Industry Canada

Biopharmaceutical Industry Technology Roadmap Initiative Preliminary Work

Volume 2: Appendix

May 1, 2000

strategic health innovations

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1. Consultation List

The contact information for all stakeholders is provided in the following table. In Appendix 4, transcriptions from consultations are available. All those consulted were provided with a draft for revisions before final transcription.

COMPANY	SAL	CONTACT	POSITION	TELEPHONE	FAX	ADDRESS	CITY	Prov	POST
Angiogene Inc.	Dr.	Francois Bergeron	President	514-281-6000x5486	514-896-4926	2099 Alexandre De Seve, ste Y-1605	Montréal	QC	H2L 4M
Angiotech Pharmaceuticals Inc.	Dr.	Ken Mellquist	CEO	604-689-9766	604-221-2330	6660 NW Marine Drive	Vancouver	BC	V6T 1Z4
AnorMED Inc.	Dr.	Michael J. Abrams	President & CEO	604-530-1057	604-530-0976	#100 - 20353 64th Avenue	Langley	BC	V2Y1N5
Antalium Inc.	Dr.	Kazimierz Babinski	CEO & President	514-842-9849	514-842-1505	1550 Metcalfe, Bureau 502	Montréal	QC	H3A 1X
Base4 Bioinformatics Inc.	Dr.	Martin Sumner-Smith	President	905-677-0532x229	905-677-1122	6299 Airport Road, Suite 601	Mississauga	ON	L4V 1N3
BIOSTAR Inc.	Dr.	Stephen Acres	President	(306) 931-7500x510	(306) 242-9010	343-111 Research Dr., Atrium Blding	Saskatoon	Sask	S7N 3R
BioTools Inc.	Mr.	Gordon Shranks	President	780-423-1133	780-423-1333	420 Sun Life Place, 10123 99 St.	Edmonton	AB	T5J 3H1
Bregma International	Dr.	Assem Hedayat	President	306-934-8270	306-934-8271	214-111 Research Drive	Saskatoon	Sask	S7N 3R
BRI	Dr.	Michel Desrochers	Director General	514-496-6101	514-496-6388	6100 Royalmount Avenue	Montréal	QC	H4P 2R2
Cangene Corp.	Dr.	Kim Wong	Director, R&D	204-275-4303	204-487-4086	26 Henlow Bay	Winnipeg	MB	R3T 5Y3
Chemical Computing Group	Mr.	Paul Labute / Bill Haden	President	514-393-1055	514-874-9538	1255 University Ave, Suite 1600	Montreal	QC	H3B 3X
ConjuChem Inc.	Mr.	Duffy DuFresne	President	514-844-5558	514-844-1119	225 President Kennedy Ave. W., #3950	Montréal	QC	H3H 3Y
CV Technologies Inc.	Dr.	Jackie Shan	Sr. VP R&D	780-432-0022	780-432-7772	#308 Campus Tower, 8625 112 St.	Edmonton	AB	T6G 1K
Exogen Neurosciences Inc.	Dr.	Michael Atkin	President	514-288-5532x33	514-288-9280	P.O. Box 605 Succ. Place du Parc	Montréal	QC	H2W 2P
Hybrisens Ltd.	Dr.	Ezekiel Shami	President	416-736-5504	416-736-5979	Farquharson Bldg S, Room 104	Toronto	ON	M3J 1P
IGT Pharma Inc.	Mr.	Bruce Schmidt	President	604-822-3503	604-822-3506	2386 East Mall, Suite 311	Vancouver	BC	V6T 1Z3
Immucon Inc.	Mr.	Alain Bossé	President	514-878-1591	514-878-0035	1224 Stanley, Suite 313	Montréal	QC	H3B 2S7
Innovation Place	Dr.	Doug Tastad	Vice Pres	306-933-6258	306-933-8215	114 #15 Innovation Blvd. - The Galleria	Saskatoon	Sask	S7N 2X
International Wex Technologies	Mr.	John Othoff	Co-ordinator	(604) 683-8880	(604) 683-8868	777 Hornby St., Suite 2000	Vancouver	BC	V6Z 1S4
Key Molecular Corp.	Dr.	Joseph Tedesco	President	(416) 323-0076	(416) 323-0764	347 Collge St., Ste. 309	Toronto	ON	M5T 2V
Lorus Therapeutics Inc.	Dr.	Philippe Lacaille	President	905-305-	905-305-	7100 Woodbine Ave. Ste. 215	Markham	ON	L3R 5J2

Methylgene Inc.	Mr.	Don Corcoran	President	514-337-3333x224	514-337-0550	7220 Frederick Banting	Montréal	QC	H4S 2A
Mount Sinai	Dr.	Alan Bernstein	Director of SLRI	416) 586-8273	(416) 586-8857	600 University Avenue	Toronto	ON	M5G 1X
Mycota Biosciences Inc.	Dr.	Marc Lussier	President & CEO	514-987-3422	514-987-0389	225 President Kennedy Ave. W., #2550	Montréal	QC	H2X 3Y
Neurotrophic Bioscience Inc.	Dr.	Anthony J. Giovinazzo	President & CEO	416-674-8047	416-674-8060	96 Skyway Avenue	Etobicoke	ON	M9W 4Y
Nortran Pharmaceuticals Inc.	Dr.	Michael Walker	Chairman & Sci Founder	604-222-5577	604-222-6617	3650 Wesbrook Mall	Vancouver	BC	V6S 2L2
Nova Molecular Inc.	Mr.	William Bardosh	VP, Dir. Of Pharmacog	514-484-7373	514-484-0905	5252 de Maisonneuve Blvd., West, #105	Montréal	QC	H4A 3S
Paladin Labs Inc.	Mr.	Jonathan Goodman	President	514-340-1112	514-344-4675	6111 Royalmount Ave., Suite 102	Montréal	QC	H4P 2T4
PharmaDerm Laboratories Ltd.	Dr.	Marianna Foldvari	President	306-934-7471	306-934-7453	3 - 411 Downey Road, Innovation Place	Saskatoon	Sask	S7N 4L8
Phenogene Therapeutics Inc.	Mr.	Robert Knapen	President	514-496-1455	514-0496-5385	6100 Royalmount Avenue - BRI	Montreal	QC	H4P 2R2
Quanta Nova Canada Ltd.	Dr.	Michael Winther	President & Researc Dir.	902-678-7575	902-678-9440	15 Chipman Drive, PO Box 818	Kentville	NS	B4N 4H
Rx&D Canada	Mr.	Zenek Dybka	Director, ON Reg.Affairs	905-627-7851	905-627-7192	home office	Hamilton	ON	
Replicor Inc.	Dr.	Jean-Marc Juteau	President & CEO	514-842-9849x3183	514-842-1505	1550 Metcalfe, Bureau 502	Montréal	QC	H3A 1X
Sick Kids Hospital	Dr.	Lap Chee Tsui	Geneticist-in-Chief	416-813-6015	416-813-4931	555 University Avenue	Toronto	ON	M5G 1X
Spectral Diagnostics Inc.	Mr.	Douglas Ball	President	416-626-3233	416-626-7383	135-2 The West Mall	Toronto	ON	M9C 1C
StemCell Technologies Inc.	Dr.	Eric Atkinson	President	604-877-0713	604-877-0704	808-777 West Broadway	Vancouver	BC	V5Z 4J7
Supratek Pharma Inc.	Dr.	Valeri Alakhov	Vice President R&D	514-849-6094	514-282-1338	275 St. Jacques, Suite 700	Montréal	QC	H2Y 1M
Tai-Can Biotechnologies Inc.	Mr.	Greg Kamanka	VP Research	604-222-3746	604-2222964	4028 West 29th Avenue	Vancouver	BC	V6S 1V
TerraGen Diversity Inc.	Dr.	Julian Davies	President	604-221-8896	604-221-8881	Suite 300-2386 East Mall	Vancouver	BC	V6T 1Z3
Theratechnologies Inc.	Dr.	André de Villers	President & CEO	514-336-7800	514-336-7242	2310 Alfred Nobel Blvd	Montreal	QC	H4S 2A
U of Alberta	Dr.	Mohsen Daneshtalab	Prof. Of Medicinal Chem	780-492-2953	780-492-1217	U of Alberta - Faculty of Pharmacy	Edmonton	AB	T6G 2N
Vancouver Hospital	Dr.	Bernie Bressler	VP Research	604-875-5641	604-875-5684	2660 Oak Street – Rm 211	Vancouver	BC	V6H 3Z

2. Stakeholder Letter

Date

Title
Company Name

Dear Sir/Madam:

Industry Canada's Life Sciences Branch has commissioned STRATEGIC HEALTH INNOVATIONS to map the technology strengths and weaknesses of the Canadian biopharmaceutical industry and to consult with various industry and research stakeholders on their views of technology needs for this industry over the next five to ten years. This will set the groundwork for an **industry-led,** government-facilitated Technology Roadmap Initiative proposed for the Summer 2000.

A Technology Roadmap identifies the new critical technologies required by an industry to meet future market demands and can form the basis from which collaborative technology initiatives are planned and implemented. The ultimate goal is for the Canadian biopharmaceutical industry to gain a competitive advantage in a global market place. (Please see attached for additional information).

In preparation for a Technology Roadmap Initiative for the Canadian biopharmaceutical industry, we will be consulting with key stakeholders who can provide perspectives on future product needs, critical technologies related to drug discovery, development and production that must be developed to meet these needs, as well as an assessment of Canada's technology strengths and weaknesses. The active participation of industry and research stakeholders is critical for the successful realization of a Technology Roadmap. As part of the consultation process, we are asking for your input during a 1 to 1.5 hour in-person interview with members of our team. We will be contacting you to arrange a convenient meeting time.

We look forward to your participation in this project. If you have any questions, please do not hesitate to call us.

Sincerely,

Borys Chabursky, President
STRATEGIC HEALTH INNOVATIONS
(416) 236-1054
bchabursky@home.com

Technology Roadmap for the Canadian Biopharmaceutical Industry

Definition

A **Technology Roadmap** is a practical business forecasting tool which gives firms in a given sector a way to predict their future technology and product needs, and map out how best to attain them. By involving industry, research, government and other relevant stakeholders, it can help to develop a consensus about a set of needs and the technologies required for meeting those needs. It can also substantially influence the focus of research and development efforts, as well as strategies, policies and programs of stakeholders. By providing better technology planning, a Technology Roadmap can be a key instrument for guiding the growth and international competitiveness of the Canadian biopharmaceutical industry into the 21st century.

Background

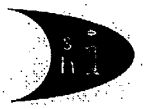
Industry Canada is currently facilitating industry-led Technology Roadmaps in Medical Imaging, Geomatics, Aerospace and Forestry Products. In the U.K., similar "Technology Foresight" initiatives have been launched in such sectors as health and life sciences, chemicals and pharmaceuticals, information and communication technology, and materials and manufacturing processes. The U.S. has also undertaken Technology Roadmapping initiatives in such sectors as integrated manufacturing, microelectronics, new materials and aerospace.

Purpose of Current Consultations

- To develop an awareness of the Technology Roadmap concept amongst key industry and other stakeholders in the Canadian biopharmaceutical sector
- To define existing technology capabilities and gaps in the Canadian biopharmaceutical sector (industry and research community)
- To identify critical technology needs and core competencies over the next five to ten years which must be developed to meet future market demands, and where Canada should position itself
- To seek the interest of stakeholders in actively participating in a Technology Roadmap initiative proposed for the Summer 2000.
- To present recommendations to Industry Canada's Life Sciences Branch

Outcome

- A document that will provide background material to prepare for the launch of a proposed Technology Roadmap initiative in Summer 2000
- The identification of key stakeholders who are interested in actively participating in the development of a Technology Roadmap for the Canadian biopharmaceutical industry



3. Consultation Template and Diagrams

Value Chain Stage	Basic Research	Commercialization	Business Development	Product Development	Market Development
2000					
Perception of Stage (1)					
Technology Drivers and Trends in VC Stage (2)					
Technology Drivers Before & After VC Stage (3)					
Relationships & Strategic Alliances (4)					

Value Chain Stage **2000**	Basic Research	Commercialization	Business Development	Product Development	Market Development
Market Needs and Demands Met & Unmet (5)					
Canadian Technology Weaknesses, Gaps and Threats (6)					
Canadian Technology Strengths and Opportunities (7)					
International Benchmarks (8)					

Value Chain Stage	Basic Research	Commercialization	Business Development	Product Development	Market Development
2005					
Perception of Stage (1)					
Technology Drivers and Trends in VC Stage (2)					
Technology Drivers Before & After VC Stage (3)					
Relationships & Strategic Alliances (4)					

Value Chain Stage	Basic Research	Commercialization	Business Development	Product Development	Market Development
2005					
Market Needs and Demands Met & Unmet (5)					
Canadian Technology Weaknesses, Gaps and Threats (6)					
Canadian Technology Strengths and Opportunities (7)					

Consultation Questions

2000

1. In 2000, what stage(s) of the biopharmaceutical value chain do you perceive your to be in, e.g. Basic Research, Commercialization, Business Development, Product Development, Market Development?
2. What do you identify as the Canadian and global technology drivers and trends in your stage of the value chain, e.g. technology platforms in Basic Research, information technology in Product or Market Development?
3. What do you identify as the Canadian and global technology drivers and trends in the stage before and the stage after your place in the value chain?
4. What are the key relationships and strategic alliances that will contribute to your technological success?
5. What do you identify as the unmet and met market needs and demand for biopharmaceutical technology in Canada and the rest of the world?
6. What do you identify as Canadian technology weaknesses, gaps and threats?
7. What do you identify as Canadian technology strengths and opportunities?
8. How would you benchmark Canada's technological development against the rest of the world?
9. Any additional comments

2005

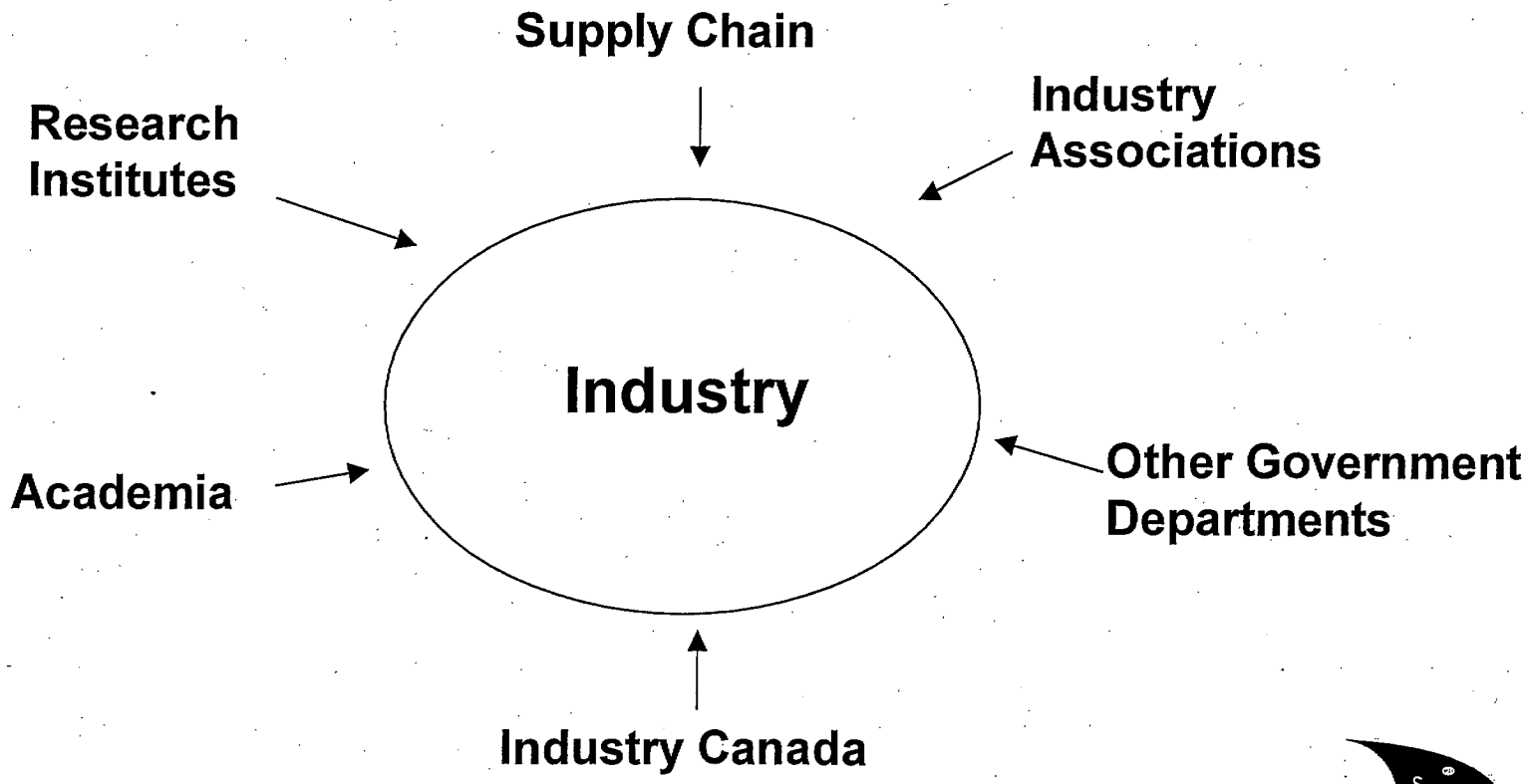
10. In 2005, what stage(s) of the biopharmaceutical value chain do you believe your organization will be in, e.g. Basic Research, Commercialization, Business Development, Product Development, Market Development?
11. In 2005, what do you believe will be the Canadian and global technology drivers and trends in your stage of the value chain, e.g. technology platforms in Basic Research, information technology in Product or Market Development?
12. What do believe will be the Canadian and global technology drivers and trends in the stage before and the stage after your place in the value chain?
13. What will be the key relationships and strategic alliances that will contribute to your technological success?
14. What do you identify as the future unmet and met market needs for biopharmaceutical technology in Canada and the rest of the world?
15. What do you identify as future Canadian technology weaknesses and threats?
16. What do you identify as future Canadian technology strengths and opportunities?
17. In 5 years, how would you benchmark Canada's technological development against the rest of the world?
18. Any additional comments

