sciences are changing the Canadian landscape. A rapidly maturing Canadian biotechnology industry is fueling, for

instance, new applications in food production, creating crops, plants and trees robust enough to withstand climate change and ensure adequate nutrition for the world's escalating population.

Biotechnology also offers alternate forms of energy in an age of shrinking resources that is further hampered by ongoing environmental damage through toxic discharge, excessive gas emissions and ever-rising pollution levels on land and in precious water resources.

Utilizing Canadian resources and strengths

The life sciences engage research, development, technology transfer and innovation and commercialization in a great number of sectors. In Canada, these activities stretch into mining, health care, forestry, fisheries, agriculture, energy and the environment.

Biophysics, bio-molecular engineering, biochemistry, bio-computing and an entire bio-vocabulary are building a new bio-economy based on biological systems.

Achieving success in the life sciences calls upon us primarily to develop the policies necessary to make sure this next societal revolution can proceed swiftly so that solutions are available in the timeframe they are needed. Numerous challenging decisions lay ahead for governments, the private sector, cities and countries around the world.

Changing practices and technologies require a higher dedication to education with strong incentives for research, planning and action. Public education is important to help dispel fears of a scientific enterprise too few people can comprehend. Close monitoring of each new development to ensure we understand and accept legal, ethical, environmental, economic and social implications are essential.

Canadian researchers are already introducing new ideas on how to translate genetic discoveries, revolutionary

“The life sciences engage research, development, technology transfer and innovation and commercialization in a great number of sectors. In Canada, these activities stretch into mining, health care, forestry, fisheries, agriculture, energy and the environment.”



Pierre Meulien
President,
Genome Canada

microbes and innovative technologies derived in the laboratory into goods and services for the benefit of the Canadian economy and society as a whole.

Supporting the economy

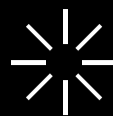
Whole new industries have evolved to support thousands of Canadian workers across the breadth of the economy. Highly skilled jobs in science have fostered new production facilities to support Canada's economy and keep Canada competitive and strong.

Going forward, Canada is armed with an arsenal of advanced technologies and an army of researchers equipped to help play a key role in addressing the most pressing challenges facing society in the 21st century. The multitude of life sciences are becoming widely recognized as a critical foundation for numerous applications that will contribute to the emergency of an internationally competitive Canadian bio-economy.

The Organization for Economic Cooperation and Development (OECD) tells us that the shape of the future economies will depend strongly on breakthroughs in fundamental and applied research in the biological or life sciences, in addition to the opportunities and innovations in regulatory and industry models. The message is very clear. We must act differently and perform differently to transform and protect our livelihood and our future.

Canada is also uniquely positioned in all of this. We have abundant natural resources upon which to build and are adding value to our economy by combining this with our expertise in life sciences to build a strong, prosperous future.

In this special insert, you will read about the importance of investing into our life sciences field financially, developing infrastructure, developing talent and fostering an environment where innovation, research and commercialization can help Canada become a global leader in the developing bio-economy.



WE RECOMMEND



Bright minds
Why fostering talent is imperative to the future of research.

PAGE 7

“The solution lies in investing in human resources. Having research as a cornerstone of our strategy allows us to target key areas for specific relief.”

Personalized medicine p. 4
What does the future hold for this new era in health care?

Celebrating investment p. 5
GSK's breakthrough gift to science.

**MEDIA
PLANET**

INVESTING IN LIFE SCIENCES
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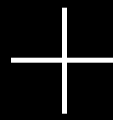


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Ontario

MaRS Discovery District

www.marsdd.com/

Kanata Research Park

kanataresearchpark.com/

Research & Technology Park

www.uwrtpark.uwaterloo.ca/

The University of Western Ontario Research Park

www.researchpark.ca/

Saskatchewan: Innovation Place Research Park

www.innovationplace.com/index-main.html

FACT
1

THE GROWTH OF THE LIFE SCIENCES SECTOR IS RAPIDLY OUTPACING THAT OF TECHNOLOGY

Why invest in life sciences?

There are few sectors that offer the highest risk and reward on investments as much as the life sciences sector.

INNOVATIVE INVESTMENT

According to Brian Bloom, cofounder and president of Bloom Burton and Co., a healthcare-specialized investment firm, despite the risks, well-funded life sciences has a direct impact on Canadian's access to medicine.

"It's one of the few sectors globally where you can not only make investment returns but contribute towards tremendous societal benefits as well," says Bloom, who has a background in medicine and biological sciences. "You can help cure disease; you can make a big difference in the lives of patients and people in the healthcare system."

Despite the healthcare woes of an aging demographic, life sciences funding has fallen on hard times.

"We're not talking about hundred-billion dollar companies with big profits but research stage biotechnology companies that fall in the bucket of the most riskiest investments globally,"

says Bloom. "Therefore as the natural swings of the market go up and down, their even more severe for these types of companies."

Peter van der Velden, president and CEO of Lumira Capital, another health care and life sciences-focused venture capital firm, points out that recent data has shown the returns from a venture perspective of life sciences have outperformed IT for the last 10 years.

"The cost of healthcare and the growth of the sector is outpacing that of any technology sector you might look at today," says van der Velden, adding that life sciences represent 50 percent of the innovation economy when you look at total dollars employed, total spending and total investment.

He muses that the companies that will see the most investment these days are the ones drawing the best patient outcomes.

"New cures, things that weren't treatable 10 years ago are treatable today," says van der Velden.

The pharm team

Bloom points out that currently, a growing source of capital is funnelling in

from the larger pharmaceutical companies.

"When capital is scarce, the largest pharmaceutical companies become more active in directly investing in life sciences companies," he says.

