

Vital signs Excellent

for Ontario's biomedical industry

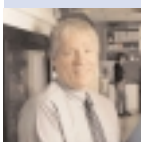
There's never been a more exciting time in the biotechnology industry and few better places for that industry than Ontario.

Nearly all the global biomed giants – Biogen, Boehringer Ingelheim, Genzyme and GE Medical Systems – have operations here. And the province has scores of home-grown stars such as Apotex, Biovail Corporation, Lorus Therapeutics and Patheon.

What makes Ontario so attractive to biotech and biomedical companies?

"The province offers everything they need to succeed," says Lorne Meikle, chairman of the executive committee for BIO 2002 and president and CEO of BioCatalyst Yorkton (a Toronto-based venture management company).

To start with, there's Ontario's biomedical workforce. "In a knowledge-based economy the assets are people and Ontario's biomedical workers are second to none," says Dr. Calvin Stiller, chairman and



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Patheon provides
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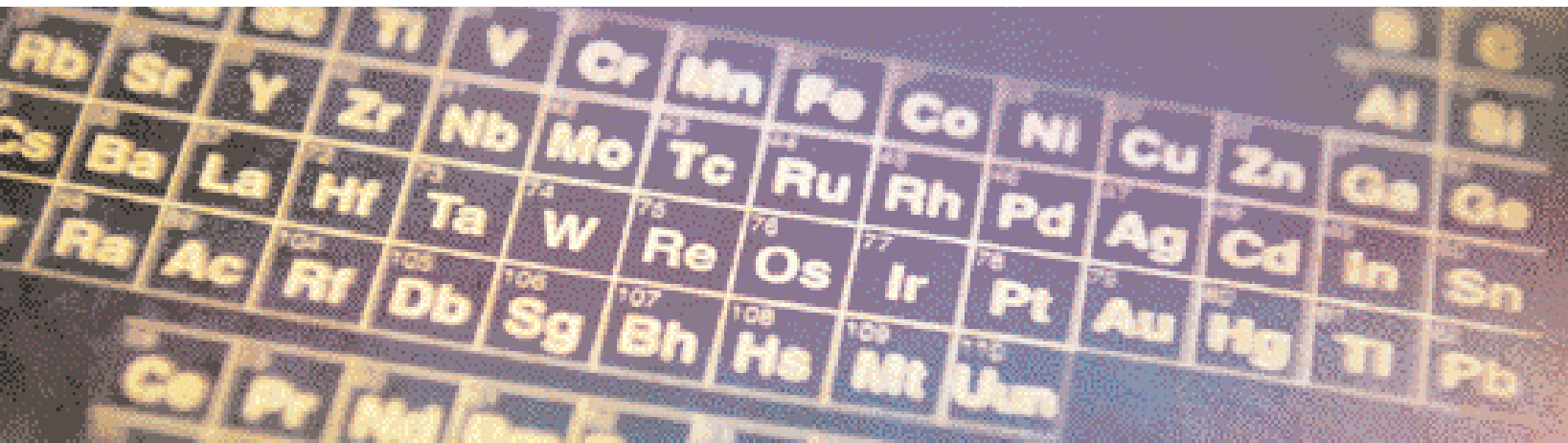


From concept
to market
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Vital signs **excellent** for Ontario's biomedical industry



CEO of the Canadian Medical Discoveries Fund, one of Canada's major life-sciences investment funds.

There are more than 33,000 highly educated people working in the industry – some of the best and brightest in the world. Equally important, the companies they work for have that all-important ingredient in high-tech endeavours called “cluster-power” – the competitive strength that's been shown to be achieved by clusters, which are geographically proximate companies working in the same or related industries.

Ontario boasts six biotech clusters located along a corridor that stretches from London in the south to Ottawa in the north. They include: Toronto, one of North America's largest biomedical hotbeds, with strengths in virtually every area including genomics/proteomics and bioinformatics; Ottawa, a powerhouse in nuclear medicine, cardiovascular devices, biochips/biosensors, diagnostics and bioinformatics; and London, a centre for medical imaging, xenotransplantation and immunology. The two emerging clusters in the corridor are Kingston and Hamilton, both of which are approaching critical mass.

And there's a steady supply of new talent, thanks to the province's 17 universities, which turn out more than 17,000 graduates per year in mathematics, engineering, sciences, and the health professions.

But Ontario's competitive advantages don't stop there.

In addition to leading minds, Ontario has leading research facilities. These include more than 30 renowned,

non-profit research institutes, such as the Hospital for Sick Children Research Institute, the Samuel Lunenfeld Research Institute, the Ottawa Heart Institute and the Robarts Research Institute and dozens more of privately funded centres such as the Joseph and Wolf Lebovic Centre for Molecular Medicine and Human Genome Research, and the Advanced Medical Discovery Institute (formerly the Amgen Institute).

Ontario's research institutes have an impressive history of medical achievement dating back to 1913 and the production of a landmark diphtheria antitoxin. Subsequent achievements include the discovery of insulin, the development of the pacemaker, the development of 3D imaging techniques and the early work on a system for automatic and inexpensive DNA sequencing.

Today, Ontario's research institutes have a worldwide reputation for their innovation in such high-demand areas as genomics/proteomics, neurosciences, cancer, cardiovascular diseases, medical imaging, immunology and drug research and development.