Technology Roadmap

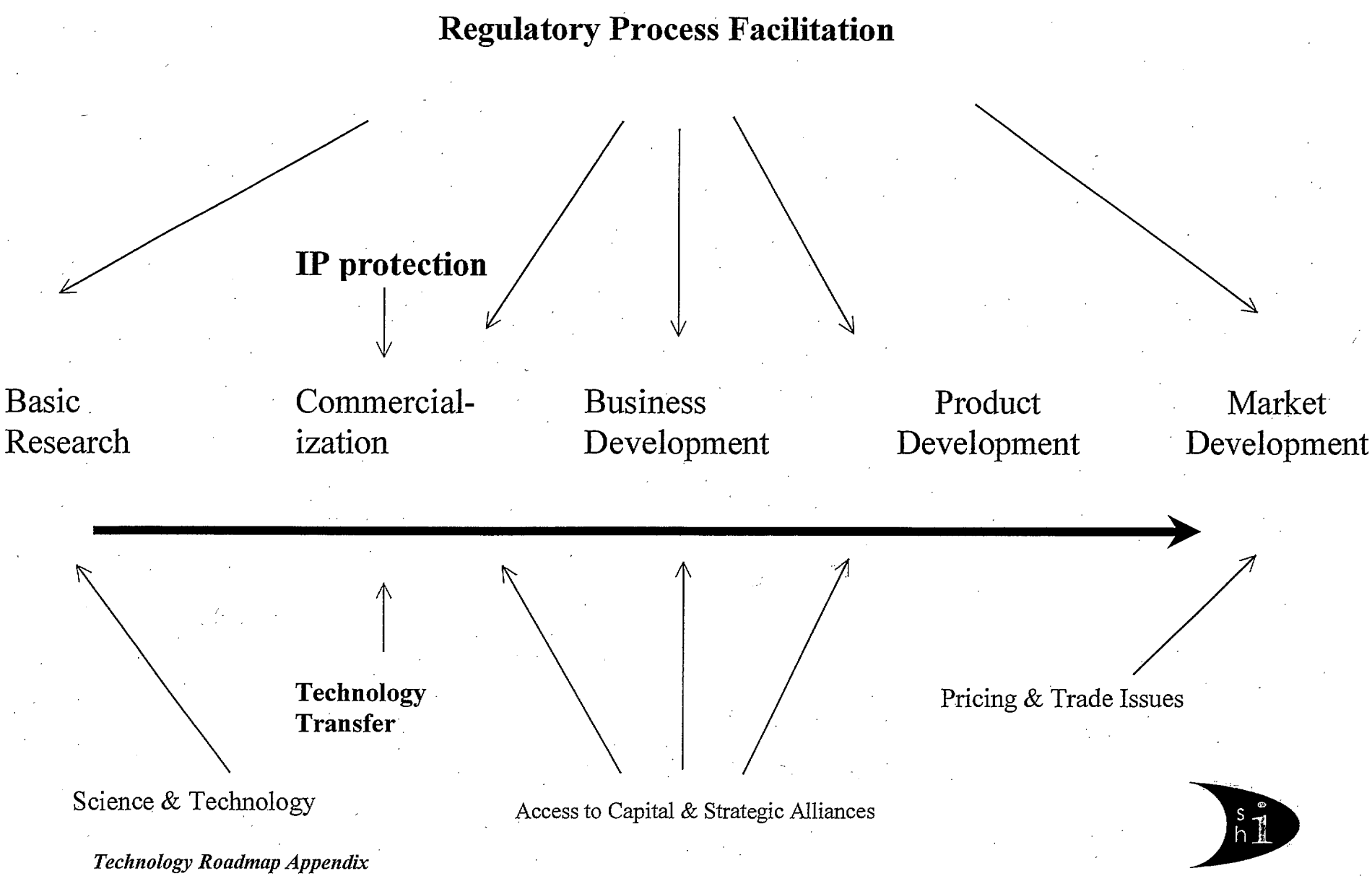
Developing, mobilizing and taking advantage of knowledge, expertise skills within and across industrial sectors to . . .

Identify critical technologies based on future market demand leading to . . .

Implementing Collaborative Technology Initiatives



Biopharmaceutical Industry Value Chain



4. Company Consultations

Name: Francois Bergeron, CEO	**Date:** March 10, 2000
Organization: Angiogene 1560 Sherbrooke St. East, suite Y-1605 Montreal, Quebec H2L 4M1 **Founded:** 1995	**Interviewers:** Alexander Liede, Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Angiogene is a R&D facility involved in proof of concept research of therapeutic applications in cardiology as in the treatment of ischemic heart diseases (basic research leading to commercialization)
- Angiogene intends to carry in-house development (in vitro and in vivo studies) of its compounds up to the phase I/II stage prior to seeking a suitable partner for the downstream development of its technology
- Angiogene's technology platform consists of antiproliferative therapeutics designed to prevent post-angioplasty restenosis of the vascular wall and angiogenic agents administered to stimulate angiogenesis and treat severely ischemic patients

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Angiogene will continue to build products pipeline aligned on current and future trends in Interventional Cardiology

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- DNA-based therapies in cardiology; this relates to Angiogene's core competence and its main focus.

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

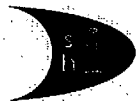
- Not in position to comment in detail about the biotechnology industry in general
- It is important for Canada to avoid the "me too" approach in this industry
- This is an interesting distinction: should the technology develop for commercial success or for the betterment of society?
- The key is to identify an unmet medical need and develop a product to fit that need

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- The facility is critical for our research. Our facilities are located at the Centre hospitalier de l'Université de Montréal (CHUM) Research Centre. University assistance is important

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Recently, there has been a good amount of seed and Round 1 capital available for



biotechnology. However, Venture Capitalists in Canada are more timid than they are in the US.

- To get a critical mass in this industry, there is a need for educating scientists in business skills. It would be nice if we could raise awareness of the business side of science at the undergraduate University level or earlier to lure more students into this field. Personally, I was not aware of the business of science when I was a science student.

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- There is a gap in the Canadian biotechnology market in (competent) business management. Perhaps the reasons for this are any combination of the following: (1) less awareness of potential in biotechnology, (2) less willing to take risks on small biotech companies than in the US, (3) they are less experienced. One idea may be to offer pharmaceutical industry executives short-term opportunities (sabbaticals) from the big pharma to develop smaller biotech companies.

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Canada has good scientists and academics; basic science is strong

9. How would you benchmark Canada's technological development against the rest of the world?

- US is the best
- Canada is better than France, UK

10. Any additional comments?

- Canada does not have sufficient quality facilities to do animal, in vivo studies
- Will Industry Canada have an influence on Health Canada? One major problem is the approval process of new drugs. We are later than the US for the review process. When we delay this process, we delay clinical trials and the progress of biotechnology in Canada.

Name: Ken Mellquist, President	**Date:** March 8, 2000
Organization: Angiotech Pharmaceuticals Inc. 6660 N.W. Marine Drive Vancouver, British Columbia V6T 1Z4 **Founded:** 1992	**Interviewers:** Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Focused on market development of paclitaxel, based on previously established therapeutic knowledge of taxol
- Initial R&D questions were: what else can this drug do? More than cancer treatment.

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Apply drug delivery and function knowledge to launch other platforms (improving medical device performance)

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

-

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Combining drug with medical devices
- Technology is not critical to the development of Angiotech's products
- New technology to create new compounds may be important

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Angiotech has partnerships with manufacturers Boston Scientific, Cook Inc., C.R. Bard and W.L. Gore. Partnerships will be mainly with non-Canadian companies

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Canada's VC market needs to mature
- Cost of doing business (e.g. travel, taxes) must decrease
- Must pay employees more (stock option plans) than they would make in the US to encourage them to move to a smaller economy. How do you get qualified individuals to move to or stay in Canada? It is difficult to staff businesses beyond 50-100 people.

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Canada is not business-friendly
- To move ahead and make business in North America, Canada must make transition between countries seamless and continue to support Universities
- What do you need to do well? (1) product must perform well, (2) develop new products and (3) do good R&D

8. In 2000 and 2005, what do you identify as Canadian technology strengths and

opportunities? • Good science; must be careful not to lose good scientists • Highly educated society • Universities commercialize well • Next door to largest economy in the world (the US)
9. How would you benchmark Canada's technological development against the rest of the world? • Canada is behind US, but on par with Europe
10. Any additional comments? •

Name: Michael Abrams, President and CEO	**Date:** March 2000
Organization: AnorMED Inc. 20353 64th Avenue, Suite 200 Langley, British Columbia V2Y 1N5 **Founded:** 1996	**Interviewers:** Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- AnorMED Inc. (AM) is involved in the discovery and development of metal based therapeutics (currently has five compounds in clinical development including those for cancer and AIDS)

2. In 2005, what stage of the value chain do you believe your organization will be in?

-

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- AM's core technology utilizes a combination of expertise in clinical pharmacology, coordination chemistry (the science of how metals atoms interact with molecules and ions) as well a sound knowledge of unmet medical market needs to develop drug leads
- AM's will utilize certain properties of metals for drug development such as: the tendency for metal ions to interact with biological molecules, their unique their dimensional structures that provide novel shapes for fitting into biological targets, their oxidation and reduction capabilities and their ability to release radioisotopes

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Coordination, medicinal and small molecule chemistry will continue to be important fields over the next 5 years
- Although not directly a technology, clinical trial expertise will also become increasingly important

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- AnorMED has not had difficulties in establishing strategic alliances (they include; AstraZeneca, Shire Pharmaceuticals and Dupont Pharmaceuticals)
- Commercial production of compounds would most likely be out-sourced

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Drugs for diseases such as cancer and AIDS

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- We have too few people with extensive experience in regulatory affairs, clinical

development and senior management • The taxation system
8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities? • We have a strength in basic science and research due to our excellent educational system • Canada has sufficient money to support this
9. How would you benchmark Canada's technological development against the rest of the world? • USA is the world's leader, but this is not surprising given the size of their population
10. Any additional comments? •

Name: Kasimir Abinsky, CEO	**Date:** March 9, 2000
Organization: Antalium 1550 Metcalfe, Bureau 502 Montreal, QC H3A 1X6 **Founded:** 1999	**Interviewers:** Borys Chabursky, Alexander Liede

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Antalium's focus is on pain management by basic research on sensory neuronal ion channels with future commercialization and product development. Antalium is a McGill University spin-off.
- Government could help in negotiations with big pharmaceutical companies

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Concentrate on identifying compounds from public databases for drug development
- Develop new technologies to permit the identification of new ion channels

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Proteomics, in particular, ion channels
- Pharmacogenetics, in specific pathologies
- Bioinformatics, data mining
- Genomics

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- New technologies will evolve to make use of deciphered human genome
- Computer technology in genomics
- Will pharmacogenomics really be applicable?

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Best not to rush into alliances
- McGill University is share-holder in Antalium and research is done with contracts at McGill University. Universities are useful in the beginning but slow process that followed with VCs; VC and University negotiations took one year. Hopefully Universities will not try to focus on patents and spin-offs.

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

-

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Universities are not entrepreneurial enough and may not view biotech as a good investment
- More money is necessary to move with research, although it is not certain whether the government can provide aid or not. Canada needs to realize that biotechs need capital and could perhaps provide VCs with incentives. The analogy would be that Canada has

built a rocketship, but there is no fuel to take off. Research should not be hindered by financial needs.

- Biotech companies should avoid equity based VC funding. It may be better to fund fewer companies with more money. If the money is there, the product will be there.

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Quebec has excellent tax benefits and Montreal is a key location for pain research
- Highly qualified scientists are in Canada
- Being in a multi-lingual setting helps
- University infrastructure helps to get investment

9. How would you benchmark Canada's technological development against the rest of the world?

-

10. Any additional comments?

-

Name: Dr. Martin Sumner-Smith, President	**Date:** March 20, 2000
Organization: Base4 Informatics 6299 Airport Rd., Suite 601 Mississauga, Ontario L4V 1N3 **Founded:** 1996	**Interviewer:** Chia Chia Sun

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- All stages of the value chain, ranging from developing the product to marketing it
- Specializes in knowledge management, e.g. Alliance Manager, an extranet, will conduct IP audit trails (customized for $50 to $100 K)

2. In 2005, what stage of the value chain do you believe your organization will be in?

- As above

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Information management: the interface between knowledge management and drug discovery development can be developed and dialogue increased to increase management efficiency
- As pharmaceutical companies consolidate, research efficiency will decrease (28% of research is already outsourced) and there will be a need to manage information better (pharma already spending 10 to 15% on information management)
- Pharma already cannot afford to access all the diverse biotechnologies available

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Biotechnology companies will become technology ("toolkit") and product suppliers
- Companies owning/managing information will dominate, e.g. drug discovery companies like Millennium will become "technology conglomerate" and the biotech equivalent of Microsoft and its operating system
- Pharma will subscribe to toolkit companies (e.g. Celera and Incyte) and buy product companies—there will be a new model of exit strategies for biotech companies, especially Canadian ones

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Sources of software technology (Oracle, Microsoft, Open Text), software suppliers, consultants, resellers—software strategic alliances are key
- Biotech and pharma companies are customers, e.g. Novartis, Aventis, Astra-Zeneca

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Better integration of technology rather than focus on development, e.g. increasing the efficiency and success rate (now at less than 1%) for products form conception to market
- Business to business collaborations

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Canada's biotech industry dominated by smaller academic-oriented companies
- Companies are not IT savvy and the sale of systems depends on their use by senior management
- Biotechnology does not have a 15% budget allocation for IT like pharma does

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Strengths include good basic research and good infrastructure for clinical trials
- With the increase in numbers of drugs, there will not be enough clinical trial sites and patients
- There is a tremendous opportunity in standardizing clinical data management systems across hospitals
- However the business model/medical environment/formulary system differ between the US and Canada, e.g. hospitals cannot form joint ventures in Canada
- There is a lot of powerful IT technology that pharma doesn't know about yet

9. How would you benchmark Canada's technological development against the rest of the world?

- IT is good

10. Any additional comments?

- We are now in the era of understanding new potential drug targets
- The drug discovery process will eventually be dominated by a few large players (akin to Microsoft) that give licenses for drugs to pharmaceutical companies
- Technological fragmentation is decreasing the chances of having powerful and dominant players
- Pharma is not buying drug discovery technologies because it doesn't know how to fully utilize them—pharma will become marketing organizations with international coordination capabilities
- The dream of biotech companies to become fully integrated pharma will not be realized; there is little chance of Canadian companies becoming big pharma—biotech companies will become product discovery or technology companies whose products are bought by MNEs or US pharma (because of lack of Canadian pharma)
- Culture of biotech venture capital vs. IT is very different in terms of timelines
- Canadians go to US investors; it is a handicap being a Canadian company with Canadian investors because the US venture capital market is driven by formal and informal relationships with investors

Name: Dr. Stephen D. Acres, President & C.E.O.	**Date:** March 15, 2000
Organization: BIOSTAR Inc. 343-111 Research Drive Saskatoon, Saskatchewan S7N 3R2	**Interviewers:** Borys Chabursky, Gord Glendon

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Biostar is in the midst of a strategic reorganization that will change or focus; however, until this is complete, our activities have been as follows:
- Product and market development of novel protein based immunopharmaceutical for markets in the human, food animal and companion animal health sectors
- BIOWEST presently has 7 Vaccines on the market with a number of pharmaceutical products in the development pipeline

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Marketing novel protein based immunopharmaceutical for markets in the food animal and companion animal health sectors
- Developing other pharmaceuticals products to improve the health and production efficiency of animals

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Immunologic technologies to immunize against "self-antigens"
- Core technology involves utilizing recombinant DNA technologies to create fusion proteins that direct the body's immune system towards a specific disease target or intracellular messenger

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Functional genomics and proteomics to uncover the functions of newly discovered genes and proteins along with recombinant DNA technologies to develop therapeutic and prophylactic products
- Technologies involved with the elucidation and manipulation of immunological adjuvants and stimulants will become increasingly important

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Spin-off from University of Saskatoon, originally operating as an animal vaccine company
- The following venture capital companies have been involved with BIOSTAR: Working Ventures Canadian Fund, Crown Investments Corporation, Saskatchewan Government Growth Fund, MDS Capital Corp., Canadian Medical Discoveries Fund, Business Development Bank of Canada, Royal Bank Capital Corporation, ICAST (AgWest Biotech
- BIOSTAR operates 2 subsidiaries: BIOWEST (animal) and STAR BIOTECH (human)

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Animal and human immunopharmaceuticals

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Main problem with business atmosphere in Canada is that a "critical mass" of Biotech companies has not developed which increases the time to develop products due to lack of money and qualified management
- Canadian Biotech companies need to think on a larger, scale (globally, not just locally)
- There needs to be a more entrepreneurial environment in Canada
- Regulatory process for drug development is more slow, complicated (more so for animals), and costly (user fees) than in the US
- Most Biotech companies need better access to capital at all stages of their growth
- Could use training in business development and regulatory processes for researchers
- Poor commercial infrastructure in Canada

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Basic science
- There should be more government funding of discovery research, such as the Network Centres of Excellence program
- Poor tax structure leads to "brain drain" to US
- Federal budget changes with respect to technology companies will help Biotech

9. How would you benchmark Canada's technological development against the rest of the world?

- Behind USA, Europe, Japan
- Some European countries have made large recent gains due to a more aggressively financed Biotech sector

10. Any additional comments?

-

Name: Gordon R. Stranks, President & CEO	**Date:** March 16, 2000
Organization: Biotools Incorporated 420 Sun Life Place 10123 99 Street Edmonton, Alberta T5J 3H1 **Founded**: 1995	**Interviewers:** Gord Glendon, Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Biotools is involved with all stages of the value chain
- Biotools develops computational tools for solving biological problems (bioinformatics)

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Biotools intends on remaining involved with all stages of the value chain
- Biotools will continue to develop bioinformatics tools
- An additional application based product will be in the diagnostic market within 2 years that link the technologies of magnetic resonance and bioinformatics

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Presently the technologies that drive Biotech are genomics (functional and otherwise) and proteomics
- Protein structure prediction is starting to be an area of active technology development
- There is a noticeable shift towards increased use of bioinformatics in Biotech and research in general

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- With an increasing number of genes being discovered, there is, and will continue to be, increased technological need for advancement in proteomics, understanding of metabolism and the nature of complex biological systems
- Bioinformatics will be an indispensable part of this process

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- A strategic alliance has been formed with Varian Inc. to work on the "MRD" project
- The "MRD" project involves the clinical application of nuclear magnetic resonance (NMR) spectroscopy and advanced computational tools such as pattern recognition, to the diagnosis and monitoring of disease and health (it also has potential applications in drug and toxicity testing)
- Partnership building is very important (eg. Biotools, Varian and local physicians are each indispensable to the development of the magnetic resonance diagnostic tool)

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Integrated products to more fully understand functional progression from gene to protein to integrated biological systems
- The eventual understanding of biological systems will lead to a much more evolved

approach to human disease.