Van der Velden says "big pharma" has close to 100 billion dollars of revenue coming off patent over the next three or four years.

"They've all been challenged in terms of the innovation that's come out of their internal pipelines—it hasn't been as fruitful as it has been historically," says van der Velden. "So they're figuring out how to bring new innovation to replace the products they have in their portfolio that are expiring."

Van der Velden says he's happy to see the boost in investment from the big pharmaceutical companies.

"I'm glad to see them in the ecosystem, I expect them to co invest with us—having another source of sophisticated capital in the market is a good thing," says van der Velden.

ANDREW SEALE

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RAPIDLY GROWING HOPE
New cure discoveries available treat diseases considered untreatable as recent as a decade ago.

STAYING AHEAD BY STAYING AT THE FOREFRONT OF INNOVATION.



From radical medical breakthroughs to incremental improvements to existing treatments, GlaxoSmithKline believes that every step forward is a step in the right direction. As one of Canada's leading research-based pharmaceutical companies, we believe in continuous innovation, because we know that everyone benefits from medical advancements, big or small. At GSK, we stay ahead by staying committed to progress. **Discover more at GSK.ca**



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- Verify skills as bio-relevant



INSPIRATION

FACT

2

A NEW
MULTI-MILLION
DOLLAR FOCUS
HAS BEEN
GRANTED TO
GENOMICSA FOCUS ON HEALTH
Battling the constant
threat of chronic disease
is just one of the reasons
why research is impera-
tive to foster.

What is personalized medicine—and how are current gene discoveries paving the way for this futuristic notion? A fundamental shift is occurring that is making what was once thought impossible a very real option.

Witnessing a new era in health care

HOW WE MADE IT

The prospect of a new style of medicine appears to be as distant as a futuristic science fiction film, however, in truth, new gene discoveries are paving the way for a transformation in health care. A fundamental shift in medical research—in Canada and around the world—and the management of health care is already under way.

Since its inception about 10 years ago, Genome Canada has helped turn a \$915-million federal investment into \$2 billion in research funds as part of a network with six regional Genome Centres and in partnership with universities, the provinces and industry. On a path to speed the movement of research results from the lab directly into the health care system, Genome Canada, in collaboration with the Canadian Institutes of Health Research (CIHR)—Canada's principal medical research funding agency, is creating a new multi-million-dollar opportunity for researchers to show how the results of genomics science can be applied to patient care.

For instance, a collaborative study between scientists in British Columbia and Toronto's Hospital for Sick Children identified a gene that proved to have an unsuspected and surprising ability. "In some women, it could ultra-rapidly metabolize codeine and convert it into morphine," says President Meulien.

Codeine was long considered one of the safest narcotic pain relievers for many people, including nursing mothers and their babies. Genomics science found otherwise when researchers investigated the death



"Medicine needs demonstration projects to show how this new approach will work and to help allay fears about what lies ahead."

Marlene Orton
Science Writer

of a 13-day-old breastfed baby—and found high levels of morphine in the baby's blood. Genetic testing showed that the baby's mother was an ultra-rapid metabolizer of codeine.

Research saving lives

Research results immediately triggered warnings by both Health Canada and the U.S. Food and Drug Administration (FDA) along with label changes on the medication.

"This is just one example of a genomics discovery and an immediate impact on how we prescribe drugs," says Meulien.

"Researchers are already seeing how cancer patients respond to chemotherapy based on their genetic characteristics. It doesn't make sense for all drugs to be metabolized the same way for everyone.

Researchers are providing fact-based evidence about human responses to disease at its most basic level: DNA coding.

Since discovering the full sequence of the human genome, we have made great progress as the science has unfolded and the technology supporting the science has evolved. It is now 100,000 times cheaper and faster to sequence DNA than it was 10 years ago.

More alike than different

Humans of all races share more than

99.9 percent of about 25,000 genes, so the code is very nearly, but not exactly, identical in each of us. Researchers now are searching for the variations and have found evidence of "susceptibility genes"—making some people more pre-disposed to heart attack, or cancer, or to super-fast metabolism of codeine into morphine. Where does science go from here? "The short answer is that we will continue investigating and understanding the genome, apply the findings to predict disease, and improve health care management while mindful of ethical, environmental, economic, legal, and social issues raised by our research," says Meulien. "We are forging an entirely new structure of health care. We are talking about disruptive innovation because the research involves our capacity to change the way medical practice is performed."

The health care system is gradually moving away from a reactive model where patients are admitted with an illness that requires diagnosis and treatment, he explains.

Necessary changes afoot

"A lot of things need to happen in Canada's health care system: among them, the way our physicians are trained to understand molecular mechanics and biology rather than just symptoms." Medicine needs demonstration projects to show how this new approach will work and to help allay fears about what lies ahead.

Together, Genome Canada with support from CIHR will launch a unique, even historic, research competition on the application of genomics in the area of personalized health. The aim of the competition is highly specific: to demonstrate how genomics research can contribute to evidence-based health care, reduce the cost of health care and explain why it makes sense economically.

A key element of this large competition is the requirement for an economic rationale, says Meulien. "Researchers will need to address why an individual project would make sense in terms of the economic sustainability of the health care service."

"The value of this competition is significant because we will tackle the important issue of how to encourage change. We are targeting research projects that are mature enough to demonstrate in any particular area of health so long as there is a 'value proposition' for the clinician in order to make a decision based on the individuals molecular profile."

The goal, said Meulien, is simple. "We need to help keep the population healthier than it is otherwise we are going to be drowned in a wave of chronic disease. The front end of this wave is probably Type 2 Diabetes. A good 90 percent of Type 2 Diabetes is actually preventable and people's behaviour needs to be changed."