As Lorne Meikle points out, “The Ontario government is committed to staying at the leading edge in high-demand areas of biotechnology and to ensuring that discoveries are commercialized in the province.” This is borne out by the government's June announcement of an ambitious \$51 million biotech strategy that addresses the commercialization issue head-on. The strategy includes creating a Medical and Related Sciences (MaRS) Discovery District in downtown Toronto – a key

Fast Facts about Ontario's biomedical industry

- Ontario has North America's third-largest regional concentration of biotechnology firms and is sixth in revenues earned;
- Ontario has more graduates in the life sciences than do most U.S. states on a per capita basis;
- Ontario is home to the University of Toronto, which houses North America's largest faculty of medicine;
- Ontario has a long history of medical achievement, dating back to 1913 when Dr. John Fitzgerald produced a landmark diphtheria antitoxin;
- Ontario has participated in the discovery of over 25 per cent of disease-related genes, including those for asthma, breast cancer and early onset Alzheimer's;
- Ontario is recognized the world over for its expertise in high-demand research areas, from genomics/proteomics to neurosciences, cancer, cardiovascular diseases, medical imaging, immunology, and bioinformatics;
- Ontario offers a unique environment for clinical testing thanks to a large and ethnically diverse patient population, a centrally managed public health-care system that facilitates recruitment and tracking, and research and development tax credits for Phase I to Phase III trials; and
- Ontario offers some of the best research and development tax credits anywhere – when combined with the federal government's, after-tax cost of a \$100 research and development expenditure to less than \$42.

**"Biotechnology
uses living organisms to create
new products that improve the quality
of our food, our health and
our environment."**

– BIOTECanada

The key to Ontario's continued growth is innovation.

Biotechnology is one industry that is a powerhouse in this area, and Ontario's biotech industry is at the leading edge of innovation worldwide.

Every day, this exciting sector generates new knowledge and discoveries. Every day, there are new implications for our health, our foods and our medicines. Every day, new products are commercialized and biotech start-ups are established that will lead to economic growth and new jobs.

This issue of Ontario Business Report profiles this progressive and innovative industry, with special attention paid to the biomedical sector. We look at many of Ontario's biotech/biomedical companies and the research institutes that attract attention and investment from around the world. And we look at our government's commitment to boost the industry's strength and profile globally.

Ontario is accurately described as a biotech hothouse. We have more than 33,000 highly educated people who work in our biotech, pharmaceutical and medical-devices sectors. We have impressive academic, scientific and research strengths. Nearly all of the global biomedical giants have operations here, and we are home to scores of home-grown stars. We also have serious "cluster-power" in a biotech corridor that stretches from London to Ottawa. This year, Ontario's biotechnology industry is expected to generate \$1.3 billion in revenue. Our government intends to build on this success.

Our goal is to make Ontario one of the top three biotechnology centres in North America. In June, to support this goal, we announced the \$51-million Ontario Biotechnology Strategy. This groundbreaking strategy promises to bring together research and commercialization interests in excess of \$10 billion over 10 years, and create up to 75,000 new jobs.

Ontario hosted the world's largest biotechnology conference earlier this year, and we were proud to highlight the strength, innovation and competitiveness of our biotech industry. Our province's business-friendly environment, superb research and development infrastructure, quality workforce, strategic location, and high quality of life all impressed the global biotech community.

Ontario has a notable history of biotechnological achievement. From the discovery of insulin, to the development of the pacemaker, to the development of 3D imaging techniques – our scientists and researchers have been at the forefront of major breakthroughs. Our government will continue to work closely with the biotechnology industry, and our education and research institutes, to build on this tradition – and to ensure Ontario remains a world leader in research, discovery and innovation.

Jim Flaherty
Minister of Enterprise, Opportunity and Innovation





Incubators hatch biotech boom

Ontario's burgeoning biotech industry is on the verge of a period of unprecedented growth. Now generating revenue of \$1.3 billion (2002 estimate), the biotech industry has been growing steadily in recent years. Three new biotechnology commercialization centres in Ottawa, London and Toronto will help the industry grow at a much faster pace.

The three incubators are funded through the \$20 million Biotechnology Commercialization Centre Fund, a Superbuild initiative. They give small, niche technology firms (which make up 60 per cent of the province's biotech industry) the environment and services they need to take a biotech innovation from the lab to the marketplace.

"The overall goal is to increase the number of biotechnology start-up firms emerging from Ontario's universities, hospitals, research institutes and private industry," says Jim Flaherty, Minister of Enterprise, Opportunity and Innovation. "These incubators will enhance their chances for success."

The Ottawa Biotech Incubation Centre (OBIC) is the first to open for business, with tenants moving into the 18,000 sq. ft. Greenbelt Research Farm facility in January 2002. Five of the incubator's seven suites are already occupied by companies focusing on advanced agri-food technologies and bio-product sciences.

"One company is working on a new drug to reduce the circulation of cholesterol," says Dr. Rainer Engelhardt, the centre's CEO. "Another is working on making a product that could destroy dangerous E.coli bacteria right at the source. The provincial government is showing great foresight with this strategic investment."

OBIC tenants get infrastructure and business services support, along with mentoring and consulting support to assist them with business development. The centre will help create more than 170 jobs and about 25 companies at Greenbelt and another Ottawa site over the next five years.

The 50,000 sq. ft. London Biotechnology Commercialization Centre opens this summer at the research park on the University of Western Ontario campus. Specializing in life sciences, the centre offers start-ups a range of business-ready, lab-ready space in modules as small as 400 sq. ft.

"We see ourselves as the hub of the industry in the area," says Peter Bruijns, the centre's president. "We're now negotiating with several potential tenants, and they demonstrate the variety and depth of companies we have in the London area such as medical devices, bio-pharma, medical imaging and environmental biotech."

The Greater Toronto Area has the fourth-largest regional concentration of biotech firms in North America. The Toronto Biotechnology Commercialization Centre will build on that strength, with members representing 98 per cent of the city's medical research organizations. The Toronto centre's members include the University of Toronto, five Toronto research hospitals, the Centre for Addiction and Mental Health, the City of Toronto and the federal government.