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- The geographic location (Saskatoon) makes travel difficult when dealing with US companies and markets
- Venture capital companies in Canada are much more risk averse, and slow to make decisions, in Canada compared to the US
- There should be more training in Biotech to teach skills, promote entrepreneurial attitude and garner interest in discipline (co-op programs could help this situation)

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- There is a resource of expertise in proteomics in Canada which could be an niche area of future development within Canada
- At the University of Alberta, there is a vast resource of expertise in Biology and Computer Science which continues to be utilized
- Great basic science in relation to rest of world

9. How would you benchmark Canada's technological development against the rest of the world?

-

10. Any additional comments?

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Name: Dr Assem Hedayat, President	**Date:** March 9, 2000
Organization: Bregma International 214-111 Research Drive Innovation Place Saskatoon, Saskatchewan S7N 3R2	**Interviewers:** Borys Chabursky, Gord Glendon

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Bregma International (BI) is a producer of biomaterials involved in all stages of the value chain
- They develop, produce, market and sell kirschner and soft suture wire, bone screws, and super-elastic nickel-titanium orthodontic archwire

2. In 2005, what stage of the value chain do you believe your organization will be in?

- BI will continue to operate at all stages of the value chain
- However, they may seek assistance in the marketing and selling sectors to increase the market share of their products
- Increase proportion of revenues on R&D
- Sell an increasing market share in Canada

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Genetics

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Gene therapy will become an increasingly utilized technology
- Difficult to say where technologies will develop over next 5 years (eg. Perhaps bone screws will not even be a utilized technology by the time he has established his market)

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- The company was originated with the aid of the Saskatchewan Opportunities Corporation (SOCO)
- Presently there are no strategic partners or alliances
- Would consider partnership if additional market share could be captured
- Positive aspect of being unpartnered is that all aspects of the company can be closely controlled with no other competing interests
- Would very much like to have access to more networking opportunities to learn from other company's experience and to facilitate market expansion

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Difficult to determine where market need will expand over next 5 years due to high rate of change

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Most potential BI customers already have sales agreements with large US producers (very difficult market for small company to break into in Canada)
- Forced to do 90% of business out of country
- Need mechanism to ensure a more wide-open access to tender lists for entering production bids in Canada

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Canada has a very good international reputation with respect to regulatory bodies whether they are for pharmaceuticals or biomaterials (90% of BI products sold in Egypt due to strong Canadian reputation)
- Very high quality of raw stainless steel here
- Canada has a good social support mechanism which drives the need for BI's products (high level of dental and medical coverage)

9. How would you benchmark Canada's technological development against the rest of the world?

-

10. Any additional comments?

- Canadian companies would benefit is the government supported the buying of Canadian products through incentives (tax breaks, etc.)

Name: Michel J. Desrochers, Director General	**Date:** March 10, 2000
Organization: Biotechnology Research Institute (founded by National Research Canada) 6100 Royalmount Ave. Montreal, Quebec H4P 2R2 **Founded**: 1987	**Interviewers**: Alexander Liede, Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- BRI's mission is to carry out advanced research in molecular biology and biochemical engineering (basic research)
- BRI has two main objectives, (1) excellence in research and (2) economic impact in the industry. BRI serves to foster research, transfer technologies, and create jobs. About 5 or 6 spin-off biotech companies started with BRI, however BRI is not an incubator.

2. In 2005, what stage of the value chain do you believe your organization will be in?

- BRI will continue to exist in its current role as long as the biotechnology industry advances in Canada. BRI's revenue is an indicator of the biotechnology industry in Canada; we do not exist as a profit organization. BRI responds to the needs of the pharmaceutical and natural resource industries, encourages technological transfers and contributes towards creating a high caliber workforce.

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Many people are talking about bioinformatics. Bioinformatics is critical, but we should keep in mind that it is a tool; bioinformatics is not a platform. Canada must boost its application by increasing training in this area. It is a mistake to view bioinformatics as a separate entity within biotech.
- Sequencing of the genome is gone.

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- The future is in proteomics. It will be the function and validation of genomics that will be important.
- High throughput methodologies in screening and diagnostics.

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- BRI will continue to build on collaborations with industry (private sector)
- In 1998-1999, the Institute's industrial research contracts allowed revenues to rise to $5.8 million. BRI had 149 employees from private companies in 1998-1999.

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Nanotechnology. This is a niche that will revolutionize biotechnology. As far as I am aware, there are only two or three centres focused on this type of research in Canada, of which Alberta is possibly the largest. Nanotechnology combines

microchip technology with biotechnology, as in the example of time-release drug therapy by subcutaneous implant. The creation of a Nanotechnology Institute would be recommended. This cannot be a virtual institute, it would require real-time communication among researchers.

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Canada is slower in the commercialization process than the United States. We were very late in funding biotechnology, about ten years behind the US. Canadian business mentality is inherently different. The Canadian VCs' philosophy is more risk averse.
- It is always a question of funding. The Canadian taxation system (income tax in particular) is a major disadvantage. The VCs have caught on with seed capital, but intermediate stage capital is difficult to find. Canadian VCs simply do not have enough experience and are more afraid of failure.
- Biotechnology Canada. With strong leadership, Biotechnology Canada could expand the base of membership and encourage progress of the industry.
- Canada would need a Ministry of Science. Many nations have Ministries of Science, we have Industry Canada. Industry Canada has too many other industry concerns to spend much time or money in the development of science industry.
- Education. Although more individuals are educated in Canada than ever before, there is less interest in science as a career. Science does not project a vision of an illustrious career.

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Basic science (with the exception of Genome--Canada opted out of HUGO years ago). We have the largest number of scientific publications per capita.
- Good universities and infrastructure

9. How would you benchmark Canada's technological development against the rest of the world?

- Canadian biotechnology now ranks as second in the world (compared with all of Europe's 1,000 companies and annual sales of $2.7 billion)
- We must be careful... Germany will supercede Canada in biotechnology. The German biotechnology companies are organized and focused in profitable sectors. In contrast to Canada, German VCs have very loose conditions and they are patient, they do not expect to see a return within just a few years.
- For example, North Carolina companies have a representative working in Germany full-time to seek out investors and partners, and sustains constant communication. Consulates are useful in this endeavor for Canadian companies, but they are not enough because they are not sector specific

10. Any additional comments?

- Genome Canada should focus on the application of genomics. Genomics in Canada is a post-sequencing phenomenon.

Name: Dr. Jacqueline Jie Shan, Senior Vice President, Research and Development	**Date:** March 16, 2000
Organization: CV Technologies Incorporated #308 Campus Tower 8625 – 112 Street Edmonton, Alberta T6G 1K8 **Founded:** 1998	**Interviewers:** Gord Glendon, Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- CV Technologies (CVT) is involved at all stages of the value chain
- CVT is a science and technology company that has developed and commercialized proprietary technology to identify, extract and biologically standardize natural mixtures for health benefits
- CVT has a number of herbal-based products presently in the market (marketed under HERBTECH in Canada)

2. In 2005, what stage of the value chain do you believe your organization will be in?

- To continue in all stages on the value chain
- To increase the number of marketable products while continuing to have pipeline development

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- CVT's technology platform is called Biochemprint which is a process that defines natural health substances with a series of functional and chemical assays with the intention to develop natural product extracts into health foods, functional foods, nutraceutical and pharmaceuticals
- Chemical engineering and extraction technologies are presently utilized in many drug discovery companies

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Technologies involved in natural health products will continue to be important over the next 5 years (these include chemical extraction and engineering technologies)

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Strategic alliance with Axis-Shield Diagnostics in the UK and another with Dupont
- A Strategic alliance with Dupont will be very helpful in establishing CVT name worldwide (contractual agreement to validate CVT's platform technology, Chembioprint, with a number of existing herbal medicines
- CVT has a joint venture, Chembioprint-Asia Ltd., with The University of Hong Kong

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- There is an enormous worldwide market for herbal-based remedies and pharmaceuticals
- This is a largely unregulated field that will need technologies to analyze these products

for safety, efficacy and consistent production methodology
- Food quality mechanisms is also an area of unmet market need

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?
- Saskatoon is a geographically isolated location with respect to doing business with people in the US (most Canadian companies need a US office to access business there)
- Canadian venture capital companies are not generally interested in the herbal medicine field
- Government should continue to fund, at a high level, basic research in this area, make additional money available for commercialization and product development
- There is a lack of industry infrastructure in Canada for the large-scale development and production of these products
- There should be regulations concerning herbal-based products to guarantee quality and intellectual property protection (eg. Create regulations that are closer to the pharmaceutical industry)

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?
- A good resource of basic research
- There is good local support for emerging technologies (Alberta Agricultural Department)

9. How would you benchmark Canada's technological development against the rest of the world?
- Canada is the world leader in the production of quality natural health products followed by the US and Europe

10. Any additional comments?
-

Name: Dr. Kim Wong	**Date:** March 23, 2000
Organization: Cangene Incorporated 26 Henlow Bay Winnipeg, Manitoba R3Y 1G4	**Interviewers:** Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Cangene Corporation (CG) is involved in the value chain stages of business and product development
- Cangene is involved in the development, manufacture, and distribution of specialty hyperimmune plasma and recombinant therapeutic products for international markets
- They produce generics and also have innovative research projects

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Cangene will continue to operate in the value chain stages of business and product development
- Cangene plans to have several products (both hyperimmunes and recombinant proteins) approved by regulatory agencies and in the marketplace.

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Recombinant protein technologies, glycoprotein expertise and microbial production techniques will are central to Cangene's product development

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- The technologies of genomics, proteomics, pharmacogenetics, drug targeting and drug delivery will become increasingly important over the next 5 years

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Cangene has a research and development agreement with the Apotex Group of Companies (Apotex owns 87% of Cangene's shares)
- Cangene has never needed to source financial markets for capital

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Their focus is the development and continuous improvement of products that are already leaders in world markets
- Cangene is building a 30,000 square foot cGMP grade microbial production facility (will be the one of the few in Canada) for operation in 2001

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- It is difficult to find appropriate manpower in Canada
- We have poor technology transfer offices (slow or no responses to enquires and ideas)

- National Centres of Excellence (NCE) have not been very helpful (poor communication and an academic, not industrial, mindset hampers their effectiveness)
- No established mechanism by which small companies can source strategic alliances

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Strong scientific base

9. How would you benchmark Canada's technological development against the rest of the world?

- Canada is at the forefront of biotech
- We have a tendency to follow, not lead although we are not behind the US scientifically
- Easier to raise capital (both public and private) in the US

10. Any additional comments?

- More professional training would help with the shortage of suitable manpower in Canada (eg. Cangene is sponsoring a series of "career day" events at the University of Manitoba).
- Companies should be more active with universities in the creation of programs
- Students should be made more aware of biotech to create interest in the sector (eg. Co-op programs)

Name: Bill Hayden, Vice President, Marketing	**Date:** March 10, 2000
Organization: Chemical Computing Group Inc 1255 University Ave., Suite 1600 Montreal, Quebec H3B 3X3 **Founded**: 1994 COMPANY REQUESTED THAT CONSULTATION RESULTS REMAIN ANONYMOUS	**Interviewers:** Alexander Liede, Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?
2. In 2005, what stage of the value chain do you believe your organization will be in?
3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?
4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?
5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?
6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?
7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?
8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?
9. How would you benchmark Canada's technological development against the rest of the world?
10. Any additional comments?

Name: Dr. Duffy Dufresne, President & CEO	**Date:** March 23, 2000
Organization: Conjuchem Incorporated 225 President Kennedy Ave. Suite 3950, 3rd Floor Montreal, Quebec H2X 3Y8 **Founded:** 1997	**Interviewers:** Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Conjuchem operates in the commercialization to product development stages of the value chain
- They utilize technologies to improve known, and create new drugs for partners to market

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Conjuchem will want to continue developing products from the commercialization to product development stage in the value chain
- Would like to be an efficient producer of products to partner for late value chain development

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Conjuchem's technology platform is an in vivo conjugation process whereby drug constructs, existing or new, are bonded to proteins
- The bonded drug retains full potency but assumes biological half-life of protein subsection and offer improved the targeted delivery of the drug, reduce side-effects and improve drug efficiency
- Technology platform has many potential applications
- Their technology platform relies on expertise in reactive chemistry and proteomics

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Computational needs to determine structure/activity relationships and create drug activity models
- Increased mechanization of drug discovery via high throughput screening (requires large increases in available capital)
- Nanotechnology
- Pharmacogenetics

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Presently has partnership with ServicePharm to develop proteinase inhibitor
- Would like to continue to partner for market development of new products (felt to be too expensive to pursue on their own)
- Presently pursuing many partnering discussions of which they expect 2 or 3 to yield new chemical entities they can improve through their technology

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Improved drug technologies (enhanced properties of known compounds)
- Presently filing for IND for local thrombin inhibitor, developing systemic opioid peripheral agonist and matrix proteinase inhibitor (MMPI) for clinical trials commencing near end of 2000

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- There is a need to provide universities with seed-money to encourage commercialization
- There is a need for increased investment in biological computational software (could be helped at university level)
- More convergence between technologies such as chip technology and drug discovery endeavors

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- The government has been good at focusing in on growth areas and putting resources into those areas
- Good educational infrastructure in Montreal
- There has developed a "critical mass" on biotech companies in and around Montreal, Toronto and Vancouver
- R & D tax credits are very helpful in keeping burn-rate down for small and mid-sized biotech companies
- Venture capital easy to source in Canada
- Presence of 5-year tax holiday in Quebec has made it much easier to recruit key management personnel

9. How would you benchmark Canada's technological development against the rest of the world?

- Canada has trouble competing with the US in the biotech industry due to the difference in scale of the populations and the amount of money put into the sector South of the border

10. Any additional comments?

- Presence of modern information technologies has decreased the barrier of geographical isolation in Quebec

Name: Michael Atkin, CEO	**Date:** March 10, 2000
Organization: Exogen Neurosciences Inc. P.O. Box 605 Montreal, Quebec H2W 2P2 **Founded:** 1997	**Interviewers:** Borys Chabursky, Alexander Liede

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Basic research in neuronal signal transduction. Exogen's mission is to discover novel therapies to extend and enhance the lives of patients suffering from acute and chronic neurodegenerative conditions, and nerve injuries.

2. In 2005, what stage of the value chain do you believe your organization will be in?

-

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Functional genomics and target validation, starting in the academic domain.

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Proteomics
- Functional genomics such as SNP application and bioinformatics (data mining)
- Stem cell research
- Robotics will increase the efficiency of biomedical research

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

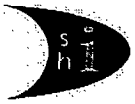
- Canada is a smaller market. A Canadian biotech company must be a global competitor. Mergers and alliances are necessary.

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Currently, there are enough VCs in Canada. Outside of Canada, VCs are more structured and the process is faster.
- Safety and ethical guidelines are important

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- The business is too Canada-centric. Canada is a smaller market and Canadian biotech companies need to compete on a global stage.
- The HPB is incredibly conservative in approving new drugs. For example, a drug might already be approved in other countries with strict guidelines and Canada takes much longer to approve these drugs than necessary. The consequence of this delay is detrimental to progress of the biotechnology industry.
- To compete and succeed, the requirements are (1) money, (2) education and (3) technology transfer.



8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Great scientists are in Canada
- Low cost of skilled labour in biomedical research (compared to the US)
- Canada has a large, vibrant VC community (much better than Europe); however, there is a degree of institutionalization and there aren't as many sources of capital as in the US
- In Quebec, tax credits and incentives (if you are engaged research) are excellent

9. How would you benchmark Canada's technological development against the rest of the world?

- Canada is second, followed by Germany.