The results speak for themselves

If the value of genomics research is ever put in question, Meulien tells the story of one pair of teenaged brothers from Pembroke, Ont. who underwent a battery of tests over 10 years to try to

diagnose a disease that was baffling physicians.

They were finally diagnosed one month after the debut of a new research program at the Children's Hospital of Eastern Ontario.

The program involved a \$4.5-million investment by federal government and it was initiated for the purpose of gene sequencing pediatric cancers and rare diseases. Because of the Genome Canada funding, the research team was able to employ the latest gene sequencing technologies available in the country and researchers were able to make a discovery. With a correct diagnosis, the family now understood their condition and its implications, physicians were able to begin more evidence based management of the condition, and no more costly and unrelated tests needed to be done. "That's the sort of outcome that we can work towards," said Meulien.

"Another 150 families are now entering this program. Seventeen more genes responsible for these rare diseases have already been revealed in the first six months of the program. This is how we are harnessing the power of genomics," says Meulien.

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PROFILE

Genome Canada

Genome Canada is a not-for-profit organization that invests in genomics research and fosters networks of expertise in Canada with a view to economic and social benefit for Canadians in the areas of agriculture, health care, energy, environment, fisheries, forestry, mining and information technology.

INSPIRATION



SEALING THE FUTURE
Canada President and CEO, Paul Lucas and Dr. Moncef Slaoui, GSK's Global Chairman of Research and Development shake hands at the launch announcement
PHOTO: GLAXOSMITHKLINE INC.



NEWS IN BRIEF

Stem cells: A Canadian history

James Till and Ernest McCulloch discovered stem cells, a breakthrough that some leading medical researchers rank alongside the discovery of DNA as one of two fundamental advances in the biological sciences in the second half of the 20th century.

However, unlike James Watson and Francis Crick, who revealed the double helix structure of our genetic code in 1953, Till and McCulloch's 1961 discovery has gone largely unheralded outside of the medical research community—even though they founded stem cell science and provided the theoretical underpinning for bone marrow transplantation.

"Their discovery should be as well-known as Frederick Banting and Charles Best producing insulin for diabetes in the 1920s," says Joe Sornberger, author of "Dreams & Due Diligence, Till and McCulloch's Stem Cell Discovery and Legacy."

"Somehow it isn't. I want Canadians to be proud of this stupendous accomplishment. We celebrate our athletes and performing artists, but tend to give short shrift to our outstanding scientists whose work saves so many lives."

A Canadian heritage

The pair made their discovery at the Ontario Cancer Institute while conducting experiments on mice to measure the effects of radiation on bone marrow and its ability to repopulate the blood supply. They noticed the number of bone marrow cells they transplanted correlated with the number of "colony forming units" produced on the spleens of the mice. They were able to prove that a single cell—a stem cell—was capable of producing the basic cell types required to make blood while also renewing itself.

A platform for further research

"Till and McCulloch's work 50 years ago continues to define research today," says Dr. Michael Rudnicki, scientific director of the Stem Cell Network, Canada's national stem cell research organization. "One cannot calculate the impact of their contribution in terms of our understanding of the body's power to heal—not merely in terms of blood stem cells, but in everything from cancer to spinal cord injury to diseases such as multiple sclerosis and heart disease."

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GSK INJECTS FUNDS INTO CANADIAN LIFE SCIENCES

In early November, pharmaceutical giant GlaxoSmithKline Inc. announced the creation of a \$50-million GSK Canada Life Sciences Innovation Fund geared towards providing capital for early stage breakthrough research in Canada.

"Every investment will be specific. It will be dependent on the opportunity, the stage they're in, how much they need to go forward, and what the risk and reward is," says Sav DiPasquale, Vice President of Business Development and Corporate Planning for GSK in Canada. "We are not going to sprinkle the fund in terms of hundreds of opportunities, we're going to really focus in on the few outstanding opportunities that can really become commercial."

The investment fund will be managed by GSK's global corporate venture

capital arm, SR One and has managed similar funds in the United States and the U.K.

DiPasquale points out that the money will be invested across a broad array of Canadian universities, research institutes and start up companies.

Any products developed and taken to the commercial stage can be licensed by GSK or another company, but the pharmaceutical company will not hold or buy a majority stake in the company.

"We're not going to take a majority stake, since we want the company to be entrepreneurial and autonomous and we want to make sure that they can get to that next stage," says DiPasquale.

Reversing the brain drain

Rav Kumar, Vice President of Regulatory and Development Operations for GSK Canada, says the fund comes at

a time when life sciences is booming but venture capital for the sector is "dry."

"A lot of the brain drain that was talked about a decade or a couple decades ago has been reversed—the government has a good job of bringing a lot of top researchers from around the world to Canadian Universities," says Kumar. "Where we fall down in terms of that research is we don't necessarily do a great job of translating that excellent science into products, companies and jobs."

GSK in Canada will be on the prowl for new medicines, new vaccines and diagnostics that are innovative as opposed to slight improvements on existing products.

One area Kumar says he's particularly interested in is supporting biopharmaceutical innovation centres which have been created across Canada over the past decade or so. He points to MaRs Innovation in Toronto,

CQDM in Quebec and the Centre for Drug Research and Development (CDRD) in British Columbia.

"Just about every province is trying to set up institutions that bring together or help to funnel ideas from universities and medical schools in that province into a centre that helps to commercialize it," says Kumar.

If the fund works well, Kumar says it could spur similar injections of funds from others into life sciences innovation in Canada.

"It would be fantastic if we could help Canada create RIM-type of success based around life sciences," says Kumar.

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INSIGHT



NO SMALL IMPACT
By 2033, biotech could account for 3.99 percent of the economy.