"We will have an over 60,000 sq. ft. facility in downtown Toronto," says Borys Chabursky, interim CEO of the centre. "We're now in the process of finalizing a location and getting a developer to start construction, and we're also in the final stages of securing a strategic partner. The Toronto centre will also be an integral part of the new Medical and Related Sciences (MaRS) Discovery District in downtown Toronto that was announced in the Throne Speech."

All three incubators offer a number of economic benefits to the entire province. They create jobs, and accelerate the commercialization of biomedical technology and the industries that support it.

"The end result is a growing number of graduate firms that generate revenue for their shareholders and tax dollars for government," says Chabursky.

Ontario welcomes the worldwide biotech community

The largest conference in the history of the biotechnology industry was held in Ontario this summer, as Toronto welcomed more than 15,000 participants from 52 countries. "Our province was very proud to host BIO 2002," said Premier Ernie Eves. "The conference showcased a growing industry in Ontario, and demonstrated to the world our commitment to innovation, the key to Ontario's economic growth."

The 16th Annual Biotechnology Industry Organization's 2002 International Convention and Exhibition was held from June 9-12. It included more than 1,000 exhibitors, six plenary events and 150 sessions and symposiums. Approximately 800 speakers discussed matters ranging from science and medicine to business development, ethics and religion. Nearly 400 journalists from around the world registered for the conference.

"We may come from different nations, but science knows no geographic boundaries," said Carl B. Feldbaum, president of the Biotechnology Industry Organization (BIO). "Our goal, which we met and indeed surpassed, was to bring together the world of biotechnology at BIO 2002."

Feldbaum noted that Toronto has "one of the most impressive biomedical research centres in North America, and in the future, it can become a biotech industry powerhouse." He said, "The City of Toronto was a gracious host, and we look forward to coming back." Ontario is the only jurisdiction outside the United States to host this prestigious event.

Prior to BIO 2002, the Ontario government announced its new \$51-million Biotechnology Strategy to help attain its goal of becoming one of the top three biotechnology jurisdictions in North America. "Investors, industry and governments all showed a real commitment during BIO 2002 to growing the biotech sector in Ontario," said Jim Flaherty, Minister of Enterprise, Opportunity and Innovation. "We gained new commitments from the federal government, and throughout the conference we received positive responses to our strategy from potential investors and researchers."

Ontario's Biotechnology Strategy will help the province realize its commercialization potential by strengthening both its existing and emerging biotech clusters.

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Vital signs excellent for Ontario's biomedical industry

component will be the Toronto Biotechnology Commercialization Centre – investing in support infrastructure in regional biotech clusters to help nurture and support start-ups.

Another competitive advantage is Ontario's research and development tax credits which are "the best in the world," according to Dr. Stiller. When combined with those of the federal government, they can cut the after-tax cost of a \$100 research and development expenditure to less than \$42.

Finally, there are Ontario's competitive business costs. *KPMG's 2002 Competitive Advantages* report confirmed what astute biomedical companies already knew about conducting business in Ontario: when it comes to establishing, building and operating a company during its first 10 years, Canada and Ontario offer the lowest costs overall of any of the G7 countries.

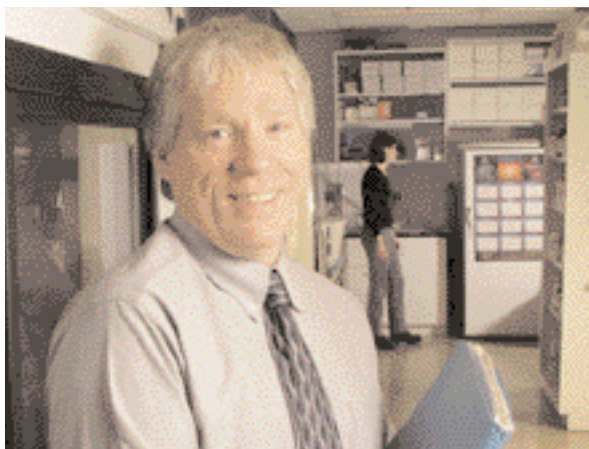
"Ontario combines the right skills, the technology, the infrastructure and the business savvy," says Lorne Meikle. "That's why the industry is thriving and attracting investment from all over the world."



Research Institute:

Generating knowledge for better human health

Samuel Lunenfeld



Dr. Stephen Lye

“Our role is to generate new knowledge and new discoveries, in order to understand the biological processes that have relevance to human disease,” explains Dr. Stephen Lye, acting director of the Samuel Lunenfeld Research Institute of Mount Sinai Hospital in Toronto. “We can then apply that knowledge either to improve patient care in a hospital setting, or work with biotech or biopharma companies to advance the development of new therapies to treat this disease.”

The Samuel Lunenfeld Research Institute, affiliated with the University of Toronto, was established in 1985. It is a recognized world leader in biomedical research, with programs concentrated in three major areas: molecular biology and cancer genetics, development and fetal health, and epidemiology and biostatistics. The goal of these interrelated programs is to understand the function of the human body’s 30,000 to 40,000 genes, and how genetic pathways lead to the development of human diseases such as cancer, diabetes, hypertension, depression and osteoporosis.

The Lunenfeld Institute employs 31 scientists, or principal investigators. Its staff of 500 includes 220 trainees at the doctoral or post-doctoral level from across Canada, and around the world. The institute also links with clinicians and clinical scientists within the hospital and with a number of investigators working directly with patient care.