10. Any additional comments?

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Name: Dr. Lap Chee Tsui	**Date:** March 1, 2000
Organization: Hospital for Sick Children 555 University Avenue Toronto, Ontario M5G 1X8 **Founded:** 1954	**Interviewers:** Audrey Turner, Michael Stinson, Borys Chabursky, Chia Chia Sun

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Basic research: vision of bedside (patient) to bench (research) to bedside (patient) research
- Lack of "full package" for every project due to a lack of a strong program; cystic fibrosis is as close as HSC gets, however, the last step of pre-clinical hypothesis testing on patients by clinician-scientists is not available
- Clinician-scientists are competing in the basic research area

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Similar to 2000

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Good basic research in biomedical areas
- Existing drivers are genomics, proteomics (automatic data collection and sample analysis); these drivers require group research and large resources—big pharma is outsourcing and acquiring because of the diversity of the technology

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- The ability to merge biological with engineering and computing skills—a difficult proposition but extremely important
- Next hirings at HSC will be in computational field; biology used to be descriptive, it is now quantitative (Lee Hood, University of Washington—the Institute of Quantitative Science does biology)

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Currently developing local capabilities and expertise in bioinformatics (Cuticchia) and Animal Imaging for which private partners are being found
- Bioinformatics Super Computing Centre is for protein folding/structure analysis; includes the genomics database transferred from Johns Hopkins University
- Investors in the Super Computing Centre include Oracle/IBM/SGI
- Canada needs to tap into MNEs because of a lack of local pharma
- There is a need for increased industrial-academic collaboration for an opportunity for academics to contribute to a bigger picture

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Personalized drugs (coined by Kalow in Toronto); pharmacology departments in Canada are well-known but outdated (still believe that pharmacology is chemistry

based)
- Need to study more complex diseases (multigenic and environmental factors)

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Canada has advanced informatics, but not BIOinformatics
- There is a lack of convergence of technology at the university undergrad level (e.g. in biology and physics)
- Canada has not developed: 1) nanotechnology for miniaturization and speed, 2) drug delivery systems such as microchip implantation, and 3) DNA diagnostic analysis using DNA chips
- Weaknesses not in technology but in synergistic effects—environmental factors prevent advancement, e.g. venture capital is risk-averse and NCEs bring out ideas but fall short of spinning off companies
- Need to facilitate transition for academic translation of knowledge into practice; also a lack of vision of companies to tap into academic
- Lack of entrepreneurialism before product development; technology transfer is important only after a product is made
- Many companies stuck in phase between commercialization and business development
- Also lack of human resources—Canada's talent cannot get academic research positions and the new culture of accountability and administration interferes with basic research culture

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Opportunity for developing technology platforms in Canada where the platforms have not been established (vs. US)
- Opportunity to develop quantitative biology
- Opportunity to formalize patient databases; Canada has excellent databases (CF is an example, as well as Cancer Care's database, Quebec databases and national databases on diabetes)
- Opportunity in telemedicine and telehealth
- Strengths in pockets of excellence, e.g. Bacterial Diseases Network, Hancock, BC, anti-bacterial peptides and antibiotics, Norman Dovichi developed capillary synthesis
- Opportunity to create both technology and service centres, e.g. a Centre for Applied Genomics that helps capture value in the area of complex diseases while also developing the technologies (the capillary synthesis machine was developed in Canada but is used elsewhere)
- Opportunity to develop analytical technologies (e.g. Virteq's DNA chip machine in Waterloo), epidemiology, competition on knowledge (people, interpretation, analysis) rather than on better equipment

Canada should not compete on better equipment—this is the U.S.'s department

9. How would you benchmark Canada's technological development against the rest of the world?

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10. Any additional comments?

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Name: Ezekiel Shami, President	**Date:** March 8, 2000
Organization: Hybrisens Ltd. Farquharson Bldg S, Room 104, Keele Campus Toronto, Ontario M3J 1P3	**Interviewers:** Chia Chia Sun, Gord Glendon

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Hybrisens is involved in the value chain stages up to and including the late pre-clinical development stage
- Involved in the enhanced clinical utility of existing protein drugs

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Plan to provide proof of concept (pre-clinical trial) to pharmaceutical company for clinical trials, product development and marketing and sales

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Functional genomics and proteomics to uncover the functions of newly discovered genes and proteins
- Enhancing clinical utility of known protein drugs through patented recombinant DNA technology and chimeric proteins (aim is to develop drug with increased cellular half-life)

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Continued functional genomics, proteomics, in vivo models
- Protein libraries and high throughput screening will be increasingly utilized by Biotech companies
- Technologies involved in the study of immunology and cytokines

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Would like to present proof of concept to pharmaceutical company to license drug for clinical trial, or garner sufficient investment to run clinical trial themselves
- No strategic alliance at present
- The lack of funding that a strategic partner could provide has necessitated Hybrisens' taking on of some external contract research work for revenue generation (this has occasionally disrupted their own research agenda)

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- There are already a large number of proteins that have been isolated and that can be produced effectively and cheaply
- We need models to demonstrate biological activity of numerous newly discovered proteins in vivo. (eg. transgenic models will be very important in this area)

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Canada should invest in the technological gaps between R&D and commercialization since this is an area where it is difficult to fund and can be expensive

- There is a shortage of expertise in protein libraries and high throughput screening
- Should be more investment in the general development of technologies in Canada, not just in the implementation of existing technologies (requires aggressive funding early in the early stages of a sector, eg. DNA chips)
- Shortage of qualified personnel

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Good basic science

9. How would you benchmark Canada's technological development against the rest of the world?

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10. Any additional comments?

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Name: Daniel Bong, Director of Technology Development	**Date:** March 14, 2000
Organization: IGT Pharma Inc. Suite 311 –2386 East Mall Vancouver, British Columbia V6T 1Z3 **Founded:** 1992	**Interviewers:** Borys Chabursky, Gord Glendon

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Drug discovery and development up to phase II clinical trials.
- Focusing presently on cancer and CNS therapeutics and the production of fine chemicals and services for the biotechnology and pharmaceutical industries
- Cancer lead drugs under development consisting structural analogs of existing drugs capitalizing on structural chemistry and plant biosynthesis expertise
- CNS drugs under development for a wide range of diseases based on knowledge of metabolic glutamate receptor family (mGluRs)

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Drug discovery and development up to phase II clinical trials
- A number of lead drugs licensed to large pharmaceutical companies with a number in the pipeline and clinical phases

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Genomics, proteomics, medicinal chemistry
- Would like to increase access to high throughput screening and combinatorial chemistry (both in-house and through external contracts) pre-clinical and clinical development

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- The continuing utilization of genomics, proteomics, medicinal chemistry, plant biosynthesis and tissue culture expertise
- IGT will be looking to increase utilization of following technologies: Nanotechnology (gene chips), genomics, high throughput screening and combinatorial chemistry

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Roswell Cancer Institute carrying out clinical trial of anti-cancer drug
- Ultimate customer is large pharmaceutical company that can carry out final stage clinical trials necessary to bring drug to market
- IGT Pharma has had relationships and collaborations with the NRC, University of British Columbia, BC Cancer Agency, Science council of BC, University of Montreal and Roswell Park Cancer Institute

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- IGT Pharma working with drug leads for the following unmet market needs: better tolerated – specific cancer therapies, pain management, epilepsy, anxiety, stroke,

Amyotropic Lateral Sclerosis (ALS), obesity and drug dependence
7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats? • Often need to look outside of country for personnel since there is a shortage of homegrown expertise (recruiting from USA is extremely difficult due to Canadian dollar and tax structure) • A lack of application based education (most individuals trained in pure science still have to learn how to make pragmatic applications of this education in the real world of pharmaceutical development) • Support of co-op university programs could help to correct this situation and encourage more students to pursue an industry science path • There is a general lack of medicinal chemistry expertise in Canada • Conservative outlook in Canadian Biotech industry (not good at recognizing our strengths) • Additional infrastructure needed (more toxicology labs and animal research facilities)
8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities? • Canada has a wealth of good basic scientists • Recent federal budget changes effecting stock options are a step in the right direction • It is easy to obtain venture capital for those that have a good concept (although it is easiest to get when the product is farther down the value chain)
9. How would you benchmark Canada's technological development against the rest of the world? • USA (1), United Kingdom and Western Europe (2), Canada (3)
10. Any additional comments? • Could see utility of Biotech human resources companies in Canada • BC not at all supportive of Biotech sector (taxes) • Broader base of CRO services locally

Name: Alain Bossé, President	**Date:** March 9, 2000
Organization: Immucon Inc. 1224 Stanley, Suite 313 Montreal, Quebec H3B 2S7 **Founded**: 1993	**Interviewers**: Alexander Liede, Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Product development and market development of products in the field of contraception and fertility. Immucon has the technology intended for the male contraceptive and male infertility markets. Based on the discovery of a protein secreted by the epididymis which binds to sperm and is essential in sperm maturation, Immucon developed a reversible means of diagnosing, and achieving temporary (contraception), male infertility. Animal studies are in the pipeline.

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Phase II clinical trials will have completed

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

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4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

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5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Big pharma until phase II. To date there have been no equity agreements made with Immucon.
- Europe, US and Japan distribution partners
- Banks

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Male infertility and male contraceptive are a $5.0B market. If you examine the number of abortions performed each year worldwide, there is a real demand for a male contraceptive product.

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- VCs are a waste of time. All the biotechnology success stories in Quebec were did not have the support of VC investors. This is a money problem in Canada. Brokerage firms and tax incentives would help alleviate this. If there is capital available in Canada, it is not easy to access.
- Clearly, Immucon is vulnerable to buy out since we developed a technology which may represent a huge market
- Canada needs programs to help entrepreneurs, e.g. business mentors, incentives in pay/tax

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities? • Our business mentality is more idealistic and entrepreneurial than the United States.
9. How would you benchmark Canada's technological development against the rest of the world? • Canada is in a good position compared to Europe.
10. Any additional comments? •

Name: Doug Tastad, Vice President	**Date:** March 15, 2000
Organization: Innovation Place Research Park 114-15 Innovation Boulevard Saskatoon, Saskatchewan S7N 2X8 **Founded:** 1977	**Interviewers:** Borys Chabursky, Gord Glendon

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Innovation Place Research Park (IPRP) is a very successful 1.25 million square foot research park whose tenants are involved in all aspects of the value chain
- Research and development in a wide variety of sectors takes place within the park, including agriculture, telecommunications, resources and environment, computing technologies, as well as activities in the health, transportation and engineering sectors

2. In 2005, what stage of the value chain do you believe your organization will be in?

- The wide range of expertise will continue to be a characteristic of the tenants at IPRP and will continue to cover all stages of the value chain

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Genomics is presently the greatest driver of technology in the Biotech industry

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Molecular farming will be a very important technology over the next 5 years (the production of non-food products from plants)
- This area will rely heavily on genomics, functional genomics, transgenic engineering and extraction technologies (bio-processing) for its success

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- IPRP was created by agreement between the Government of Saskatchewan and the University of Saskatchewan in 1977
- IPRP is a development of the Saskatchewan Opportunities Corporation (SOCO)
- IPRP has become involved in equity arrangements with early stage Biotech tenants with the long term goal of developing a traditional landlord tenant relationship

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Pesticide resistant and other genetically engineered food plants are not presently being embraced in the market place

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- A general lack of qualified and experienced industry management personnel
- There is no strategic overview in Canada to help Biotech industry development (no programs to support industry and technology transfer)
- The processes to apply for government funding are complicated

- The Canadian Foundation for Innovation (CFI) is increasingly supporting academic, not industrial, research

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- There is a strong basic research in Canada
- The NRC and other granting agencies are helpful in supporting this research and some have close ties to industry (eg. NRC's Plant Biotech Institute)
- There is sufficient capital in Canada for those who have good ideas
- Agriculture Canada is a good supporter of research with a history of out licensing their technologies and has a historical relationship with farmers

9. How would you benchmark Canada's technological development against the rest of the world?

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10. Any additional comments?

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Name: John Olthoff, Coordinator	**Date:** March 13, 2000
Organization: International Wex Technology Inc. #2000-777 Hornby Street Vancouver, British Columbia V6Z 1S4 **Founded:** 1992	**Interviewers:** Borys Chabursky, Gord Glendon

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Basic research up to mid stage clinical trials of drug development (basic research, trials and manufacture primarily carried out in China)
- Involved in the purification and manufacture of natural compounds for use in multiple therapeutic areas
- Presently developing Tetrodin (HT) which is a drug derived from the extraction of the active ingredient in blowfish toxin for use as an anti-opiate and analgesic
- Four or 5 other possible products in pipeline

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Continuing to develop products through the value chain to present to pharmaceutical companies for late stage clinical trials, marketing and sales
- Expect Tetrodin (HT) to be available in China, North America, Mexico and selected European countries
- Plan to have 4 or 5 drugs on market

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Extraction technologies
- Genomics

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Increasing use of genomics based technology if the ethical environment continues to be supportive
- Gene therapy may become an explosive field if effective delivery mechanisms are developed
- Tissue re-engineering

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Lifetime Pharmaceuticals Corporation has licensed Tetrodin (HT) for distribution in Mexico
- Will continue to utilize Big Pharma as primary customer to perform late stage clinical trials and to market and sell products.
- International Wex Technologies could be target of strategic alliance by other companies looking to capitalize on their extensive knowledge of working in China

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Quality of life therapeutics for a world-wide population of increasing average age will

be continue to be an unmet market need • Products that address therapeutic areas of common diseases such as cancer and heart will continue to be of primary importance
7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats? • Its is difficult to raise capital here compared to USA • A more entrepreneurial environment is needed within the academic and financial sectors in Canada • There is a need for federally based programs that encourage pharmaceutical investment • There should be more funding available for products and companies in the gap between seed-funding and late stage clinical trial results
8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities? • It is less expensive to bring a product to market in Canada than in some other countries • There are fewer liability issues here for drug producers than in the USA • Canada has a strong research base to draw upon • It is easier to recruit participants for clinical trials than in the USA
9. How would you benchmark Canada's technological development against the rest of the world? •
10. Any additional comments? •

Name: Joseph L. Tedesco, Co-Founder & President	**Date:** March 8, 2000
Organization: Key Molecular Corp. 347 College Street Toronto, Ontario M5T 2V8 **Founded**: 1988	**Interviewers**: Chia Chia Sun, Alexander Liede

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Design and synthesis of novel bioactive drugs and biochemicals in basic research. Development of mathematical models and computer programs for molecular modelling. The objective is to bring technology to practitioners.

2. In 2005, what stage of the value chain do you believe your organization will be in?

- The ideal position is similar to Visible Genetics who are able to cross all stages of the value chain

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

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4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Process information from human genome
- Bioinformatics, make it easy to use technology

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- I recommend encouraging alliances with academia
- Larger companies should form alliances with smaller ones
- Key Molecular requires special facilities for drug discovery and collaboration with University laboratories is crucial

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- It is important to recognize how to bring biotech/biopharma to the doctor's office
- There is a need to link academic and private sectors, i.e. give library access to private start-up companies. Libraries are important because of cross-disciplinary work (e.g. bioinformatics).
- There is a need for high security, especially in a setting such as a biotechnology incubator
- My organization would like synergy with other start-up companies and larger companies, such as an incubator might provide

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- There is a regulatory burden in the approval of new drugs
- Quality control of products
- A lot of companies are funded that perhaps should not be

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities? • More real science that is commercially applicable, e.g. Visible Genetics, Glycodesign, Molecular Mining
9. How would you benchmark Canada's technological development against the rest of the world? • Canada is moving in the right direction
10. Any additional comments? •

Name: Mr. Philippe Lacaille, Chair and CEO, and Dr. Jim Wright, President and CSO	**Date:** March 27, 2000
Organization: Lorus Therapeutics Inc. 7100 Woodbine Avenue, Suite 215 Markham, Ontario L3R 5J2	**Interviewer**: Chia Chia Sun

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- All stages except for marketing development
- Business model is to in-license new products, develop them to end of Phase II clinical trials and then out-license them to strategic pharmaceutical partners for Phase III

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Lorus will be in the product development stage: the company has several products in various stages of development, including research phase and approved immunotherapy products

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Consolidation of the industry due to too many companies competing for a small pool of capital
- Lorus formed from a merger with GeneSense – strategy was two fold: 1) Technological strategy to utilize complementary strengths to develop a combination of products and therapies to take a different angle of attack on cancer diseases, to have a large product portfolio to diversify and decrease risk and to attract technology from other biotech companies 2) corporate strategy driven by market forces to form critical mass in order to access long-term capital
- Lorus' technological platforms in the clinical stage are 1) immunotherapy, 2) anti-sense and 3) small molecules; in the preclinical stage, they are 1) functional genomics and 2) gene therapy

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Proactive management of change
- Responsiveness to the commercial potential of a great idea, e.g. Canadians talk about products, not technologies
- Recognition of the value inherent in Canadian science; Dr. Wright believes that in maybe 1% of the time the connection is made between the science and the business, e.g. NRC and other government agencies do not see the wealth in Canadian ideas

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- 1) Alliances with research centres, 2) Large MNEs to take on Phase III, international registration and launch through existing sales and marketing forces, 3) Biotech-biotech, 4) Biotech-government and 5) Biotech-payors (e.g. government or HMOs)

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Innovation in technology is being met, but there is a need for skilled people and the

fiscal environment for attraction of capital

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Threat: extreme pressure from US (and other countries in Asia and Europe) that understood a long time ago the value of biotech; Europe and Japan will become the major competitors
- Weakness: Sum of money allocated to basic research in Canada is not enough (trying to reach $1 B cp to US spending of $14 billion), government does not provide infrastructure to take an idea into a product
- Weakness: Export of intellectual abilities
- Weakness: Lack of translation of value of great science into commercial products due to infrastructure (i.e. it is hard to do both business and science;
- Weakness: Limited by capital, lack of government incentives, costly infrastructure, lack of communication between biotech/pharma/academia/government

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Strength: Quebec model is impressive, using government resources such as tax incentives to attract people and investment
- Strength: Strong university activity and science in almost every province, good business schools
- Strength: Clusters of expertise 1) Mount Sinai/OCI/Hospital for Sick Children in cancer/biotech, 2) Saskatchewan/Manitoba/Guelph in agricultural biotech, 3) Quebec/McGill in health care/biotech
- Opportunity: To partner with countries with emerging biotech strengths, e.g. Germany, through trade agreements/tax incentives
- Opportunity: To be put on the international map with translation research products with tremendous market opportunities (e.g. 3TC, insulin)
- Opportunity: To develop manufacturing facilities in Canada

9. How would you benchmark Canada's technological development against the rest of the world?

- Top 2 or 3, below US, on par with Europe but potentially falling behind Europe
- Germany is a good case study on how the government has utilized great science to develop a great industry complete with robotics, state-of-the-art molecular biology and young entrepreneurs, and cross-functional national conferences that foster strategic alliances between local and foreign pharma and biotech

10. Any additional comments?

- The industry feels ignored and not well understood; believes that there is an educational component necessary for government to learn and be more responsive
- Mr. Lacaille believes that biotech in the future will have the same impact as pharma did 100 years ago; innovative companies will be the major movers and employers in the Canadian economy
- Need for follow-through and long-term efforts; would like to see that there is a commitment from the Minister or Deputy Minister to work together to advance the health care industry in Canada

Name: Donald F. Corcoran, President & CEO	**Date:** March 9, 2000
Organization: MethylGene Inc 7220 Frederick-Banting, Suite 200 Montreal, Quebec H4S 2A1 **Founded**: 1997	**Interviewers:** Borys Chabursky, Alexander Liede

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Product development and clinical trials. Methylgene is focused on medicinal chemistry and the discovery new compounds and their application in the treatment of human diseases such as cancer and infectious diseases.