Heather Blumenthal

Life Sciences Analyst



Biotech in Canada at a glance

1995

Companies: 358
Employees: 7,749
Revenues: \$1.95 Billion

2005

Companies: 532 (50% increase since 1999)
Employees: 13,433 (73.4% increase)
Revenues: \$4.2 billion (13.7% increase)

50%

Increase

The growth rate of biotechnology has outstripped those of other sectors of the Canadian economy. And it is expected to continue to do so.

Biotech: Poised for economic impact

For thousands of years, people throughout the world have used the principles of biotechnology to breed more productive plants, of which one consequence was the rise of modern civilization.

Now, scientists armed with genetics knowledge have made this a much more precise exercise, and are able to confer resistance to pests or herbicides or faster growth or better drought resistance. The use of modern biotechnology is no longer limited to agriculture—it is happening in a broad range of sectors of the Canadian economy, such as healthcare and medicine and industry, including the energy and the environment.

A recent study has found that biotechnology accounted for some \$15 billion of economic activity in 2005, the equivalent of just over one percent of Canadian GDP (the total value of goods and services that make up our economy). The study, “Measuring the Contribution of Modern Biotechnology to the Canadian Economy” was carried out by the Centre for the Study of Living Standards (CSLS) in partnership with Genome Canada.

Andrew Sharpe, executive director of the CSLS, says that it’s not the size of biotech’s economic contribution in Canada that’s impressive—the real story is in the way that share has grown and will continue to grow. By 2030, he says, biotechnology will definitely “be a more important part of the Canadian economy” and could contribute about \$144 billion of economic activity.

On a global level, the Organization for Economic Cooperation and Development (OECD) in a landmark report notes that in the same period the bio-economy may contribute about US\$1 trillion to the GDP of OECD countries. This international marketplace highlights the importance of biotechnology to Canadian competitiveness in the global arena, and why we need to track its development.

An area of growing economic importance

The growth rate of biotechnology has outstripped growth in other sectors of the Canadian economy and will continue to do so, Sharpe says. Between 1999 and 2005, biotechnology grew at an average annual rate of 10.7 percent, faster than any sector in the Canadian economy with the exception of mining and oil and gas extraction. By 2030, according to the study, the role of biotechnology in the economy will grow at an average annual rate of 9.4 percent between 2005 and 2030, while nominal GDP growth for the entire economy will be, on average, just 4.2 percent per year. By 2030, based on this scenario, biotech would account for 3.99 percent of Canadian GDP,

FACTS

Canadian biotech companies

Canada has more than 500 biotech companies engaged in applying innovation for the benefit of Canadians. Among them are:

■ **Boreal Genomics** employs more than 30 people and has generated \$1 million in revenues and attracted more than \$7 million in venture financing. The BC company has developed a DNA concentration technology that allows it to provide genomic analysis for the most challenging samples in life sciences research and clinical diagnostics.

■ **DVS Sciences** is an Ontario company with an international reputation for the development, manufacture and distribution of technology that is transforming the way researchers investigate cell biology, including understanding the origins of disease; facilitating the development of drugs and therapies; and leading the way toward personalized healthcare.

■ **Caprion Proteomics**, based in

more than triple its current value.

Biotech is a uniquely knowledge-based undertaking, says Genome Canada President and CEO Pierre Meulien, and needs to be fed by research.

“Genome Canada is adopting a ‘minds to markets’ approach,” he says. “We are putting in place novel programs aimed at quickly translating scientific ideas and discoveries into successful innovations that support continued growth in biotechnology across sectors of key economic importance.” It gives Canada a unique opportunity to build value into our natural resource base through genomics based innovation.

Biotech supporting growth in multiple sectors

Montreal, is a leading provider of proteomics-based services to the pharmaceutical industry. By helping to understand the behaviour of the proteins that turn genes on and off, Caprion is supporting the development of diagnostics and treatments for diseases ranging from infectious diseases to cancer to diabetes. Caprion has performed more than fifty large-scale biomarker discovery and validation projects for more than twenty major pharmaceutical industry clients from North America, Europe, and Asia.

■ **J.D. Irving, Limited** is a major presence in the forest products sector. The New Brunswick company is actively involved in reforestation programs and operates two seedling nurseries that produce up to 27 million trees per year. The company is partnering on a Genome Canada project to develop genetic markers in spruces for select those with desirable traits, including resistance to pests such as the white pine weevil.

The bulk of Canada’s biotech activity is in the medical and healthcare sector, accounting in 2005 for 58.3 percent of firms, 80.9 percent of total employment and 70.6 percent of revenues. The return on this activity is more than simply economic, however. This activity is developing and making available new ways to prevent, diagnose and treat common diseases such as cancer. And as Sharpe and Ricardo de Avillez—the study’s author and a noted economist—point out, economic analyses alone can’t include gains in quality of life or better health outcomes unless a way can be found to quantify these. That, they say, is material for another study!

Agriculture is the second-largest area of biotechnology activity, with companies involved in developing new crop varieties; creating new ways to diagnose and treat disease in livestock; and producing genetically modified fish that grow bigger more quickly. Agriculture biotechnology is helping to keep Canadian farmers and fishers more competitive and maintain the viability of their communities.

A growing area of activity is industrial biotechnology, including energy and environment industries. These firms measured just 18.6 percent of all Canadian biotechnology companies in 2005, but their presence is expected to grow. Biotechnology is used in producing fuels such as bio-ethanol or biodiesel, chemicals such as enzymes or amino acids and chemicals used in the production of foodstuffs, pulp and paper, detergents and textiles. Biotechnology can also contribute to cleaning up industrial pollution and ensuring cleaner, more environmentally friendly manufacturing processes.