“Increasing our knowledge and discovery are our priorities,” says Lye. Indeed, the institute has been identified as one of the “Top Ten Cell Superstars and Genome Giants” by *Science Watch*, a journal that tracks trends and performance in basic research. “But over the years, we have also made significant efforts to build bridges with industry. We want to really enhance our ability to be at the forefront of research and improve the economic capacities of Ontario and Canada.”

Seven new companies have been created involving the discoveries and expertise of Lunenfeld scientists. These companies employ over 170 individuals and have attracted more than \$130 million in investment. For example, GlycoDesign, Inc. has become an international leader in the development of novel therapeutics in the field of glycobiology (the role of sugar chains on proteins).

Lye is proud of the institute’s commitment to sharing the importance and excitement of scientific research with the community. “We have put on a number of awareness lectures that are open to the public,” says Lye. “We are also committed to outreach and education, and work hard to generate interest among school children in

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Robarts Research Institute:

Raising the bar of scientific discovery

“Medical research saves lives, saves money and creates jobs.”

This has long been a favourite saying of Dr. Mark Poznansky, president and CEO of the Robarts Research Institute, located in London, Ontario. Since it was established in 1986, the institute has consistently backed up this statement. As Canada’s only independent medical-research institute, the institute has realized major discoveries, won prestigious awards and made vital contributions to medical science and technology commercialization.

“Our scientists are leaders in their respective fields, attracted by the institute’s reputation for excellence in fundamental inquiry into biology and medicine, as well as clinical research,” explains Poznansky. Named for former Ontario premier John P. Robarts, the institute has almost 450 employees, including 48 principal investigators and 170 trainees. Some of their notable achieve-

ments include proving that ASA helps to prevent strokes; developing world-leading imaging technology, particularly 3-D ultrasound used to diagnose tumours of the breast, eye and prostate; and helping to prove that the drug Cyclosporin prevents organ rejection in transplant patients.

The institute conducts core research in five basic research areas: imaging, transplantation immunology, neurosciences,

vascular biology and clinical trials. “Between 60 and 100 per cent of the institute is engaged in biotechnology,” says Poznansky. “It’s a large area and I tend to think about it in its widest sense. Medical imaging makes up about one-third of the institute, but it has an important biotechnology component in terms of early detection and treatment of disease.” Affiliations with the University of Western Ontario and London Health Sciences Centre help discoveries move from the lab, to the clinic, to the classroom – to the benefit of both patients and future scientists.

Dr. Poznansky believes that, “We are friendly with the private sector, but not driven by it.” As he explains, “We are driven by the pursuits and mechanisms of biology and medicine as opposed to commercialization. However, we do try to develop a culture of entrepreneurship. As soon as we have something that has commercial potential, we have a very effective technology transfer process within the institute.”

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Adherex Technologies

takes a new approach to treating cancer

Adherex Technologies got its start in Montreal in 1996, a spinoff of McGill University. Adherex's technology included a potentially new way to treat cancer, among other life-threatening diseases, but in spite of its promise, the company struggled for its first few years.

*Company: Adherex Technologies
Sector: Biotechnology
Location: Ottawa
Contact: www.adherex.com*

Then, in 1998, two things happened that changed Adherex's course. It got a new CEO, John Brooks, and he relocated the company to Ottawa to take advantage of the city's growing life sciences community.

"I was attracted by Ottawa's extensive research and development infrastructure and the availability of excellent lab space," Brooks explains. "I also liked the lifestyle the city offered and felt that it would be important in recruiting and keeping top-notch minds."

Its lead product, Exherin, which is based on proprietary cell-adhesion technology, represents a fundamentally different way of treating cancer. Rather than targeting and destroying cancer cells, Exherin targets the blood vessels that nourish tumours. Tested in a number of preclinical trials, Exherin has shown the potential to slow or halt tumour growth by cutting off the blood supply that feeds them. In effect, Exherin starves the tumours. What's more, it works in 30 minutes, and has no known side-effects.

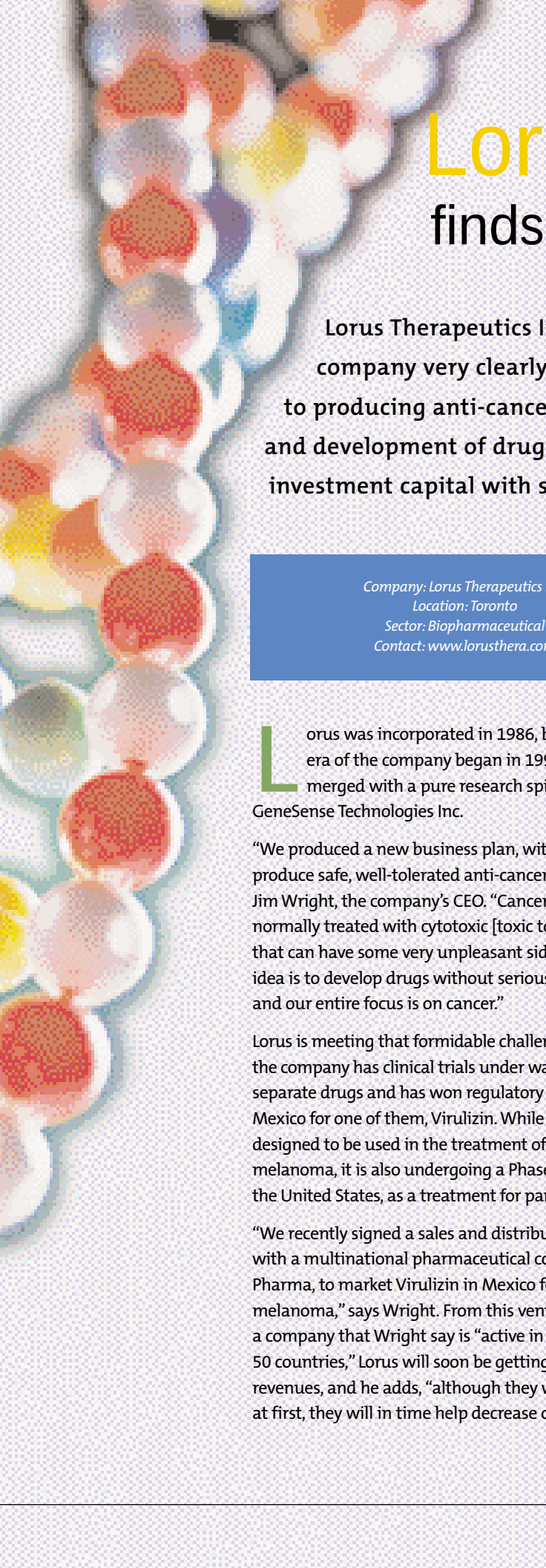
"Exherin seems to work across a wide range of tumours," says Brooks. "Preclinical trials have included breast, ovarian, lung and colon tumours."