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Product development

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Research and development of new therapies
- Gene therapy

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Functional genomics, that is, applying genomics to drug development
- Combinatorial chemistry
- Pharmacogenomics
- Gene therapy
- Bioinformatics and data crunching
- Will Canada be able to compete in these is another question? It will be interesting to compare the core competencies in Canada according to the granting agencies to what will be developed into new technologies by 2005.

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Relationships/partnerships with pharmaceutical companies

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- There is never enough knowledge of chemistry. There are few chemists developing novel approaches to treat and prevent disease. Canada should invest in University chemistry programs.
- New ways of combinatorial chemistry, new computational programs are needed

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Canada was too late with genomics. Canada can always carry out good genetics research (e.g. founder population in Quebec), but they are no longer a player in the sequencing of the human genome.
- Chemists may be inexperienced in the biotechnology business

- Limited funding in biotechnology in Canada
- It will be difficult to compete with the United States and big pharma in the area of combinatorial chemistry
- Speed up time to market for new drugs
- There is a shortage of qualified executives for biotechnology in Canada

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Research in medicinal chemistry, vaccines is strong in Canada
- Canadian biotech need to find a niche so as not to compete with the United States head-on
- Anything to speed up the speed from concept to drug development would be good
- Factors which will influence the success for Canadian biotech are (1) funding to progress along the value chain, (2) funding for basic research to develop new ideas, (3) access to Round 1 capital. The US simply has more VCs. Canada needs to establish a world-class funding system. Canadian biotechs may be running out of cash. We do not have a system in place to develop a company like Amgen. Canadian VCs should decide to give more money to fewer companies and commit to.
- Canada's potential lies in finding a niche. The example of Bombardier in the aerospace industry is an excellent one. Bombardier did not attempt to compete head-on with Boeing, instead they identified a need and developed a product to meet that need.

9. How would you benchmark Canada's technological development against the rest of the world?

- United States is #1. Canada and Europe follow. Canada is under-rated; the industry is younger and qualified individuals may be going to the US. It would be advantageous to attract people back to Canada. As there are limited funds in biotech, there is no way to spend time on training.

10. Any additional comments?

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Name: Marc Lussier, Founder & Director, Scientific Operations	**Date:** March 9, 2000
Organization: Mycota Biosciences Inc. 225 President Kennedy Ave. W., Suite 2550 Montreal, Quebec H2X 3Y8	**Interviewers:** Alexander Liede, Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- We are involved in large scale target identification and validation for the discovery of novel treatments of fungal infections in humans. Our focus is to develop therapies that will target essential fungal specific genes and not affect human cells.

2. In 2005, what stage of the value chain do you believe your organization will be in?

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3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)? (he wants to stress the fact that his answers reflect HIS area of research not necessarily Canadian or global industries in general.)

- List of targets for drug interactions
- Lead compounds (post-drug screening)
- Transcriptional profiling on DNA chips

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Functional genomics; is gene essential? how?
- Pharmacogenomics
- Large scale validation of targets, hybrid protein system validation, protein-protein interactions (proteomics)

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- There is a need to have partnerships with medium sized biotech or large pharmaceutical firms to take lead compounds from an experimental stage to clinical stages.
- We are a McGill university spin-off company and we maintain close ties to university founders lab for basic research that is not being done in the company. Mycota and founders have put together a NSERC CRD grant application to fund this basic research. The info generated by this basic research is critical in building value on certain of our targets and drug screening assays. (Universities are highly under-funded by government and request equity of start-up companies they support)

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Canada's biotech industry needs to reach critical mass. This is dependent on money.

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- VCs are less interested if a company's product is still R&D. Scientists need business

knowledge otherwise they cannot bargain with a business person. Although scientists generally have little business knowledge, it is difficult to find an executive with biotech knowledge.
- More money should go to fewer biotech companies
- Investor Partnership Canada is political and demonstrated conflict of interest. Competition currently opened to new industries. This effort should be encouraged (i.e. government acting as VC). A similar body exists in Quebec which is more bureaucratic (Investment Quebec).

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?
- Quebec has a good program of tax incentives
- People are clever in Canada, we produce excellent research with limited resources (genetics research)
- Canadians are good at finding a specific niche for success
- Genome Canada
- Office of Technology Transfer at McGill is entrepreneurial, pro-spin-off, although under-staffed

9. How would you benchmark Canada's technological development against the rest of the world?
-

10. Any additional comments?
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Name: Anthony J. Giovinazzo, CEO	**Date:** March 7, 2000
Organization: Neurotrophic Bioscience Inc. 96 Skyway Ave. Etobicoke, Ontario M9W 4Y9 **Founded:** 1998	**Interviewers:** Chia Chia Sun, Alexander Liede

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Neurotrophic Bioscience (NTB) brings together nerve cell and trophic factor biology, protein factors and proteogenomics of trophic factors. NTB's core competencies are in cellular and molecular biology technologies (basic research leading to product development).

2. In 2005, what stage of the value chain do you believe your organization will be in?

-

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Bioinformatics will encourage the convergence of computers, in silico and physical systems with biology. This will be an industry opportunity for Canada.
- Tissue repair and regeneration
- Pain and pain management is a massive area. Acute, chronic and injury-related pain has a need for new products and clinical approaches (e.g. COX-2 inhibitors).
- Functional biology linking genes and proteins to disease onset and progression at the cellular and sub-cellular levels.

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Functional genomics
- Bioinformatics. Canadian government should invest in this. It is necessary to hire the best mathematicians.

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Genomics/Proteomics partnership
- CRO re: trial design
- New delivery techniques

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- The central nervous system has seen few new products. There is one drug approved around the world for Alzheimer's. Research has not focused on disease progression.
- Cancer has been a good area of focus. In the US, anti-angiogenesis and other approaches to chemotherapy are under investigation including antisense therapy.
- Biomaterials (bone regeneration), tissue repair and regeneration are covered well
- Public awareness of biotechnology is lacking in Canada. A government-sponsored initiative would be recommended. Biotech industry could sponsor educational kits directed at schools.

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Basic research is imperative. Canada needs to provide substantial and significant funding for basic research. Industry has problems in funding basic research; discoveries should not be directed for commercial success.
- The US is the industrial leader, with money, people and understanding. This is needed in Canada. The US is willing to throw enough money at companies to make it work.
- There is a lack of adequate facilities for animal studies in Canada. Neutrophic is collaborating with Howard Hughes Institute in the US, an institution with the expertise in neurodegenerative diseases and the colony of animals needed for in vivo studies.
- The US government has more sources of funding for small biotech businesses, including NIH SBIR (Small Business Investment Research Grants) and CRADA (Contract Research and Development Agreements) which ensures intellectual property of the investigator.
- MRC, CIHR should concentrate more on funding research on the central nervous system
- There should be a more uniform application of existing funding programs across Canada. In Quebec there are more government incentives for developing biotech companies.
- There should be tax incentives to get individuals with expertise in the area to continue to be employed in Canada. Currently, Canadian biotech companies cannot afford experts.

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Canada has to be a world-class player in specific aspects of biotechnology. Canada should continue in or go back to cellular bioassays (basic research). Research should focus on the onset of disease and work backwards to further understanding into the pathophysiology of the disease process. It is important not to re-invent US tools.
- Basic research, clinical trials and hospital system are strengths
- Increase awareness of Canadian assets directed at Europe and the United States. The US is more aware of the Australian biotechnology industry than Canada's.
- Canada needs to generate funding for the fledgling industry of biotechnology. Six (6) investors in Canada do biotech, three (3) have chosen to focus on very late stage pre-public opportunities almost exclusively in the US!

9. How would you benchmark Canada's technological development against the rest of the world?

- Canada ranks after the US, France, UK. Canada is #5 or #6 in biotechnology. The industry is just starting to be recognized in Canada.

10. Any additional comments?

- I would like to have a round-table meeting of biotech companies with the Deputy Minister and an independent facilitator

Name: Dr. Michael Walker, Chairman and Director	**Date:** March 14, 2000
Organization: Nortran Pharmaceuticals Inc. 3650 Wesbrook Mall Vancouver, British Columbia V6S 2L2 **Founded**: 1986	**Interviewers**: Borys Chabursky, Gord Glendon

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Basic research and commercialization of lead drug discovery

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Basic research and commercialization of lead drug discovery

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Nortran drug discovery techniques involve searching known compounds for a lead and evolving the lead through structural activities relationships (SAR) for enhanced efficacy and safety towards patenting and partnering the compound
- Their focus is in the modulation of the behavior of ion channels
- The mapping of the human genome has been an important endeavor, but the technologies in the areas of functional genomics and proteomics are those that are now the most relevant in deciphering the function of these genes and the subsequent development of the therapeutic strategies based on them
- Other important support technologies include, high throughput screening (HTS) and combinatorial chemistry (CC)

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Continued use of functional genomics, proteomics and their various support technologies (HTS and CC) to unravel gene function

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Commercialization strategy involves taking drug candidates from research stage through to the end of Phase I or II clinical trials, and then licensing them to pharmaceutical companies for clinical trials, formal approval process and marketing
- In 1997 entered into licensing agreement with Chemical Company of Malaysia Berhad (CCM) for development and marketing of local anesthetic in Southeast Asia and China
- In 1998 entered into collaborative research agreement with Astra Hassle AB for research on Antiarrhymic
- Pipeline drugs in areas of "Pro-Erectile", "Intractable Cough" and "Intractable Pain" are still in need of partner development

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

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7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Historically poor Canadian patent law legislation (Trudeau era) has hurt the

development of drug discovery companies by discouraging investment
- Limited total pool of investment capital
- Lack of emphasis on education for pharmaceutical and biomedical sciences forcing many companies to look outside of Canada for personnel
- Need for better taxation incentives to aid in personnel recruitment (Quebec's example of a temporary tax holiday is a good one)

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?
- There may be just a large enough capital pool in Canada to support companies with good concepts
- Government helps with sufficient grant opportunities for those with early stage academic research proposals
- There are many individuals within the Canadian scientific community who are willing to do high quality piece work on a contract basis which helps to keep the cost of R&D low (possibility of virtual lab network)

9. How would you benchmark Canada's technological development against the rest of the world?
- Canada is probably in the top 5 or 6
- USA as world leader although they have not reached that status by being efficient with resources (immense money spent in Biotech investment)
- Canada has done well in molecular biology but not in clinical pharmacology

10. Any additional comments?
- Education at al levels is the most important investment that can be made in Canada for the future of the Biotech industry. The lack of well-educated Canadian personnel necessitates the difficult task of recruiting from outside of country.
- Government should not be so risk averse in allocating grant money and let those with sound ideas have capital with a minimum of "strings" attached to promote sound entrepreneurial endeavors
- Create network of well respected, senior "mentors" to aid young companies in research plan so that they will not waste effort "re-inventing the wheel" with respect to the scientific approach

Name: William Bardosh, VP, Director of Pharmacogenomics Program	**Date:** March 2000
Organization: Nova Molecular Inc. 5252 de Maisonneuve West, Suite 105 Montreal, Quebec H4A 3S5 **Founded:** 1995	**Interviewers:** Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Commercialization
- To commercialize technologies and research concepts built on the link between genetic markers for disease of the Central Nervous System (CNS), disease progression and response to therapy.

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Commercialization

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- NMI utilizes expertise in pharmacogenomics, functional genetics, biochemistry and high throughput screening

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Pharmacogenomics, functional genomics, biochemistry, DNA analysis, nanotechnology and drug design and delivery

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- There are minimal opportunities in Canada to form strategic alliances forcing companies to look elsewhere for support
- Looking for partnership with major pharmaceutical company soon to develop neuron transplantation product

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- NMI believes that the underlying mechanism of neuron repair is basic to patient management of neural degenerative disease, stroke, trauma and infection
- Understanding these processes and the development of products utilized in maximizing neuron repair is a presently unmet market need
- Areas of Alzheimer's diesease, stroke, Parkinson's, neuronal loss in AIDS, etc.

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Fundamental technology knowledge (eg. Hardware and biological systems)

- Overly politicized (too many agendas)
- Canada has not developed a critical mass in the biotech sector
- Government should help to educate

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Expertise in mass spectroscopy
- Early stage research (Academic based)
- Strong networks of researchers
- International in outlook

9. How would you benchmark Canada's technological development against the rest of the world?

- Canada is ahead of Europe and behind the US, which is first

10. Any additional comments?

-

Name: Jonathan Ross Goodman, President	**Date:** March 9, 2000
Organization: Paladin Labs Inc. 6111 Royalmount Ave. Montreal, Quebec H4P 2T4 **Founded:** 1995	**Interviewers:** Borys Chabursky, Alexander Liede

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Product development and market development. Paladin is not involved in the basic research, we are mainly focused on marketing and selling. Paladin is interested in the Canadian market and therapeutic areas. We will conduct a clinical trial only for the purposes of licensing the product and obtaining regulatory approval. Our areas of focus are urology, rheumatology, dermatology, palliative care and any other therapeutic areas that may be profitable.

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Marketing and selling for the Canadian market. We are interested in companies who have completed phase II/III clinical trials.

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Company is not in a position to comment on where the industry is headed. Paladin is interested in a lucrative technology. Paladin is not a technology leader, rather a technology follower. A technology that works in the US may be applied to the Canadian market by Paladin.

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Pharmacogenomics

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- VCs have 15% equity of company. Investors need to understand biotech and invest in them.

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

-

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- There are few qualified executives for this industry in Canada
- There should be more independent VCs.

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- R&D
- Great tax credits, however, the audit process is time-consuming

9. How would you benchmark Canada's technological development against the rest of the

world? • It is difficult for Canada to compete in a billion dollar market
10. Any additional comments? •

Name: Dr. Marianna Foldari, President and Director of R&D	**Date:** March 15, 2000
Organization: PharmaDerm Laboratories Ltd. 3-411 Downey Road Saskatoon, Saskatchewan **Founded**: 1991	**Interviewers**: Gord Glendon, Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- PharmaDerm Laboratories (PDL) is involved in basic research up until the last pre-clinical stages of development
- Involved in the development of needleless drug delivery systems of large molecules including vaccines, genes and proteins

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Basic research up until the last pre-clinical stages of development
- Planning to have at least to products on the market (transdermal insulin patch and interferon topical cream) as well as a number of others in the development pipeline

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- PDL laboratories platform technology involves a lipid based delivery system that allows large molecules to be transported across the skin and mucosa
- Genetics, proteomics, drug delivery

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Genomics, functional genomics, proteomics, pharmaco and toxico-genetics, drug delivery and targeting and molecular biology
- These technologies will continue to be drivers if the ethical atmosphere continues to be conducive (consumers will dictate the public acceptability of these technologies which will have a tremendous impact on their marketability)

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- PDL is a University of Saskatoon spin-off company
- PDL merged with Helix Biopharma Corporation in November 1999 to aid in the development of their drug delivery products

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Pharmaceuticals that are efficacious, safe and easily administered will always be an unmet market need
- As more genes and proteins are characterized, drug delivery methods will need to be aggressively explored to make the most of new genetics driven therapeutic possibilities

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- There needs to be a continuation and expansion of good basic science in Canada to drive

the Biotech sector
- Not enough capital for companies (risk averse VC's)
- Shortage of qualified personnel
- More support is needed from provincial government with respect to seed funding and infrastructure
- Conflict of interest in grant review process (should adopt external review process as has the US NIH)
- Needs to be more active promotion of technology transfer by government (Network Centres of Excellence is a good example)
- Need more GMP facilities in Canada

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?
- Good level of federal government support for research through IRAP and NSERC
- Canada is approaching a "critical mass" of strong Biotech companies
- Canada has a strong social security base which is will ensure the continuation of strong markets for drugs

9. How would you benchmark Canada's technological development against the rest of the world?
- USA is ranked first
- Europe is doing increasingly well (eg Denmark's' "Medical Valley")
- Canada is in top 10 but is loosing pace in relation to other countries with more aggressive Biotech sectors

10. Any additional comments?
-

Name: Robert Knapen, President	**Date:** March 10, 2000
Organization: Phenogene Therapeutics Inc. 6100 Royalmount Avenue Montreal, Quebec H4P 2R2 **Founded:** 1997	**Interviewers**: Borys Chabursky, Alexander Liede

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Basic research

2. In 2005, what stage of the value chain do you believe your organization will be in?

-

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Phenogene is interested in functional genomics and target validation (reverse genomics).

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Functional genomics and target validation are still very much in the academic domain, but they will be the future drivers in the biotechnology industry
- Research in embryology and tissue regeneration. Extend understanding of process and function before therapeutic application.

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Research stems from the academic domain and is then applied to its therapeutic potential by industry
- In 10 to 15 years, big pharmaceutical companies will allow for 75% of the R&D to be done externally by smaller biotech companies. A strategic alliance with a big pharma is in the future of Phenogene.