Study breaking new ground

The CSLS study is groundbreaking in many ways. It is the first to accurately quantify the value of biotechnology to the Canadian economy, looking solely at the activities of biotechnology producers and users (for instance,

the companies that produce genetically modified seeds and the farmers who plant them). More importantly, though, the study has created a framework for future evaluations of the economic role of biotechnology.

De Avillez notes some of the challenges in undertaking a study of this type. He says, “what jumped out at us were the glaring difficulties in trying to measure with precision the contribution of biotechnology to Canada.”

Part of the problem, he says, is a simple lack of data. Statistics Canada used to do a survey of biotech in Canada, called the “Biotechnology, Use and Development Survey”, or BUDS. But that survey, started in 1999 and conducted every two years, was discontinued in 2005 due to lack of funding. No replacement survey has emerged.

Another part of the problem, adds Sharpe, is that biotechnology is not actually a category of activity under NAICS, the North American Industry Classification System, the standard by which the United States and Canada classify businesses for the collection and analysis of statistical data.

“There’s no category for biotech,” he says. “It’s really more a technique, a way of doing things.”

Regardless of the challenges, the methodology used in this study gives a framework for deriving a more accurate sense of the economic impact of biotechnology in Canada, now and in the future.

“This is an important step in so many ways,” adds Meulien, “because it underscores for Canadians the increasingly important and central role that biotechnology and the life sciences will play in years to come.”

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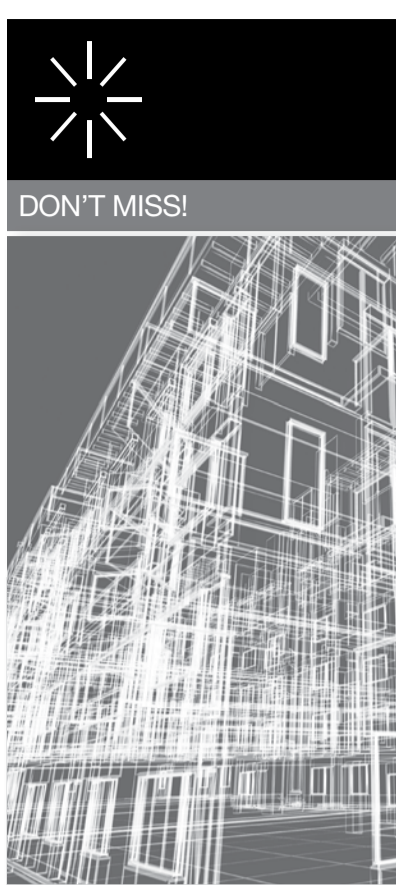
Read more on the web:

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NEWS

FACT
3
INVESTING IN RESEARCH FACILITIES REQUIRES CONTINUOUS FOCUS



Good infrastructure is vital for research

Canada has played a significant role in the field of vaccine research and development, but if we are not careful, the time will come when we can only reflect on what we used to be, predicts Andrew Potter from the University of Saskatchewan.

The country has no shortage of skilled professionals and excellent universities, but infrastructure spending has to ramp up, so that these best minds can be put to work.

"If you wait 10 years to see who drives the vaccine market worldwide, it will be China, and that's because they have decided to focus on the area, and invest in it. They will be successful," Potter predicts.

Potter heads the Vaccine and Infectious Disease Organization, part of the brand new InterVac, at the University of Saskatchewan. The \$141-million facility, which opened in September, includes a Level-Three containment facility, the second of its kind in Canada. This enables scientists to work safely with some of the most dangerous pathogens on earth.

"It is the most advanced facility in the world. But that will be short lived because the next one to be built will incorporate a lot of the things that we have done here," he comments.

In short, infrastructure spending is not a one-off event.

Proactive thinking required

If Canada wants to stay in the game, and reap the intellectual, financial and health benefits that world class research in the life sciences make possible, we must be proactive.

"We do well when the influenza virus hits, we spend billions of dollars on vaccines. My point is that we also need to spend the money before the crisis happens." This includes investing in infrastructure and people, so that cutting edge research can be conducted to better understand these viruses.

"Our politicians tend to think in terms of three to four year windows. The truth about research investment is that we need to think in terms of 25-year time frames."

Why infectious diseases?

Infectious diseases are significant killers in developed economies like Canada, says Potter. "Influenza is a phenomenal problem. It kills the elderly and the young. It is an incredibly under-reported problem."

Scientists are seeing changes in some of the childhood diseases too. "The fact of the matter is that microbes change. Those microbes that were circulating in the 1960s are not the same today," he explains. Already, measles is making a comeback. This, coupled with societal complacency and misinformed fears about vaccines in some quarters, is inadvertently helping the virus' cause.

Potter recognizes the limitations of a "stuffy" scientist appealing to the public about the benefits of vaccination. "We need a media-savvy spokesperson for vaccines, somebody like a Jim Carrey and former girlfriend Jenny McCarthy," he notes wryly.

PEOPLE POWER
The biotechnology industry is experiencing a shortage of skilled workers. Allowing immigrants waiting for accreditation could alleviate this issue.

Finding the right person for the job

Question: What is the factor that fuels the success of the biotech industry in Canada?

Answer: Obtaining the top brain power for the job is the most imperative—and challenging—hurdle the industry faces.

According to BioTalent Canada Executive Director Rob Henderson, the skills shortage in biotechnology is linked to two key challenges. On the one hand, which most people acknowledge, it's a question of drawing skilled, committed professionals into the field.

At the individual company level, it's about attracting and keeping the right candidates for specific positions.

In BioTalent Canada's 2009 report *Generating Opportunity: HR Needs in the bioenergy, biofuels and biotechnology subsectors*, almost half the industry respondents cited finding the right candidate as a key challenge. A further third nominated competing for qualified can-



"Our programs work for internationally educated medical specialists whether or not they achieve certification."