In fact, initial results were so impressive they attracted the interest of global giant AstraZeneca PLC, a leader in cancer treatment. Last fall, the two companies entered into a formal collaboration with the goal of accelerating development of Exherin, which is slated to begin human trials by the end of 2002.

"This is a very exciting time for us," says Brooks. "More than a million North Americans were diagnosed with cancer last year and there's a compelling need for more effective cancer treatment. We're hopeful Exherin will be it."

There is more to Adherex than Exherin. The company's technology has the potential for other applications, including drug delivery through the skin, delivering drugs to the brain, nerve regeneration and wound healing.

Success hasn't come without its share of setbacks – there have been financial hurdles as well as scientific challenges to overcome – but Brooks is confident Adherex is on track in its quest to help revolutionize cancer therapy.



Lorus

finds new ways to fight cancer

Lorus Therapeutics Inc. has a unique corporate slogan that defines the company very clearly: “business and science working together.” Dedicated to producing anti-cancer drugs through research and through the acquisition and development of drugs from other companies, the Toronto firm matches investment capital with some of the world’s leading cancer research.

*Company: Lorus Therapeutics Inc.
Location: Toronto
Sector: Biopharmaceutical
Contact: www.lorusthera.com*

Lorus was incorporated in 1986, but the modern era of the company began in 1999, when Lorus merged with a pure research spinoff company, GeneSense Technologies Inc.

“We produced a new business plan, with the vision to produce safe, well-tolerated anti-cancer drugs,” says Jim Wright, the company’s CEO. “Cancer patients are normally treated with cytotoxic [toxic to cells] drugs that can have some very unpleasant side-effects. Our idea is to develop drugs without serious side-effects, and our entire focus is on cancer.”

Lorus is meeting that formidable challenge. For instance, the company has clinical trials under way for three separate drugs and has won regulatory approval in Mexico for one of them, Virulizin. While this drug was designed to be used in the treatment of malignant melanoma, it is also undergoing a Phase III clinical trial in the United States, as a treatment for pancreatic cancer.

“We recently signed a sales and distribution agreement with a multinational pharmaceutical company, Mayne Pharma, to market Virulizin in Mexico for malignant melanoma,” says Wright. From this venture with a company that Wright says is “active in more than 50 countries,” Lorus will soon be getting its first revenues, and he adds, “although they will be modest at first, they will in time help decrease our ‘burn’ rate.”

Wright notes that Lorus is well-capitalized, with about \$40 million in cash raised through public share offerings. Like many biotech companies, Lorus is dependent on access to capital with which to fund research and development that can take several years to generate revenue-producing drugs.

“Toronto is the best place in Canada for biotech start-ups, for two reasons,” says Wright, who established GeneSense Technologies with co-founder Dr. Aiping H. Young (now Lorus senior vice president of research and development) in Winnipeg in 1996. “We have the best access to investment capital here, in the financial centre of Canada. And we also have access to a huge pool of well-educated scientists and business people in southern Ontario.”

Lorus, which recently moved to a new 20,000 sq. ft. headquarters near Pearson International Airport in Toronto, has a staff of about 45 people (including 13 PhDs and three MDs).

“We’re developing our own products, like GTI-2040, a drug in clinical trial for the treatment of patients with renal cell carcinoma, in-house,” he says. “We also acquire the rights to drugs from outside the company and develop them. For example, we’re working on some anti-cancer drugs from Harvard Medical School.”

Persistence pays off for BLES Biochemicals

This past Valentine's Day was a particularly happy one for the people at BLES Biochemicals Inc. in London, Ontario. They were given the news that Health Canada had approved the marketing of BLES (bovine lipid extract surfactant). Used in hospitals to treat premature infants suffering from neonatal respiratory distress syndrome, the product has itself had a long gestation period.

*Company: BLES Biochemicals Inc.
Sector: Biotech
Location: London
Contact: Dave Bjarneson (bles@wwdc.com)*

Initial research into BLES's potential for treating lung problems in premature babies began at the University of Western Ontario in the early 1970s.

"The approval process is long, and for good reason," says BLES Biochemicals Inc. president Dave Bjarneson, "but it can feel like a marathon, where the last mile is the longest. We are delighted that our product is now being used in more than 80 hospitals across Canada."

BLES is made from a mixture of fats and proteins collected from beef lungs. Certain components are extracted, processed and purified to produce the compound that gives the premature baby's lungs improved function.

"Basically," says Bjarneson, "our expertise lies in the purification process. In our Phase III trial, we compared BLES to a synthetic product. Our performance was better in several areas."