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Currently, there are enough VCs in Canada. Outside of Canada, VCs are more structured and the process is faster.
- Networking between big pharma and biotech companies would help competition. VCs should not function simply as a source of funding, they could help link smaller biotech companies with the big pharmaceuticals.

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- There is a lack of critical mass in the industry in Canada. To compete in the global market, biotech needs to establish a critical mass. Money is key. Canada is less business-driven than the US and there is less money.
- Canada's basic science is under-funded
- Canada's scientists have little or no business knowledge. Biotech companies do not have the time or money to invest in training. Staffing becomes an issue. There are not enough

qualified individuals in Canada, and money is lacking if qualified individuals exist. The problem is akin to "which came first, the chicken or the egg?" To reach a critical mass, Canadian biotechnology firms must hire knowledgeable CEOs and other qualified personnel. To attract these individuals, we need the critical mass.

- The VCs for seed capital is adequate in Canada. However, there should be greater competition between VCs in Canada and a greater number of independent VCs (from US?). The process involved with VCs in Canada takes too long. In the US, Venture Capitalists cannot afford to waste time.
- Canadian investors may be less appreciative of the cyclic nature of the biotech market, and less willing to take risks.

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Canada has good scientists. Canada needs more funding for basic research.
- Canadian biotechnology should focus on one particular niche rather than compete head-on with the United States. It is not possible to focus and compete in everything.
- Genome Canada is the first step in the right direction and they should invest more money in fewer locations such as the three major centres in biotechnology (Toronto, Montreal and Vancouver)

9. How would you benchmark Canada's technological development against the rest of the world?

- The United States is #1. The National Institutes of Health is able to fund more research

10. Any additional comments?

-

Name: Dr. Michael D. Winther, President and Research Director	**Date:** March 2000
Organization: QuantaNova Canada Ltd. 15 Chipman Drive, P.O. Box 818 Kentville, Nova Scotia B4N 4H8	**Interviewer:** Michael Stinson

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Basic research and commercialization

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Basic research and commercialization

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- QuantaNova's (QN) technology platform involves the use of microarray techniques and real time PCR (functional genetics) in combination with bioinformatics software
- New technologies needed to increase accuracy of analyses and increase throughput

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Technology drivers will continue to be functional genetics in combination with high throughput screening
- Bioinformatics will continue to be important and will become a more powerful tool as computers increase in speed

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- QN aims to form alliances with large pharmaceutical or biopharmaceutical companies now and in the future
- QN may specialize in niche markets rather than main line pharmaceuticals where larger companies will dominate

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- The market presently demands more molecular entities
- In the post-genomic era the market for tailored drugs will be rapidly expanding

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Canada is in direct competition with well-capitalized US companies who can afford state of the art technologies
- Canada should fund centralized technology centres (don't regionalize technology access because it will dilute the available resources too thinly)
- A general lack of funding
- Lack of a centralized vision

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Strong basic science
- We have a strong basis in proteomics
- Strength in the agricultural and forestry niches

9. How would you benchmark Canada's technological development against the rest of the world?

- Large US screening companies are the world standard
- These companies will have outstripped the capabilities of most government labs

10. Any additional comments?

-

Name: Jean-Marc Juteau, CEO	**Date:** March 9, 2000
Organization: Replicor Inc. 1550 Metcalfe St., Suite 502 Montreal, Quebec H3A 1X6 **Founded:** 1999	**Interviewers:** Alexander Liede, Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Replicor develops applications of platform technologies based on the regulation of DNA replication. Replicor is involved in basic research (75%) and business development/commercialization/alliances (25%) of these technologies. Our major products are (1) origin of replication consensus, or a 36 bp piece of DNA designed to incorporate vectors for gene therapy, (2) screening and designing of compounds for stimulating or inhibiting DNA replication and (3) regulation of DNA replication in therapeutics in cancer and tissue regeneration.

2. In 2005, what stage of the value chain do you believe your organization will be in?

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3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

-

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Proteomics
- Functional genomics
- Gene therapy will be a huge market, although not one gene therapy has been approved yet

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Replicor is a McGill University spin-off and uses laboratory space to develop technologies in-house
- Alliances with big pharma

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- For biotech to continue, University research must be good
- Tax incentives are required
- Technology transfer needs to be facilitated

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Researchers need more education in business
- VCs need to invest after seed funding, currently it is very difficult to obtain mezzanine capital. Companies must wait too long for financing, then VCs stake bigger claim of weakened company. It is better to seek intermediate funding in Europe and the United

States.
- Canada missed the boat in genomics and perhaps proteomics

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?
- Quality of fundamental science per capita

9. How would you benchmark Canada's technological development against the rest of the world?
- Canada is #3. US is #1 and France/Germany/UK are #2. Canada may be ranked second if you look at technology transfer.

10. Any additional comments?
-

Name: Zenek Dybka, Director, ON Regional Affairs	**Date:** March 2000
Organization: Rx&D Hamilton, ON	**Interviewers:** Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

-

2. In 2005, what stage of the value chain do you believe your organization will be in?

-

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Genomics
- Combinatorial Chemistry

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

-

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

-

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Functional Genomics
- Pharmacogenomics
- Diagnostics

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Provincial formulary access is restrictive
- Tax structure is an impediment to growth
- IP protection is a weakness (lags behind), non-effective enforcement
- Approval rate for products can be up to 2 years longer than other jurisdictions; Canadian products are approved first elsewhere
- Not enough money invested into R&D for both basic and applied research
- Brain Drain
- Pricing maintained by PMPRB; low cost of drugs decreases profit and reduces re-investment thereby stifling innovation
- Biotech clusters are not, as yet, identifiable
- Restrictive market interventions

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Good infrastructure for basic R&D
- The R&D tax credit structure
- Excellent health science centres and health care infrastructure

- Positive changes to patent law
- Good CRO industry
- Opportunities to change regulatory structure and patent laws to lead to increased investment by pharma

9. How would you benchmark Canada's technological development against the rest of the world?

- US is number 1
- Canada is 6th or 7th, after UK and Germany

10. Any additional comments?

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Name: Dr. Alan Bernstein	**Date:** March 1, 2000
Organization: Samuel Lunenfeld Research Institute (SLR) Mount Sinai Hospital 600 University Ave. Toronto, ON M5G 1X5	**Interviewers:** Audrey Turner, Michael Stinson, Borys Chabursky, Chia Chia Sun

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Basic research, but applying technologies to all stages but possibly not including market development
- Focus on genomics (typing for breast and colon cancer – strong), proteomics (strong), some bioinformatics, mouse models (strong), epidemiology (building a floor), drug design (building some capabilities), no pharmacogenomics yet, member of PMH Gene Chip Consortium ($200,000 contributed each by Sick Children's Hospital, Princess Margaret Hospital, University of Toronto, Mount Sinai; developed in conjunction with U of Toronto Engineering department)
- Difficulty to obtain critical mass/international credibility

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Currently building capabilities in all stages of the value chain
- SLR is building capabilities through economies of scope rather than scale; for scale, a critical mass in science is needed
- SLR's strategy is to focus on limited diseases across all areas of the value chain
- Wrote a CFI application to develop own customized chip capabilities at SLR

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Identification of dozens of potential drug products to be tested in people
- Identification of protein targets for disease

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Dr. Bernstein does not like to predict beyond 2 years but identifies some of the drivers as being merger-related and due to the high costs of research
- Other drivers include convergence of technologies, the departure from traditional models (e.g. high throughput screening is entirely different than traditional chemistry), and focus on prevention
- There will be a need for appropriate clinical trials and testing to support drug target identification and pharmacogenomics profiling using gene chip technologies
- Pharma companies are really interested in pharmacogenomics (genotype profiling) and rational drug design, e.g. Herceptin and breast cancer
- Technology drivers include convergence of materials science, information technology and physics – data analysis (bioinformatics) is becoming key
- Summary of trends in 5 to 10 years: 1) genetic epidemiology will be important, 2) pharmacogenomics (response to drugs & susceptibility to disease) will be important and 3) convergence of technologies

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Academic collaborations are overdone and unsuccessful (e.g. networks)
- Academic-industrial partnerships are good
- Spin-offs are the best way to "collaborate"; academics provide proof of principle and spin-offs provide scale-ups, e.g. Glycodesign

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Market demand will be driven by the molecular basis of disease
- We will identify molecules that will lead to new drugs (INDs) and new pharmacogenomic profiles (accurate stratification of patients based on molecular disease), e.g. Herceptin and Hb2 receptors for breast cancer
- The basis of schizophrenic disease will be identified, the same way we have identified the molecular basis for colon cancer
- The vision in 5 years is to cure and prevent disease on a molecular basis
- However curing disease will be expensive due to the technology and complexity of disease (5 to 10 genes each); emphasis increasingly on common diseases and lifestyle

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Cross-disciplinary studies are considered high-risk for investors, and also constitute a personal risk
- There is a lack of cross-sector collaboration in industry and academia, e.g. bioinformatics requires IT, biotech and statistics knowledge
- There are cultural and profile issues
- Canadian companies are not plugged into pharma needs, e.g. X-ray crystallography and structural biology (rational drug design) are very strong in Canada from a research perspective, but there are no Canadian companies (except for possibly Edmonton's Biomolecular Design)
- Outmoded academic system: institutional grouping based on therapeutic area/disease/department vs. research institute that develops critical mass built around technologies
- Canada had an opportunity to "leapfrog" US in functional genomics (MSH scientist)

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Canada has the infrastructure for clinical testing, however, this infrastructure is breaking down (e.g. Atlantic Canada's hospital systems are restructuring due to bottom line and academic mission is being lost)
- Opportunity for Canada to take advantage of clinical trial needs and develop high clinical trial expertise (e.g. MSH high-end clinical trials, McMaster's academic RCP and St. Paul's Hospital, Vancouver, although St. Paul's lacks molecular biology expertise)
- Compared to U.S. HMOs, that have no attraction for especially early stage trials, Canada is strong
- Prostate cancer studies at Vancouver General Hospital using microarrays are good

- Mouse models, proteomics and bioinformatics are good in Canada
- Gene-hunting in Canada is good (Tom Pawson)
- Founder populations in Quebec, Nfld, Hutterites,
- Gene cloning has a good track record (Michael Hayden, NCEs)); however the technologies are changing and emphasis is now on common diseases
- Single payer health care system is good
- Opportunity for converging technologies (e.g. Chris Bachhouse in Albert is examining fluidic chips)
- Opportunity in structural biology – we have biologists in Edmonton and elsewhere
- Opportunity in functional genomics and genetic epidemiology (identification of susceptibility to disease)

9. How would you benchmark Canada's technological development against the rest of the world?

- In the U.S., there are a few U.S. companies developing technologies and offering services (e.g. Affymetrix, Myriad, Curagen), however there are none in Canada (except for possibly ?Visible Genetics, TM Bioscience?)
- High tech US industry (Affymetrix, Incyte) vs.. low-tech Canadian industry (due to risk-averse venture capital, e.g. BioChem Pharma's low-end origins, QLT's high-end origins)
- Global pharmaceutical industry based in US; US has critical mass and numerous excellent researchers
- Affymetrix (Pat Brown) is a good example of how to cultivate entrepreneurialism within basic research and represents the convergence of cross-disciplinary approaches (statistics, physics, software development, materials science)
- Other high-tech international companies against which Canada should benchmark itself: Lorus (low-end anti-sense), Protana (Denmark), Pharmacia (Sweden)
- Canada probably tied for 2nd with US first
- US often relies on Canadians to develop new agendas, e.g. Canadian came up with concept of functional genomics 10 years ago but US worked faster in taking advantage of this concept commercially
- MNEs in US experience lack of networking
- Americans value basic research more than Canada – US finds the brightest people, has effective technology transfer, and infrastructure is paid for by granting agencies

10. Any additional comments?

- Best model for research is building critical mass around a research institute rather than around a disease (similar to the pharmaceutical model); Abe Fuchs building a hospital at McGill University; SLR crosses over from basic research into clinical work
- Would like to see collaboration on infrastructure problems so that like-minded scientists can work together
- Clinicians being left out of value chain – the days of clinicians such as Banting and Best discovering drugs are gone; now it is the bioinformaticians discovering drugs
- Academics would like to know the agenda for the roadmap and see that government is involved
- Potential industry/other stakeholders: Paul Lucas, Cecil Pickett, Michael Hayden, Vic Haywood, Tom Pawson, BioChem Pharma, Glaxo, Merck Frosst, Cecil Digga, Schering Plough in US, MRC, CFI

- Is interested in participating in roadmap initiative

Name: Mr. Douglas Ball	**Date:** March 17, 2000
Organization: Spectral Diagnostics Incorporated 135-2 The West Mall Toronto, Ontario M9C 1C2 **Founded:** 1991	**Interviewers**: Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- The company focuses on all parts of the value chain and is fully integrated from basic research to manufacturing to commercialization.
- Spectral specializes in the development and commercialization of point-of-care rapid tests. Fields of focus presently include cardiac (rapid measurement of myoglobin, CK-MB and troponin I from whole blood for example) and sepsis (rapid measurement of gram negative infections from whole blood). Next generation of sepsis products will measure gram positive, fungal and viral infections. Future fields under consideration include drugs of abuse, heart failure and stroke and expanding into home based/over-the-counter testing.

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Spectral will have more enabling technologies and products in various stages of development and increased revenue.

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Utilizing internal expertise to develop and commercialize better diagnostic tools for acute testing in both hospital and home based markets.

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Diagnostic technologies and biochemical markers that are prognostic enabling early intervention and therapy to avoid acute life threatening situations. The effect is to reduce costs to the health care system and improve patient outcomes.
- Gene therapy
- Functional genomics
- New delivery platforms for point of care diagnostics that are easier to use and lower cost to produce

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- SDI presently has strategic alliances with Astra-Zeneca, Biovail for sales and marketing in Canada, Sigma Diagnostics for latex technology and sales and marketing and Elan Diagnostics for sepsis diagnostic technology and sales and marketing.
- Cardiac point-of-care products are sold in the US through a joint-venture sales organization (70% owned by Spectral) with a direct sales force of 30 people.
- Sepsis products to be manufactured by Spectral and marketed by Elan Diagnostics.

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- No opinion expressed

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Canadian biotechnology industry lacks a critical mass. The country has emerging technologies and developments at hospitals and universities but lags in commercializing activities (sales, marketing and strategic partnering). Additionally the country has yet to establish a broad manufacturing base on an international scale and according to internationally recognized standards such as FDA. Spectral has more in common with business outside of the country than within.
- Universities are developing a commercial orientation but are often as commercially unrealistic as their scientists or doctors.
- Convergence of science and business is lacking
- The country lacks experienced management that has taken biotechnology from laboratory to product launch. Recruits from US can fill the gap. However, the cost is expensive since American can demand considerably more compensation to move north and live in a tax unfriendly environment.
- Level of competition is low in Canada

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

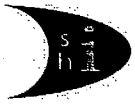
- Good basic science and emerging technologies.
- Immigration rules have eased with respect to recruiting foreign workers

9. How would you benchmark Canada's technological development against the rest of the world?

- Canada lags in what should be its proportionate global share.
- There is a lack of vision and leadership at the political and biotech communities
- We should be better at celebrating and promoting what success we already have in Canada. That includes people and companies.
- Grant application process should be less cumbersome
- Critical mass in Canadian biotech sector not yet been achieved
- Need to create a more business friendly environment by the lowering of personal taxes.
- Options are an important currency to attract and maintain professionals. Proposed changes to the federal taxation of options was disappointingly short of the mark.

10. Any additional comments?

- Concern that regional orientation distorts government role in sustaining, picking and growing winners in this segment.