Rob Henderson
Executive Director, Biotalent Canada

didates as their biggest hurdle.

Investing in human resources

The situation hasn't changed dramatically, though there are glimmers of hope, says Henderson.

"The solution lies in investing in human resources. Having research as a cornerstone of our strategy allows us to target key areas for specific relief," he explains. The trouble with investment is that it does take a while to recoup the benefits, but it does pay off long term. The trick is perceiving opportunity where others are merely seeing a problem.

For example, the Kitchener-Water-

loo-Dufferin area in Ontario is going through a particularly brutal winter right now, with major employers like RIM and Maple Leaf Foods laying off staff. A pilot BioTalent Canada skills transfer program, developed with workforce planning boards and key stakeholders, will be launched in 2012, to help traditional manufacturing workers transition to biomanufacturing jobs, where their skills and knowledge are desperately needed. The project aims to place one hundred traditional manufacturing workers into biomanufacturing jobs across Canada.

It's not all negative

Henderson is adamant that it is not all doom and gloom for biotechnology. "It is heartening that the politicians are responding to the needs of the biotech industry, by bringing in more skilled immigrants." Last year, 10,000 skilled immigrants came to Canada—many of them doctors, nurses and vets, who need to get re-credentialed.

Under the auspices of the Foreign Credential Recognition Program, immigrants who are waiting for Canadian accreditation can work in the life sciences industry. "Our programs work for internationally educated medical specialists whether or not they achieve certification; and gives them the opportunity to nurture a new career in the bio-economy while keeping their skills relevant," Henderson notes.

"The good news is that word is getting out and we are finding a huge uptake among immigrants in our program," says Henderson.

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Creating a culture of innovation

Canada has great scientists, world class institutions, and a good, well-established health-care system that offers a great platform to conduct clinical trials, says Rx&D President Russell Williams.

Rx&D is an association of leading research-based pharmaceutical companies dedicated to the discovery and development of new medicines and vaccines.

"We already invest about \$1.3 billion in research in this country and that's a significant figure. The pharmaceutical industry is very committed to growing its research base here," Williams says.

Rx&D Chair Philip Blake, who is also president and CEO at Bayer, says a discussion about investment in innovation should concentrate on Canada's existing strengths.

"The actual research component is a very small part of the equation. A major part of our energy and expense is connected with conducting clinical trials. This is where Canada can really play a big role," he explains.

EXPERT



Phil Blake
CEO, Bayer

"A major part of our energy and expenses is connected with conducting clinical trials."

Slow to embrace new medicines

Rx&D's 2010-11 International Report on Access to Medicines (IRAM)

released last week shows that Canada's public drug plans continue to provide less access to new medicines and vaccines compared to 31 other developed nations. Canada ranks 31 out of 32 countries when it comes to accessing first-in-class drugs.

The IRAM findings have negative implications in helping to divert more research activities this way, say Blake and Williams. "The biggest challenge Canada has in attracting more clinical trials is that we are not good at adopting new innovations in drugs and vaccines," explains Blake.

Protecting innovation

Another issue that needs to be addressed if more innovation is to occur is the patent's wobbly status here. The Canadian Intellectual Property Office states that a patent provides protection within Canada for up to 20 years (a global standard) from the filing date.

However, the regime only guarantees the developer about seven to nine years of market exclusivity, after a 10-year period spent developing the drug and Health Canada and provin-

cial regulators' reviews are factored in. The current regime also appears to favour generic manufacturers over the innovators, especially in the court of law. If a legal decision goes against a generic manufacturer, that party has the right of appeal. This privilege is not extended to the innovator.

"Our intellectual property regime leaves a lot to be desired. In many ways it is holding us back from having a European outreach. We have a situation where Canadian CEOs are trying to have a global mandate but fail, not because of lack of expertise, but because of the IP regime," Williams says.

However, he remains optimistic.

"By working together, governments, stakeholders and the innovative industry can help drive more R&D investment to strengthen our economy, and improve the health, well-being and productivity of Canadians. This is a timely opportunity for us," he adds.

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Leadership in Life Sciences

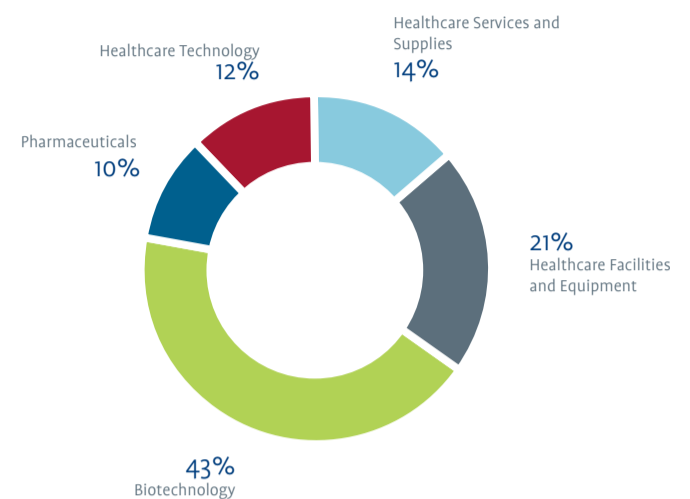
TMX Group - Advancing Life Sciences

Toronto Stock Exchange (TSX) and TSX Venture Exchange (TSXV), provide growth oriented Life Sciences companies with a dynamic marketplace to access North American and global capital. TSX and TSXV are home to 121 Life Sciences companies that have a total market capitalization of \$23.4 billion.