Ontario's hospitable research and development climate made the long process of developing BLES and guiding it through the necessary regulatory trials and submissions easier for the company. In addition, unlike many biotech companies that finance their research work through venture capital, BLES used the Scientific Research and Experimental Development Program.

"All levels of government are doing a good job for research and development," says Bjarneson. "The tax

credits were a good incentive for us, and we also received grants from the Medical Research Council. The London Economic Development Corporation has also been a big supporter."

While BLES is primarily used for neonatal patients, it also holds promise as a treatment for adult lung disorders. The company is investigating its potential as a treatment for respiratory conditions arising from various types of lung injury.

Today, BLES is being used at prestigious medical institutions such as Mount Sinai Hospital and the Hospital for Sick Children.

"We want to maintain the Canadian market, then look further afield," says Bjarneson. "We've filed for approval in New Zealand, and we're looking at a number of other foreign markets."





Diabetes cure the goal for Diabetogen

If researchers at London, Ontario-based Diabetogen Biosciences are successful – and president and CEO William McGinnis is confident they will be – a cure or preventative treatment for diabetes could soon be added to the list of Ontario’s biomedical “firsts.”

*Company: Diabetogen Biosciences
Sector: Biotechnology
Location: London
Contact: www.diabetogen.com*

A spinoff of the research at the respected Robarts Research Institute, Diabetogen was established in June 2000 to capitalize on discoveries dealing with the autoimmune component of Type 1 diabetes (insulin-dependent) and already has four products in development aimed at each stage of the disease.

How great is the need for a prevention or a cure?

Type 1 diabetes is a chronic and progressive autoimmune disorder that afflicts almost two million people in North America, and 20 million worldwide. It’s the single most costly chronic disease – direct medical expenses top US \$35 billion a year in North America – and the sixth leading cause of death.

With a handful of other biotech companies working toward the same goal, Diabetogen is in a race to gain Canadian and U.S. government approval for its products and establish them in the market ahead of its competitors. McGinnis, a 30-year veteran of the North American pharmaceutical industry, is determined his company will cross the finish line first and he’s convinced he’s got the advantage.

“In the biotech industry, the workforce defines competitive edge,” Mr. McGinnis says. “Our chief scientific officer, Dr. Terry Delovitch, is a leading expert in the field of autoimmune diseases and he’s backed up by some of the best and brightest young research minds to be found anywhere.”

That research strength, combined with an aggressive business development strategy, has helped attract investors with deep pockets. To date, two rounds of venture capital investment have raised close to \$8 million to help advance Diabetogen’s technology platform and advance its drugs towards clinical trials.

The company has also caught the eye of California-based Abgenix Inc., which recently announced a collaboration with Diabetogen. It’s an important deal for Diabetogen because it means that Abgenix will manufacture Diabetogen’s monoclonal antibody products, ensuring a steady supply from the clinical trials stage through to commercialization.

For McGinnis and his research team it’s been a fast race so far. “We’re trying to do in three to five years what most biotech companies take seven to 10 years to accomplish,” says McGinnis. “The secret to our success is a complete focus on Type 1 diabetes.”

But while the company’s immediate goal is finding a preventative treatment or cure for Type 1 diabetes, Diabetogen’s science holds the possible promise of a cure for other autoimmune diseases, including rheumatoid arthritis, multiple sclerosis, lupus and psoriasis. And with five per cent of North Americans suffering from autoimmune diseases, the potential market is huge.

All of which has McGinnis and his team running as fast as they can.



PATHEON

*Company: Patheon Inc.
Sector: Pharma/Biotech
Location: Toronto*

Contact: Kevin McCarthy www.patheon.com

A company that began as a small, privately held manufacturer of over-the-counter pharmaceutical products in Fort Erie, Ontario, in 1974 is now a major supplier to the world's leading pharmaceutical and biotechnology companies. Patheon Inc., which went public in 1992, provides outsourced drug development and manufacturing services to 15 of the world's 20 largest pharmaceutical companies, and has more than 100 clients worldwide. A smaller, but growing,

component of its work is in drug development for biotech firms.

"Research and development, and marketing are now the main focus for a lot of the big pharmaceutical companies," says Robert Tedford, CEO of Patheon. "By hiring us to do their manufacturing, they can devote their resources to these core activities and minimize investments in capital-intensive facilities."

Companies such as GlaxoSmithKline, Aventis, Johnson & Johnson and Bristol-Myers Squibb all agree. Patheon gives its clients turnkey solutions for everything from pharmaceutical dosage form development (tablets, capsules, etc.) right through to commercial manufacturing and packaging. Patheon also manufactures

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Samuel Lunenfeld Research Institute

careers in science and technology." The Lunenfeld Institute holds Science Day workshops, invites 13-year-olds to be "Scientists for a Day," and many trainees "adopt" a classroom in a local Toronto-area high school and visit the grades 9 and 10 students regularly throughout the school year.

The Lunenfeld Institute actively develops new programs of scientific research, including The Centre for Modeling Human Disease, which is supported by the province's Ontario Innovation Trust program. This centre, under the direction of Dr. Janet Rossant, will produce new mouse models of human development and clinical disorders, which will ultimately aid in the understanding of function and involvement of all genes

in human disease. As Lye says, "This is an incredibly exciting time for science – with the genome project, with the work in stem cells and in understanding how proteins talk to one another.

"At the same time, barriers between the clinic, the laboratory and industry are breaking down. Alongside maintaining research excellence, one of our goals at the Lunenfeld Institute is to train new scientists who can seamlessly move between these sectors, and help create an environment of tremendous economic development and growth."

For more information on the Samuel Lunenfeld Research Institute, please visit www.mshri.on.ca or call (416) 586-8224.

provides outsourcing remedy for pharma and biotech companies

clinical trial material and scale-up services for reformulations and new drugs.