Name: Dr. Eric Atkinson, Manager of Marketing & Corporate Development	**Date:** March 14, 2000
Organization: StemCell Technologies Inc. 808-777 W. Broadway Vancouver, British Columbia V5Z 4J7	**Interviewers**: Gord Glendon, Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Stem Cell Technologies (SCT) operates at all stages of the Value Chain
- Provides a range of products to support biomedical and Biotech research in the areas of hematology, immunology, cell transplantation, gene therapy, cancer research and developmental biology
- Specializes in media preparations for cell growth and cell separation technologies as well as created Stemsoft, which is a SCT software spin-off company

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Continue to expand technologies in all stages of the Value Chain
- Continue to be a leader in field of quality preparations of media for cell growth
- Will continue to grow at 25% per year with additional distribution to the US

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- SCT utilizes tissue culture media expertise to retain strong position in market
- Cellular screening techniques are essential for experimental hematology

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

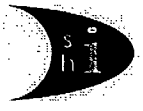
- Continued and increasing importance in genomics (functional) and proteomics
- Bioinformatics will increase in importance to unravel functions of newly discovered genes and proteins
- Stem cell culture technologies will remain an important element for the majority of basic research utilized by Biotech companies
- Gene therapy will continue to grow as a basic therapeutic technique as more and more genes are characterized for their functional properties

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- SCT grew out of the Media Preparation Service of the Terry Fox Laboratory for Hematology/Oncology Research in 1993 (A close relationship persists today between SCT and the Terry Fox laboratory)
- In 1998 opened European distributor, StemCell Technologies France
- Privately owned company
- Could entertain strategic alliance with US company to aid in understanding of their regulatory system

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Development of Biotech priorities should reflect the greatest health concerns of the



country (cancer, heart disease, etc.)
7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats? • British Columbia is a very difficult province to work from given the lack of support that Biotech companies receive from the government and the provincial tax structure • Border issues between Canada and the US cause difficulties in shipping including delays and additional costs • Brain drain to US • Canadian taxes are too high
8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities? • Canada has a very strong scientific reputation
9. How would you benchmark Canada's technological development against the rest of the world? • In the top 5 or 6 • USA would rank as number one with Germany and Japan in the top 5
10. Any additional comments? •

Name: Dr. Valery Alikov	**Date:** March 17, 2000
Organization: Supratek Pharma 275 St. Jacques Ouest, Suite 700 Montreal, Quebec H2Y 1M9 **Founded:** 1994	**Interviewer:** Chia Chia Sun

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Product development: currently in preclinical stage of developing the product pipeline for Phase II, III trials
- Platform is drug delivery/gene therapy

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Envisions marketing in cooperation with big pharma

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Advances in genomics
- Better access to Human Genome Project
- 2nd generation technologies, e.g. Inhale's aerosol delivery of proteins (e.g. insulin) and Hemisphere's oral delivery of proteins (beta-feron, insulin, erythropoetin, heparin)

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Genomics and drug delivery will be key – access to proper molecules is important to move research forward
- 3rd generation technologies that are based on principle of improving drug discovery performance using combinatorial physical chemistry, e.g. building libraries, databases, screening programs

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Big pharma for marketing/distribution/outlicensing of product
- Also possible "supergenerics" that improve drugs with innovation
- Biotech (preferably midsize or large)
- NCEs (protein engineering, genomics): would like to become an adjunct member and make delivery systems available to networks through broad or in-kind collaborations
- Supratek will deliver the carrier system and will form alliances for application of the therapy
- Company has products in neurobiology/cancer, antivirals, arthritis

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Demand for drug delivery is huge (most stable market segment)
- There will be a need for better performing formulations of existing drugs
- There will be a need for less expensive, faster acting and more successful molecules

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Infrastructure for technology: technology transfer is not advanced, bureaucracy reduces technological success, taxes are too high and salaries are too low for mid-level professionals who are the most important driving force in the industry

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Research in gemonics area
- NCEs are excellent for interaction between academic science and industry
- NRC network is strong
- Drug delivery is growing

9. How would you benchmark Canada's technological development against the rest of the world?

- Top 5 in drug delivery internationally
- Top 5 in genomics internationally

10. Any additional comments?

- Background on drug delivery: can generate not only products with improved properties compared to parental drug, but can also discover entirely new drugs (new indications) based on old molecules with well established clinical properties.
- New patents can be based on composition of a drug, i.e. drug in conjunction with a delivery system
- Drug delivery allows big pharma to improve drug performance
- $600 M over 10 to 15 years to develop a new drug
- Drug delivery product takes 3 to 5 years and costs $10 to $50 M
- Interested in participating in roadmap

Name: Greg Kamenka, Vice President, Research	**Date:** March 13, 2000
Organization: Tai-Can 4028 West 29th Avenue Vancouver, British Columbia V6S 1V5	**Interviewers**: Borys Chabursky, Gord Glendon

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Basic research up to early stage clinical trials.
- Tai-Can is involved with extraction, characterization and synthesis of lead diagnostic, preventive and therapeutic compounds from foreign (Central and South American) plants and animals historically associated with Native cures

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Tai-Can plans to continue to be involved in basic science, up to early stage clinical trials
- Plans include the development of products in the areas of cholesterol control, appetite suppression, chest congestion and anti-viral activity (shrimp "white spot" protection)

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Genetics and microbiology

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Genetics and proteomics
- Extraction, characterization and synthesis of bioactive natural products

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Strategic alliances with universities are not always effective due to the difficulties in intellectual property issues
- Does believe that strong alliances with other pharmaceutical companies are necessary to develop strong clinical trial evidence and to develop market share though established channels
- Has ties with Biotech companies in Taiwan and Malaysia and has used CRO in Viet Nam to conduct clinical trials

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Presently, there is a great need for pharmaceuticals for disease prevention around the world
- The global availability of sufficient and nutritious food supply is an unmet market need that Biotech has not embraced as vigorously as they have pharmaceuticals
- The will be an unmet market trend towards anti-microbial, anti-aging and so called "lifestyle" products

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- It is difficult for individual researchers outside of typical research institutions to gain

sufficient credibility to garner federal grants.
- Federal grants are not awarded for companies conducting research outside of country which makes it difficult for Canadian companies that utilize foreign natural resources.
- The full extent of existing granting opportunities and programs are not widely known

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?
- There is a great deal of flexibility in the kinds of projects that can receive start-up funding.
- Canada has a wide resource of available technologies for innovative research.
- The presence of programs such as the Scientific Research and Educational Development Fund which allows individuals and companies to receive aid in paying a portion of trainees' salaries.

9. How would you benchmark Canada's technological development against the rest of the world?
- Canada in the top 5 worldwide with the USA first.
- Germany has made some recent strong advances in Biotech due to large influx of capital pools.

10. Any additional comments?
-

Name: Dr. Julian Davies, Chief Scientific Officer, Vice President of Research	**Date:** March 13, 2000
Organization: Terragen Discovery Inc. 2386 East Mall, Suite 300 UBC Campus Vancouver, British Columbia V6T 1Z3 **Founded:** 1996	**Interviewers:** Borys Chabursky, Gord Glendon

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- The commercialization and business development stages
- Terragen Discovery Inc. (TDI) is focused on generating novel small molecule drug leads from traditionally inaccessible and rare microbes
- TDI does not carry out clinical trials of their lead drug discoveries

2. In 2005, what stage of the value chain do you believe your organization will be in?

- TDI will continue to develop small molecule drug discoveries for pharmaceutical development, especially in the area of anti-bacterials and anti-fungals.
- TDI does not carry out clinical trials of their lead drug discoveries

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

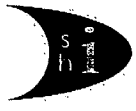
- TDI's platform technology (combinatorial biosynthesis) allows the insertion of genome fragments from uncultivable microbes into expression vectors which are transferred into cultivable hosts to generate small molecule libraries for drug screening
- The relevant technologies necessary for this endeavor are molecular biology (genetics), high throughput screening, small and medium scale fermentation, organic microbiology and chemistry for extraction, purification and structural identification of bioactive small molecules

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Technological utilization over the next 5 years will se an increased need for high throughput screening, molecular biology and functional genetics
- Demand will increase for organic chemistry expertise in the areas of natural product extraction, purification, and structure determination
- Nanotechnology, bioinformatics and the exploration of biodiversity are areas where Canada should be concentrating on developing competence over the next 5 years

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- TDI was formed from the West-East Centre for Microbial Diversity, which was established in 1994 as a collaborative research venture between the University of British Columbia and the National University of Singapore
- ChromaXome and Xenova Discovery were acquired in 1999 to strengthen TDI's proprietary discovery capabilities
- TDI is interested in collaborations with other small biotech companies or larger pharmaceutical companies for drug discovery and new drug development



6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- TDI is presently targeting drug leads in the areas of anti bacterial, fungal and cancer sectors
- New drug discovery will be a continually important area of unmet need which will demand an effort in the development and support of new technologies

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- There is a lack of fermentation and high throughput screening expertise in Canada
- We are not strong in microbiology or the production of small molecules
- There is a dearth of venture capital as well as a risk averse environment among its institutions in Canada compared to that of the USA and other parts of the world
- The taxation system here makes it difficult to attract quality personnel from the USA
- British Columbia, in particular, is not supportive of the Biotech sector

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

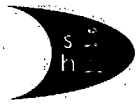
- Strong molecular biology and some natural chemistry expertise
- The presence of Biotech incubators located on university campus is very helpful to facilitate technology transfer and to permit founders to retain university associations
- The Networks of Centres of Excellence (NCE) programs are very good, especially the Canadian Biodiversity Network (CBDN), in developing technologies and facilitating technology transfer

9. How would you benchmark Canada's technological development against the rest of the world?

- Canada in the top 10 world-wide
- The USA is indisputably the world's strongest in Biotech
- United Kingdom, Germany, France and Australia also rank ahead of Canada
- We are ahead of Spain and Italy

10. Any additional comments?

- Canada could improve its Biotech sector by developing more "small business grants" like those available in the USA and to develop more grant opportunities for seeding early stage companies
- Government granting programs need to increase financial support for basic research, which is the principal driver for the biotech sector with respect to patentable discoveries and personnel training



Name: André de Villers, CEO	**Date:** March 9, 2000
Organization: Theratechnologies 2310 Alfred-Nobel Blvd. Saint-Laurent, Quebec H4S 2A4 **Founded:** 1993	**Interviewers:** Borys Chabursky, Alexander Liede

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- R & D company with 39 different patents. Our organization is involved in all stages of the value chain. Partnerships are formed as late in the chain as possible.

2. In 2005, what stage of the value chain do you believe your organization will be in?

-

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Proteomics is where the technology should be going
- Pharmacogenomics
- Research into the delivery of drugs/proteins

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Biomedical devices combining digital technology, i.e. for aging population

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Alliances are good but ownership is important to maintain
- Theratech insisted in keeping production in Canada in dealings with Hewlett-Packard. In fact, big pharma prefer to have R&D done by smaller companies.
- Being in Canada is a disadvantage for alliances. It is necessary to have contacts in the big pharma and they are more likely to support local biotech before a Canadian biotech.
- It would be good to jump-start meetings with Canadian CEOs. Industry Canada does not have a role in facilitating alliances. Trade missions are equally ineffective.

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

-

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- There is a lack of appreciation and misconception of the biotech industry in Canada. House of Commons and the public are more concerned with the genetic manipulation of agriculture.
- The VCs should encourage biotechnology. At least one of these they will see it become a big pharma and compete with the global market. The main problem is financing. Biotech market is cyclic in nature. It is not realistic to compare biotechnology with software; the patent time is longer, time to market is longer and biotech has a more costly infrastructure. The best chance to compete with the US market is government support. Grants are not ideal, loans, on the other hand, are desirable. Loans may be

assessed by the NRC and they may help deter biotechs from selling product ownership to big pharmas.
- Proteomics can be further developed, the base exists in Canada. Canada can fill the gap with training and money.
- On the "brain drain" in Canada, 50% is due to money, 50% is due to project or job. Canadian biotechnology can improve its projects, but the money is necessary to prevent the brain drain.

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?
- It is imperative to identify a niche to compete within genomics, bioinformatics, etc.
- It is important for Canadian biotech firms to keep product as long as possible
- The basic science is good in Canada
- Patenting process is good

9. How would you benchmark Canada's technological development against the rest of the world?
- Canada is #2 in the world. Canada is entrepreneurial and more willing to take risks than the Swiss for example.

10. Any additional comments?
-

Name: Mohsen Daneshtalab	**Date:** March 8, 2000
Organization: University of Alberta 114 Street – 89 Avenue Edmonton, Alberta T6G 2M7 **Founded:** 1908	**Interviewers:** Borys Chabursky

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- Our institution is interested in new drug discoveries in the areas of infectious diseases (e.g. antifungals) and cancer
- Basic research

2. In 2005, what stage of the value chain do you believe your organization will be in?

- Basic research

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Genomics
- Fingerprinting technologies
- Computer assisted drug design, cell receptor-based designs
- Computer guided drug isolation and synthesis
- Combinatorial chemistry
- High throughput screening

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- No ideas to comment, but the future is in:
- Applied genomics
- Pharmacogenomics
- Gene therapy
- Combinatorial chemistry
- High throughput screening

5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Our institution has a relationship with CV Technologies

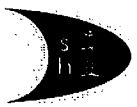
6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- Preventive medicine is improving
- Herbal medicine and new technologies are identifying new compounds which can be developed, new active ingredients

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?

- Small companies cannot do this business alone; there needs to be more investment by VCs and granting agencies. Small companies are forced to out-license rather than hanging in there.

• Little or no support from government • There is a need for more biotechnological equipment and facilities in Canada • Commercialization could be improved
8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities? • Good research comes out of Canada • Canada is good technologically
9. How would you benchmark Canada's technological development against the rest of the world? • Canada is in good shape, same as Europe, but not as good as the United States. To compete with the US, more money needs to be injected into the industry.
10. Any additional comments? • Canada needs more money



Name: Dr. Bernard Bressler	**Date:** March 15, 2000
Organization: Vancouver Hospital and Health Sciences Centre 855 West 12th Avenue Vancouver, British Columbia V5R 1M9	**Interviewers:** Borys Chabursky, Gord Glendon

1. In 2000, what stage of the value chain do you perceive your organization to be in?

- The Vancouver Hospital and Health Sciences Centre (VHHSC) is involved at all stages of the Value Chain
- Research priorities of VHHSC are directly linked to the major clinical priorities of the Vancouver Hospital (Brain and Spinal Cord Research Centre, Cancer Research Centre, Lung Disease Centre, Immunology Research Centre, Clinical Epidemiology and Evaluation Centre and Discipline Development Program)

2. In 2005, what stage of the value chain do you believe your organization will be in?

- The VHHSC will continue to be involved at all stages of the Value Chain concentrating on research in the previously mentioned disciplines

3. In 2000, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- Technologies carried out in the VHHSC include genomics, functional genomics, gene therapy, and recombinant genetics

4. In 2005, what do you identify as the Canadian and global technology drivers in the stages of the value chain (your stage, and the stages before and after)?

- The VHHSC will continue to pioneer the following technologies: genomics, functional genomics, gene therapy, and recombinant genetics
- Great strides are being made in the field of magnetic resonance imaging and it will continue to be an active area of research and clinical application

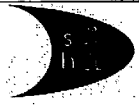
5. In 2000 and 2005, what are the key relationships and strategic alliances that will contribute to your technological success?

- Efforts have been made to educate the venture capital sector to the possibilities available for growth in Biotech (in response to risk averse nature of the discipline in Canada)
- The city of Vancouver, the province of British Columbia, University of British Columbia, industry and the VHHSC have been successful in building a Biotech incubator the UBC campus
- Additional efforts are presently being made by VHHSC to build a large Biotech development on its campus

6. In 2000 and 2005, what do you identify as the unmet and met market needs and demand for technology in Canada and the rest of the world?

- The major diseases of the world are an obvious area of unmet need in regards to the availability of appropriate preventive and therapeutic regimens (cancer, heart disease etc.)

7. In 2000 and 2005, what do you identify as Canadian technology weaknesses, gaps and threats?



- Taxes are too high in Canada (makes the US an attractive target for "brain drain")
- Typically, not enough financial opportunities or incentives to keep, or recruit, a critical mass of qualified professionals in the area of biomedical research and Biotech

8. In 2000 and 2005, what do you identify as Canadian technology strengths and opportunities?

- Strong science base available for what should be an active technology transfer environment
- There is enough venture capital for those with very strong concepts to counter the risk averse nature of the industry

9. How would you benchmark Canada's technological development against the rest of the world?

- In the top 10 for Biotech

10. Any additional comments?

-

5. Company Descriptions

The following company descriptions are obtained from information provided on company websites and marketing material requested, whenever available, from companies consulted.

Angiogene

1560 Sherbrooke St. East, Suite Y-1605
Montreal, Quebec
H2L 4M1

Founded: 1995
Employees: 13

Angiogene's expertise and core focus is cardiology. The company is focused on the development of DNA-based therapies to treat Ischemic Heart Disease. Angiogene has developed a unique expertise in assessing responses of the vascular wall to angioplasty, an intervention performed routinely by Cardiologists around the world. The company's technology platform consists of antiproliferative therapeutics designed to prevent post-angioplasty restenosis and angiogenic agents administered to stimulate angiogenesis and treat severely ischemic patients.

The company currently has one patent issued on core technology for its anti-proliferative radiolabeled-DNA technology. Angiogene has also filed/acquired two patents covering innovative approaches to produce radioactive endovascular devices and one patent on a detecting device designed to measure in vivo the actual dose of radiation administered within a vessel. The company has also recently filed a patent for a potent antiproliferative cell-cycle targeting agent discovered by its research team. Finally, Angiogene is in the process of establishing proprietary positions for technology derived from its Angiogenesis program.

Angiogene's management and scientific expertise include Guy Leclerc, President and Chief Scientific Officer, Remi Martel, Director of Development, and Francois Bergeron, Chief Executive Officer.

Angiotech Pharmaceuticals Inc.

6660 N.W. Marine Drive
Vancouver, British Columbia
V6T 1Z4

Founded: 1992
Employees: 35

Angiotech Pharmaceuticals Inc. is focused on the development and commericalization of innovative treatments for angiogenesis dependent diseases and conditions including arthritis, cancer, cardiovascular disease and neovascular disease of the eye. The company is developing

medical device coatings and treatments for chronic inflammatory diseases through reformulation of the anticancer drug, paclitaxel.

Angiotech has three pharmaceutical therapies in clinical development: systemic paclitaxel for secondary progressive multiple sclerosis (Phase II), systemic paclitaxel for rheumatoid arthritis (Phase I) and topical paclitaxel for psoriasis (Phase I and Phase I/II). In January 2000, the paclitaxel-coated coronary stent program also entered human studies. Other medical device programs include paclitaxel-loaded surgical implants for the treatment of restenosis associated with peripheral vascular surgery. Although Angiotech's focus is on its own products, the drug delivery expertise and drug delivery systems developed by the company have potential for much broader applications.

Angiotech's management is led by President and CEO Robert Abbott, and Chief Operating Officer Donald E. Longenecker.

AnorMED Inc.

#200 - 20353 64th Avenue
Langley, British Columbia
V2Y 1N5

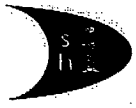
Founded: 1996
Employees: 68

AnorMED Inc. specializes in the discovery and development of metal based therapeutics and diagnostics. The company currently has five compounds in clinical development including two in Phase III. Products in development include an anti-hyperphosphataemia agent, an imaging agent for blood clots, an anti-HIV agent, and a platinum oncology agent. AnorMED's unique core technology involves the integration of properties of metal compounds and metal binding compounds for drug discovery solutions.

The company is collaborating with several companies to develop its products: AstraZeneca PLC of London UK, Shire Pharmaceuticals Group PLC of Andover UK, DuPont Pharmaceutical Company of Wilmington, Delaware USA, and the Rega Institute of Leuven, Belgium.