Sector Highlights

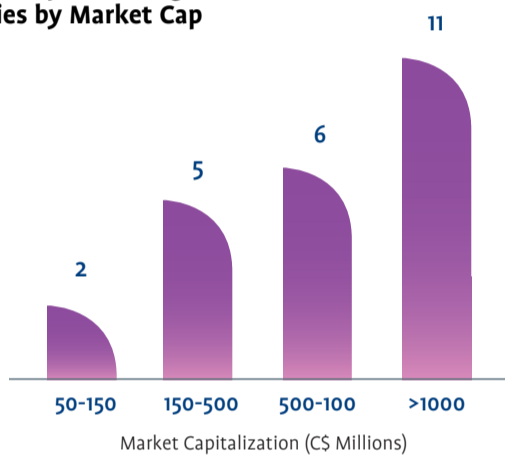
- Growing Access to Capital**
 - \$567M of equity capital raised in 2010
 - \$320M of equity capital raised in the first half of 2011
- Strong Trading Fundamentals**
 - 3.1 Billion shares traded in 2010
 - 1.6 Billion shares traded in the first half of 2011
- Sector Stabilized and Growing**
 - 6 new listings in 2010, and 2 in first half of 2011
 - 98 financings completed in 2010, and 50 in the first half of 2011
 - More than 30% of TSX Life Sciences issuers are graduates of TSXV

TSX & TSXV Life Sciences Companies Span a Range of Industries

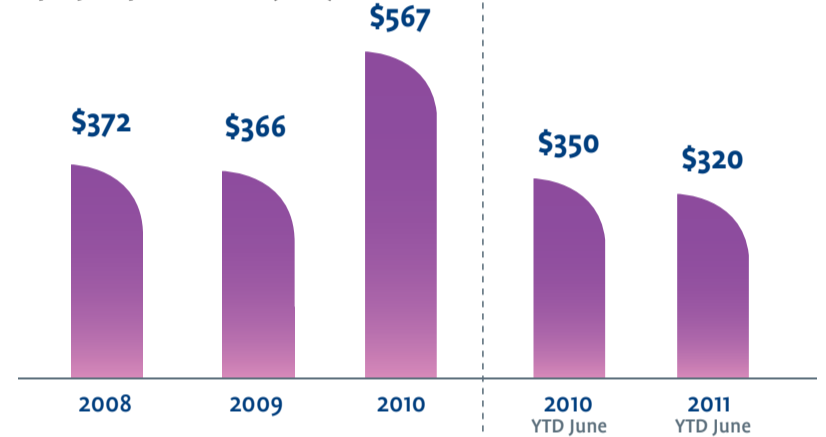


Strong Market Support

Average Analyst Coverage for Life Sciences Companies by Market Cap



Equity Capital Raised (C\$M)



Life Sciences Listings

Toronto Stock Exchange

Name	Ticker	QMV (C\$ millions) 30 June 2011	HQ Location	TSXV Grad
Adherex Technologies Inc.	AHX	13.6	USA	
Aeterna Zentaris Inc.	AEZ	200.8	Quebec	
Afexa Life Sciences Inc.	FXA	39.2	AB	Yes
Akela Pharma Inc.	AKL	5.3	USA	
Allon Therapeutics Inc.	NPC	27.5	BC	Yes
Amorfix Life Sciences Ltd.	AMF	12.7	ON	Yes
Atrium Innovations Inc.	ATB	519.4	Quebec	
BELLUS Health Inc.	BLU	10.9	Quebec	
Bioniche Life Sciences Inc.	BNC	90.6	ON	
BioWest Therapeutics Inc.	BWE	3.5	BC	Yes
Cangene Corporation	CNJ	103.5	MB	
Cardiome Pharma Corp. *	COM	259.2	BC	
Centric Health Corporation	CHH	325.7	ON	Yes
Cipher Pharmaceuticals Inc.	DND	25.3	ON	
CML HealthCare Inc. *	CLC	837.3	ON	
DiagnoCure Inc.	CUR	38.7	Quebec	
GeneNews Limited	GEN	15.2	ON	Yes
GLG Life Tech Corporation	GLG	211.4	China	
Helix BioPharma Corp.	HBP	191.9	ON	
IMRIS Inc.	IM	297.2	MB	
IntelliPharmaCeutics International Inc.	I	58.8	ON	
Isotechnika Pharma Inc.	ISA	24.3	AB	Yes
Labopharm Inc.	DDS	10.0	Quebec	
Lorus Therapeutics Inc.	LOR	7.0	ON	
Medicago Inc.	MDG	102.1	Quebec	Yes
MethylGene Inc.	MYG	114.4	Quebec	
Microbix Biosystems Inc.	MBX	17.3	ON	

Name	Ticker	QMV (C\$ millions) 30 June 2011	HQ Location	TSXV Grad
Nordion Inc. *	NDN	678.8	ON	
Northstar Healthcare Inc.	NHC	12.8	USA	
Novadaq Technologies Inc.	NDQ	142.0	ON	
Novoko International Inc.	EKO	60.7	Quebec	Yes
Nuvo Research Inc.	NRI	41.5	ON	Yes
Oncolytics Biotech Inc.	ONC	382.4	AB	
Ondine Biomedical Inc.	OBP	3.1	BC	Yes
OPMEDIC Group Inc.	OMG	76.3	Quebec	
Paladin Labs Inc.	PLB	810.0	Quebec	
Patheon Inc.	PTI	260.9	USA	
ProMetic Life Sciences Inc.	PLI	50.7	Quebec	
Prottox Therapeutics Inc.	PRX	64.4	BC	Yes
QLT Inc. *	QLT	352.3	BC	Yes
Response Biomedical Corp.	RBM	13.6	BC	Yes
Resverlogix Corp. *	RVX	88.9	AB	Yes
SemBioSys Genetics Inc.	SBS	3.1	AB	
Spectral Diagnostics Inc.	SDI	19.3	ON	
TearLab Corporation	TLB	27.5	USA	
Tekmira Pharmaceuticals Corporation	TKM	29.1	BC	
Thallion Pharmaceuticals Inc.	TLN	5.8	Quebec	
Theratechnologies Inc. *	TH	265.9	Quebec	
Transition Therapeutics Inc.	TTH	69.7	ON	Yes
TSO3 Inc.	TOS	115.5	Quebec	Yes
Valeant Pharmaceuticals International Inc. *	VRX	14,822.8	ON	
Warnex Inc.	WNX	4.0	Quebec	Yes
YM BioSciences Inc.	YM	315.7	ON	