"Fifty per cent of the 100 top selling drugs today will be off patent by 2005, so the large pharmaceutical companies have to focus on new product development. By using us for manufacturing and development services, they can reduce their outlay of capital. And if a drug is not approved for some reason, they aren't left with idle manufacturing capacity," says Dr. Shabbir Anik, executive vice president of PDS and chief scientific officer.

Patheon, which makes about 575 products that are sold in over 120 countries, has six manufacturing sites in Ontario, and four recently acquired plants in the United Kingdom, France and Italy.

"Patheon's real growth started in the 1990s, when a strategic plan was put in place," says Nick DiPietro, the company's president and COO. "We've grown by acquiring high-quality manufacturing plants. In 1996, we had 369 employees and about 250,000 sq. ft. of manufacturing capacity. In 2002, we have 2,800 employees worldwide, with about 1,700 of those in Ontario. In fact, two of our last three acquisitions were in Ontario."

Development work for biotech companies is another growth area for Patheon. In fiscal 2001, 79 per cent of the company's revenues were from big pharmaceutical companies, while the remaining 21 per cent came from work done for biotech and virtual pharmaceutical companies.

"A lot of biotech companies have no manufacturing capacity and just one or two products, so they come to us," says DiPietro. "We have 175 scientists on staff here in Toronto dedicated to development work only. We can offer clients integrated development services, which can take a new biotech product right through to full commercial manufacturing."

As Patheon continues its strong growth, the company intends to keep a balanced portfolio of pharmaceutical and biotech clients.

"We'll continue to grow from our base here in Ontario," says Tedford. "We serve the entire North American marketplace, in this increasingly globalized industry, from Ontario. It's a great location for a company like ours."

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Robarts Research Institute



To date, nine companies have emanated from the discoveries at the Robarts Research Institute. These include software companies, medical-imaging hardware companies and two biotech firms, Viron Therapeutics and Diabetogen Biosciences. Together, the companies have created more than 100 new jobs.

To meet its growing needs, a 96,000 sq. ft., seven-floor addition is currently being built, doubling the institute's space. "Our growth and success can be traced to several factors," says Poznansky. "There are many generous donors who believe in our research and invest in the institute for philanthropic reasons. There are also many investors who invest in our companies."

"But the heart of our success is good science. We have an independence that is not always possible in university or hospital-driven research facilities. And we constantly raise the bar in terms of the quality of our science, the quality of our scientists, the importance of our discoveries and the potential for economic return. Everything flows from the science."

For more information about Robarts Research Institute, visit www.robarts.ca or call (519) 663-3021.



Kingston

Celebrating business opportunities
in Ontario's municipalities

www.kingstonbiotech.com

Kingston has a heritage shaped by politics, and by water. It was the first capital city of Upper and Lower Canada, chosen for its strategic location at the junction of the St. Lawrence River, the Rideau Canal Waterway and Lake Ontario. Kingston was well-positioned for defence of the new colony and, with its thriving shipbuilding industry, played a significant role in the development of the province.

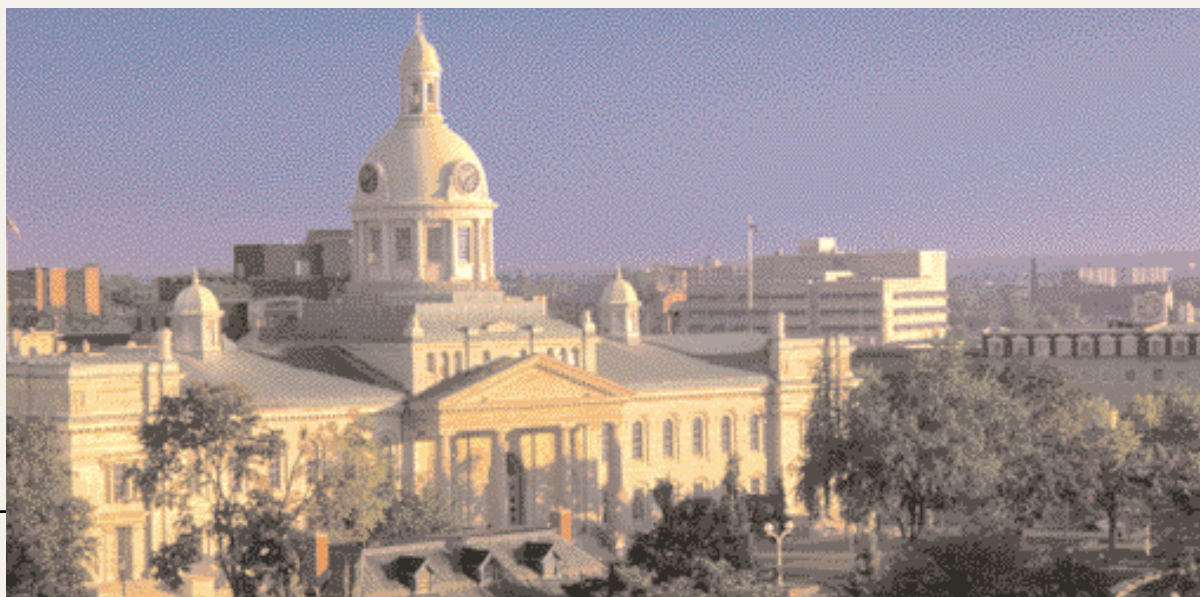
Today, the waterways of Kingston (population: 116,000) remain a large part of its identity. The city is known as the freshwater sailing capital of North America, and the western gateway to the Thousand Islands. Its economy is based primarily in service-sector employment, primarily government, education and health. It has a strong industrial base, with manufacturers including DuPont, Alcan and Bombardier, and one of the highest concentrations of call centres in North America.

Kingston is also a burgeoning Ontario centre for biotechnology. "Biotechnology has long been a significant part of the health-care sector in Kingston, and is important to our wider range of knowledge-based industries," explained Shelagh McDonald, project manager of the Biotechnology Action Plan, with the Kingston Economic Development Corporation. "We clearly have all the components in place to encourage growth of a strong biotechnology cluster." As a result, three years ago the

city launched an aggressive plan to be recognized internationally as a player in the biotechnology sector, and to drive the research, development and marketing of world-class product for global markets.

Kingston currently has four emerging technology clusters: health sciences, advanced materials, information technologies and telecommunications, and environmental products and services. Together, they account for more than \$2 billion in annual output. Prestigious local educational institutes, including Queen's University and St. Lawrence College, are closely associated with biotechnology. These facilities conduct high quality research, and help take new discoveries from the research lab to the market.

For instance, Queen's University's PARTEQ Innovations is ranked fourth among the top 50 research institutions in North America for performance in technology transfer. Queen's also collaborated with the city on the creation of the Kingston Technology Exchange Centre, a 7,000 sq. ft.



technology incubator and network designed to foster the commercialization of new technology in Kingston.

"If I were to narrow down Kingston's attraction to the biotech community, I would say scope and scale," says McDonald. "We have world class institutions, excellent technology transfer abilities, a solid track of biotechnology start-ups and room to grow. We are also small enough that people within the various institutions can, and do, collaborate with each other." McDonald also points to the benefits of a more relaxed lifestyle, and a highly skilled labour force with 60 per cent of the population having post secondary degrees.

Kingston clearly supports a strong entrepreneurial spirit, with 90 per cent of local businesses having 50 employees or less. It also encourages significant growth opportunities for its businesses. "More and more local firms are receiving venture capital, which is having a positive effect on economic growth and job creation," says McDonald. "We plan to promote even more research and development, to develop our own companies and encourage them to stay and flourish in Kingston, and to attract other companies to the area. Right now, the public sector makes up a substantial part of the employment base. We want to enlarge the private sector and have it more in balance with the public sector. Seizing the opportunity available in Kingston's biotechnology sector is central to that goal."

“Biotechnology has long been a significant part of the health care sector in Kingston, and important to our wider range of knowledge-based industries,”

Alongside Kingston, regional biotechnology clusters have also developed around academic centres in Toronto, Ottawa, London, Guelph and Hamilton.

For more information, please visit www.kingstonbiotech.com or phone (613) 544-2725.

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From concept to market

The drug refined, Phase II began. It went on for five years and involved testing Hemolink in five different applications – anemia due to renal failure, chemotherapy-induced anemia, orthopedic surgery, cardiac surgery and life-threatening blood loss due to accident. The Phase II trials demonstrated that Hemolink more than lived up to its early promise, proving to be safe, effective and compatible with all blood types but also having a longer shelf life than whole blood.

Phase III has been going on for the past year, and Kennedy expects it to continue for another year, with Hemolink going to market in Europe by the end of 2003. The company has built a \$90 million production facility in Toronto that's ready to start producing 300,000 units of Hemolink a year once it gets the green light.

For Kennedy, this last stage has proven the most challenging, involving a delicate balancing act.

"Biotech is a risky business," he explains. "It takes a lot of time and resources to bring a drug to market. And while you're working away on it, you just don't know if someone else out there is developing something that will trump you."

The trick, which he's learned from 20 years in the pharmaceutical business here and in the U.S., is to continue the research without diverting essential resources and attention from the flagship product.

A decade ago, the number of biotech companies in Ontario could be counted on the fingers of one hand. Today, there are more than 110 firms and the number is growing quickly – proof positive that there are scientists and entrepreneurs ready to rise to the challenge of taking a drug from concept to commercialization.

From concept to market:

the anatomy of a biotech drug

“Bringing a biotech drug to market tests all your skills, your spirit and your will,” says Hemosol president and CEO John Kennedy. He knows what he’s talking about.

Hemosol was among the first home-grown biotech firms in Ontario and it’s taken the company 14 years and about \$160 million to develop its flagship product, Hemolink. This biotech drug has, among other things, the potential to revolutionize blood transfusions. Commercialization is still a number of months away.

Hemosol’s experience is typical in the industry, where the odds of successfully launching a single product are one in 10 – and where, if you’re successful, it takes on average 15 years and anywhere from \$300 million to \$400 million.

It all starts with an idea. In Hemosol’s case, it was to develop a blood replacement product for transfusion based on hemoglobin. (Biotech drugs are based on natural organisms, rather than just chemicals.) The potential market is huge: 14 million units a year for surgery in North America alone. But there were major obstacles, such as how to extract hemoglobin from red cells, and then purify and stabilize it.

It took nearly four years to figure that out. Proving the drug was effective and taking it from bench-top to industrial scale took another eight.

The first step was establishing “proof of concept” or feasibility. That involved three years of preclinical lab testing on animals. It was followed by three phases of human clinical trials in Canada, the United States and the United Kingdom.

Generally speaking, Phase I trials determine the profile of a product and how it performs in humans. Phase II demonstrates that the product works as intended. Phase III establishes how well it works compared to other drugs now on the market.

For Hemosol, Phase I went very quickly – just three months from start to finish. Then it took two years to analyze the results.

“There were some surprises,” says Kennedy. While seeing to such surprises is a normal part of the process, it means logging more lab time.

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Company: Hemosol
Sector: Biotechnology
Location: Toronto
Contact: www.hemosol.com

OBR Ontario

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