*Equity options listed on the Montreal Exchange

TSX Venture Exchange

Name	Ticker	QMV (C\$ millions) 30 June 2011	HQ Location	QT/RTO
Acasti Pharma Inc.	APO	37.0	Quebec	
Advanced Proteome Therapeutics Corporation	APC	17.6	USA	
Advitech Inc.	AVI	4.1	Quebec	CPC/QT
ALDA Pharmaceuticals Corp.	APH	2.9	BC	CPC/QT
Allegiance Equity Corporation	ANQ	2.2	ON	
Annidis Corporation	RHA	8.4	ON	CPC/QT
Audiotech Healthcare Corporation	AUD	2.6	BC	
bioOasis Technologies Inc.	BTI	10.7	BC	CPC/QT
BioSign Technologies Inc.	BIO	51.0	ON	
Biosynt Inc.	RX	1.1	ON	
Biotonix (2010) Inc.	BTX	3.8	Quebec	CPC/QT
Calyx Bio-Ventures Inc.	CYX	2.1	BC	
CardioComm Solutions Inc.	EKG	3.4	BC	
Ceapro Inc.	CZO	7.9	AB	
Changyu Medtech Ltd	CYQ	0.5	China	CPC/QT
Chemaphor Inc.	CFR	3.9	ON	CPC/QT
China Health Labs & Diagnostics Ltd.	CHO	9.3	China	CPC/QT
Covalon Technologies Ltd.	COV	13.5	ON	CPC/QT
CRH Medical Corporation	CRM	42.1	BC	
Critical Outcome Technologies Inc.	COT	16.9	ON	CPC/QT
Cynapsus Therapeutics Inc.	CTH	3.3	ON	CPC/QT
DiaMedica Inc.	DMA	50.9	MB	
Ergoresearch Ltd.	ERG	7.2	Quebec	CPC/QT
Functional Technologies Corp	FEB	37.2	BC	CPC/QT
Granville Pacific Capital Corp.	GE	1.5	BC	
Hamilton Thorne Ltd	HTL	2.6	USA	CPC/QT
Healthscreen Solutions Incorporated	MDU	3.0	ON	
HTN Inc.	HET	1.5	ON	
IBEX Technologies Inc.	IBT	2.2	Quebec	
iCo Therapeutics Inc.	ICO	11.6	BC	CPC/QT
Immunotec Inc.	IMM	11.6	Quebec	RTO
Immunovaccine Inc.	IMV	25.1	NS	CPC/QT
InNexus Biotechnology Inc.	IXS	2.5	USA	
Innovotech Inc.	IOT	16.4	AB	CPC/QT

Name	Ticker	QMV (C\$ millions) 30 June 2011	HQ Location	QT/RTO
IntelGenX Technologies Corp	IGX	22.0	Quebec	
Kane Biotech Inc.	KNE	12.1	MB	CPC/QT
Lifebank Corp.	LBK	1.6	BC	
Med Biogene Inc.	MBI	3.3	BC	RTO
Medifocus Inc.	MFS	3.9	USA	CPC/QT
MedMira Inc.	MIR	7.4	NS	
MedX Health Corp	MDX	0.8	ON	
Miraculus Inc.	MOM	7.4	MB	
Neovasc Inc.	NVC	40.8	BC	CPC/QT
Neptune Technologies & Bioresources Inc.	NTB	174.0	Quebec	
North American Medical Services, Inc.	NMI	1.6	BC	
Osta Biotechnologies Inc.	OBI	3.7	Quebec	CPC/QT
Pacgen Biopharmaceuticals Corporation	PGA	1.7	BC	
Patient Home Monitoring Corp	PHM	4.6	USA	RTO
PharmaGap Inc.	GAP	9.2	ON	
Prism Medical Ltd.	PM	29.4	ON	
Pyng Medical Corp.	PYT	2.8	BC	
Quest Pharmatech Inc.	QPT	2.7	AB	
Sernova Corp	SVA	12.3	BC	
Sirona Biochem Corp	SBM	9.6	BC	CPC/QT
Sonomax Technologies Inc.	SHH	20.5	Quebec	
SQI Diagnostics Inc.	SQD	118.8	ON	CPC/QT
Stellar Biotechnologies Inc.	KLH	19.2	USA	CPC/QT
Stem Cell Therapeutics Corp.	SSS	13.7	AB	
Sunshine Agri-Tech Inc.	SAI	2.7	China	CPC/QT
The Medipattern Corporation	MKI	18.7	ON	CPC/QT
Theralase Technologies Inc.	TLT	19.0	ON	
Titan Medical Inc.	TMD	58.3	ON	CPC/QT
Urodynamix Technologies Ltd	URO	2.8	BC	
VentriPoint Diagnostics Ltd	VPT	15.2	USA	CPC/QT
Verisante Technology Inc.	VRS	31.1	BC	
Victhom Human Bionics Inc.	VHB	1.1	Quebec	
Welichem Biotech Inc.	WBI	2.5	BC	
Zecotek Photonics Inc.	ZMS	29.0	BC	

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