AnorMED's strategy is to progress its portfolio of promising lead drug candidates through early stage clinical trials and then seek out licensing and/or corporate partnerships. The company also plans to take their products further down the development chain toward regulatory approval in order to obtain their full commercial potential.

AnorMED's President and CEO is Michael Abrams and the Executive Vice President & COO is Geoffrey Henson.



Antalium Inc.

1550 Metcalfe, Bureau 502
Montreal, Quebec
H3A 1X6

Antalium, a spin-off of McGill University, is focused on the development of novel drugs for pain based on novel ion channels. Kazimierz Bainski is the company's CEO and President. Dr. Babinski and fellow researcher Philippe Séguéla of McGill University and the Montreal Neurological Institute have discovered an acid-sensing ion channel (ASIC) expressed in sensory nerves, that is implicated in pain transmission. MedTech and its partner T^2C^2 have provided Antalium with $600,000 to enable further development of the technology.

Antalium researchers have cloned the first novel human ASIC receptor and are in the process of validating it in animal models. It is expected that blocking these peripheral receptors will prevent their activation or modulation by the endogenous pain-inducing molecules, thus interfering with pain transmission to the spinal cord and brain.

Base4 Inc.

6299 Airport Rd., Suite 601
Mississauga, Ontario
L4V 1N3

Founded: 1996
Employees: 36

Base4 Inc. provides integrated solutions for the pharmaceutical and biotechnology industries. The company's primary focus is information management of knowledge and data. Base4 selects and rapidly adapts leading edge technology products from other industries and applies it the pharmaceutical research process to provide clients with a "competitive advantage in all phases of the data-information-knowledge continuum".

Base4's principal software product is "PharMatrix", a browser-based collaborative knowledge management system tailored to the needs of research and development within the biotechnology and pharmaceutical industries. The software is used by companies to manage information collection, use, dissemination, and retention. In addition to security features, PharMatrix also includes Project and Department Management components.

The PharMatrix Corporate R&D Portal is a corporate portal focused on the pharmaceutical industry. The portal provides access to PharMatrix, Pharmafind search engine, electronic scientific journals, T.O.C. and industry news alerting services, chemical structure and gene sequencing databases, scientific software applications and other internal corporate information all from one central "dashboard".

Base 4's PharMatrix Alliance Manager facilitates collaboration between industry partners by enabling users to track sponsored research and intellectual property as it relates to the ownership of proprietary discoveries by parties.

Founded in Mississauga, Canada, Base4 has regional sales offices in Vancouver, the Bay Area, Boston, New Jersey, and Pennsylvania. The U.S. headquarters is in Carlsband, California. Base4 has also recently established its presence in Europe with the opening of its office in Basel, Switzerland.

Base4's management includes President and CEO Martin Sumner-Smith and Vice-President and CFO Richard Leong.

BIOSTAR Inc.

343-111 Research Drive
Saskatoon, Saskatchewan
S7N 3R2

Employees: 35

BIOSTAR Inc. specializes in the development of protein based immunizing agents for humans and animals. The company's primary products include novel immunopharmaceuticals for substantial markets in the human, food animal, and companion animal health sectors. The company has also developed and launched several genetically engineered subunit vaccines for food animals. BIOSTAR's lead product, NorelinTM, is currently in a Phase I/II clinical study in patients with prostate cancer.

BIOSTAR has four issued or allowed patents on its immunopharmaceutical products, and four other applications pending. It also holds six issued patents on its animal vaccines, with three other applications pending.

The company's platform technology and leading products are a family of immunopharmaceuticals based on fusion proteins that incorporate a proprietary carrier protein that stimulates the immune system. These products have been designed for the treatment of cancer in humans (NorelinTM), the enhancement of productivity in food animals, and population control and behaviour modification in companion animal markets.

STAR BIOTECH is the human pharmaceutical-focused subsidiary of BIOSTAR, focusing on the development and commercialization of novel treatments for hormone-dependent cancers and other serious disorders. NorelinTM is an immunopharmaceutical product based on a proprietary recombinant DNA antigen, IPS-21 and provides therapeutic benefits for "hormone-dependent" disorders including prostate cancer, breast cancer, endometriosis and uterine fibroids.

BIOSTAR has developed a patented Plasmid Production System (PPS) that overcomes the regulatory concerns in gene therapy, by eliminating the presence of antibiotic resistance genes and the use of antibiotics in the growth medium.

Management includes President and CEO Stephen Acres, Vice-President of Development Carolyn Weeks-Levy, and Vice-President and CFO Todd Lahti.

BIOSTAR's investors include Working Ventures Canadian Funds, Crown Investments Corporation, Saskatchewan Government Growth Fund, MDS Capital Corp., Canadian Medical Discoveries Fund, Business Development Bank of Canada, Royal Bank Capital Corporation, and ICAST (AgWestBiotech).

BioTools Inc.

420 Sun Life Place
10123 99 Street
Edmonton, Alberta
T5J 3H1

Founded: 1995

BioTools Inc. specializes in biotechnology and computing sciences. The company develops highly sophisticated methods for data mining, data manipulation, and graphical visualization of information. Through the development of its products, BioTools aims to provide the research community with comprehensive and easy-to-use tools to simplify and accelerate the research process.

The company offers two primary bioinformatics products: GeneTool for DNA sequence analysis, and PepTool for protein sequence analysis. These tools offer researchers a single environment through which to rapidly search public and proprietary databases, probe sequence homologies, access functional information, align multiple sequences, and predict the secondary structure of proteins.

BioTools' software developers utilize advanced data compression techniques that allow for enormous databases of information to be compressed to a size that allows users to have a copy included into their own hard drive, making it user-friendly. Moreover, users can effectively search proprietary databases with the security of their own firewall. Public database searching is also available within BioTools' software program without exiting.

BioTools was founded in 1995 by four Alberta professors: Dr. Jonathon Scheffer, Dr. Duane Szafron, Dr. Brian Sykes, and Dr. David Wishart. The current management team includes Gordon Stranks, President and CEO, and Dr. David Wishart as the Chief Scientific Officer, and Scott Fortin, VP of Software Development.

Bregma International

214 - 111 Research Drive
Innovation Place
Saskatoon, Saskatchewan
S7N 3R2

Bregma International is based in Innovation Place and researches, develops, and manufactures medical and dental products. Products include Kirschner wire, Soft Suture Wire, Bone Screws, and Super-Elastic Nickel-Titanium Orthodontic Archwire.

The President of Bregma International is Assem Hedayt.

Biotechnology Research Institute (BRI)

6100 Royalmount Avenue
Montréal Quebec
H4P 2R2

Founded: 1987
Employees: 400

The Biotechnology Research Institute was founded by National Research Canada. The Insitute's mission is to "establish, promote and assist the development of biotechnology by creating an interactive research environment with industry." BRI maintains advanced facilities to carry out collaborative research projects in molecular biology and biochemical engineering.

In the pharmaceutical biotechnology sector, BRI's research is aimed at molecular target identification and the design of drugs to treat cardiovascular, degenerative and inflammatory diseases, as well as cancer. BRI's work in biopharmaceuticals includes the following areas:

- Animal Cells Engineering
- Bimolecular NMR
- Mammalian Cells Genetics
- Bimolecular Interactions
- Cell Surface Receptors
- Genetics
- Enzymology
- Protein Chemistry
- Macromolecular Structure

BRI's bioprocess sector, which carries out bioprocess innovation and technological development, is internationally recognized as a center of excellence in bioprocessing.

The Institute also provides a Biotechnology Training Program that covers fermentation processes, separation and purification techniques, Good Manufacturing Practices (GMPs), and facility maintenance.

BRI research R&D partners include Biomira, ABI, Allelix, BioChem Pharma, Ibex Technologies, BioMéga, Glaxo Wellcome Inc., Merck Frosst, and Syntex.

CV Technologies Inc.

#308 Campus Tower
8625 - 112 Street
Edmonton, Alberta
T6G 1K8

Founded: 1998
Employees: 40

CV Technologies (CVT) is a biopharmaceutical company specializing in the development and commercialization of proprietary technology to identify, extract, and biologically standardize natural mixtures which deliver health benefits. The company has two full-scale laboratories and has access to eighteen satellite facilities.

CVT uses its ChemBioPrint technology to obtain specific chemical and biological profiles of natural mixtures, as well as to determine their mechanisms of action and optimal dosages. In this way, CVT scientists have developed precise operating procedures for commercial production. The company markets its product in Canada under its brand name NerbTech. It also supplies proprietary ingredients to national and international markets. CVT currently has 14 patents including 8 US patents, as well as 13 patents pending worldwide.

CVT, the University of Hong Kong, and Gainforce Ltd. developed an agreement in 1998 defining the operation of a new company, ChemBioPrint Asia Ltd. The business of this new company is to develop, manufacture, and market proprietary natural pharmaceuticals based on CVT's ChemBioPrint technology. The company will initially market CVT's HerbTech line of products but intends to use CVT's revolutionary technology to become the leading supplier of superior natural pharmaceutical, nutraceutical, and biopharmaceutical products in Asia (excluding Taiwan and Japan). CVT has a 60.5% shareholding in ChemBioPrint Asia, Gainforce, 29.5% and the University of Hong Kong, 10%.

The President and CEO of CV Technologies is James H. Bruce.

Cangene Corp.

26 Henlow Bay
Winnipeg, Manitoba
R3Y 1G4
&
Units 3-4, 3403 American Drive
Mississauga, Ontario
L4V 1T4

Cangene Corp. specializes in the development, manufacturing, and distribution of specialty hyperimmune plasma and recombinant therapeutic products worldwide. The company's strategy is to focus on the development and improvement of products that are leaders in global markets because they offer the highest possible value to the customer. Cangene's manufacturing process is optimized for the production of small-volume, high-value hyperimmune products.

As a service-oriented contract manufacturer, Cangene offers clients expression feasibility studies, process development and scale-up of products, and cGMP manufacturing.

The company uses an innovative approach to manufacture its' plasma products producing a high yield and purity that provides Cangene with a competitive advantage. Cangene's leading product is a hyperimmune, WinRho SDF, used for the prevention of hemolytic disease of the newborn (HDN) and in the treatment of an autoimmune clotting disorder (ITP).

Cangene has developed a generic-style strategy for its recombinant products. Using its own efficient manufacturing process, the company can capitalize on the successes of known commercial products. Cangene also offers a patented production technology, CANGENUS™, for recombinant protein manufacturing.

The President of Cangene is John Langstaff.

Chemical Computing Group

1255 University Ave, Suite 1600
Montreal, Quebec
H3B 3X3

Founded: 1994

Chemical Computing Group develops high-end software for use in drug development. The company's focus is computational chemistry. Chemical Computing Group has developed unique software that is easy to use. The company developed an integrated system, which is platform independent. For example, it may be required to alter only 200 lines of its program to adapt it to a particular computer system. In the future, Chemical Computing will develop software applying Bayesian statistics to predict protein-protein interactions that may be important. This will be applied to high throughput screening and combinatorial chemistry.

Bill Hayden is the Vice-President of Marketing at Chemical Computing Group.

ConjuChem Inc.

225 President Kennedy Ave.
Suite 3950, 3rd Floor
Montreal, Quebec
H2X 3Y8

Founded: 1997

ConjuChem Inc specializes in drug delivery technologies. The company has developed two novel chemistry platforms for in-vivo bioconjugation that provide for improved traditional drug delivery systems that eliminate the need for drug release and the associated problems of circulating free drug inherent to those systems. One of these technologies enables local, tissue-specific delivery that retains high levels of localized biological activity with significantly enhanced duration and very limited systemic exposure.

The other technology platform involves a systemic (parenteral) delivery system which yields a significantly enhanced duration of biological activity while eliminating side effects associated with free drug distribution, metabolism, and excretion in the body. Conjuchem's drug delivery technologies involve the "derivatization of an active drug to form a Drug Affinity Complex (DAC) which when administered into the body undergoes a very rapid chemical reaction with specific, targeted, endogenous proteins, resulting in an irreversible covalent bonding of the DAC to its target protein. The resulting DAC/protein bioconjugate retains the biological activity of the original active drug."

Conjuchem products on the market include: DAC Thrombin Inhibitor (local) for thrombus prevention in angioplasty, arterial grafs, endarterectomy and to reduce post-surgical clotting morbidity; DAC Thrombin Inhibitor (systemic) for the prevention of deep vein thrombosis low molecular weight heparins; and DAC Opioid (systemic) for the treatment of chronic pain without CNS effects and with longer duration than morphine.

Conjuchem President and CEO is Duffy DuFresne.

Exogen Neurosciences Inc.

P.O. Box 605
Montreal, Quebec
H2W 2P2

Founded: 1972
Employees: 15

Exogen Neurosciences Inc. is a neuronal signal transduction company. The company's mission is to discover novel therapies to treat patients suffering from acute and chronic neurodegenerative conditions, and nerve injuries. Exogen focuses on acute neuronal cell death, including spinal cord injury, chronic neurodegenerative disease, and neural restoration. Disease targets include Parkinson's Disease and Alzheimer's Disease.

Exogen has developed a technology platform of signal transduction and functional genomics to identify proteins essential for the life, death and growth of neurons. The company has a unique library of over 70 recombinant adenoviruses affecting neuronal signaling which they use to devise high throughput neuronal assays targeted to specific signaling pathways. They are screening large libraries against these assays in search of small molecule drugs. Their screening program has successfully identified compounds that promote neuronal survival. The six lead proteins are currently being deconvoluted to provide structures, and the next step is to mount chemistry optimization and pharmaceutics, and disease models. At the same time, new screens are being run and new assays developed.

Exogen has filed 12 patent applications of which several have been issued. Patents include composition of matter, core discovery methods and preclinical models. In the first quarter of 2000, Exogen plans to approach potential corporate partners to discuss potential product and toolkit out-licences. With regards to strategic partnerships, Exogen's expertise would be of value to companies committed to developing drugs to treat the damaged or diseased nervous system. The company is willing to partner compounds on an exclusive basis, and platform technologies non-exclusively.

Exogen was founded by Dr. Philip Barker, Dr. David Kaplan, and Dr. Freda Miller, all affiliated with McGill and the Montreal Neurological Institute through research and teaching roles. Exogen investors include Canadian Medical Discoveries Fund, McGill University, the Montreal Neurological Institute, Neuroscience Partners Limited Partnership, Societe Financiere d'Innovation (Sofinov), and La Societe Innovatech Du Grand Montreal.

Exogen management includes Dr. Philip Barker, President and CEO, and Dr. Luc Paquet, Director of Drug Discovery, and two Senior Scientists: Dr. Farid A. Said, and Alain Boudreault.

The Hospital for Sick Children (Research Institute)

555 University Avenue
Toronto, Ontario
M5G 1X8

Founded: 1954
Employees: 950+

The Research Institute at The Hospital for Sick Children is a world-class scientific research centre specializing in basic and clinical research leading to the improved understanding, prevention, treatment and care of children's diseases. The Research Institute is one of the world's largest hospital-based paediatric research centers and is affiliated with The University of Toronto.

With over 540 research projects underway, the Research Institute houses a full spectrum of research activity, integrating biomedical research with clinical practice from basic science to clinical application in: Anaesthesia, Biochemistry Research, Cardiovascular Research, Cell Biology, Clinical Pharmacology and Toxicology, Endocrinology, Gastroenterology and Nutrition, Genetics, Haematology/Oncology, Immunology and Cancer Research, Immunology and Allergy, Infectious Diseases, Microbiology, Neonatology, Nephrology, Neurology, Neurosciences, Opthamology, Otolaryngology, Paediatrics, Pathology, Psychiatry Research, Psychology, Respiratory Research and Surgical Research.

In the past five years, thirty-two major research discoveries have been made at the Research Institute with scientists winning more than 70 international prizes and awards.

The Director of Research Business Development at the Research Institute is Robert Foldes.

Hybrisens Ltd.

Farquharson Bldg S, Room 104, Keele Campus
Toronto, Ontario
M3J 1P3

Hybrisens Ltd. specializes in the enhanced clinical utility of existing protein drugs. Hybrisens President is Ezekiel Shami.

IGT Pharma Inc.

Suite 311 - 2386 East Mall
Vancouver, British Columbia
V6T 1Z3

Founded: 1992

IGT Pharma Inc is a drug discovery company focused on the development of innovative therapeutics for cancer and diseases affecting the central nervous system. IGT's three operational divisions are the following:

- **Cancer** - Discovery and clinical development of new anti-cancer drugs with enhanced therapeutic properties through rational drug design and medicinal chemistry. IGT's core cancer therapeutic technology was discovered at the University of British Columbia and is being commercially developed by IGT.
- **CNS Disease** - Discovery and clinical development of novel therapeutics for the treatment of disorders of the brain utilizing capabilities of medicinal chemistry, combinatorial chemistry and molecular targeting. The therapeutic technology is based on metabotropic glutamate receptor pharmacology.
- **Fine Chemicals** - A provider of leading edge chemicals and services to the biotechnology and pharmaceutical industries worldwide, under the division Precision Biochemicals Inc. This division provides IGT with sales revenue.

The Company is currently focused on five therapeutic targets, specifically two cancer drugs (AVLB & IGT-13) and three CNS drugs for the treatment of stroke, epilepsy and anxiety.

IGT's management includes Bruce Schmidt, President and CEO, Dr. Kenneth Curry, VP of Research and Corporate Director, and Dr. Martin Peet, VP of Business Development.

IMMUCON Inc.

1224 Stanley, Suite 313
Montreal, Quebec
H3B 2S7

Founded: 1993

IMMUCON Inc. develops and commercializes products related to contraception and fertility. The company's immunocontraceptive products will first target the male contraceptive and sterilization markets but the company also plans to apply its technology to develop female contraceptive products.

IMMUCON has developed a male infertility diagnostic test, P34H Sperm Fertilizing Ability Test, which was introduced to the market at the end of 1999. The company is currently researching a cure to treat male infertility that they hope will be on the market in 5 years.

The male contraceptive pill that IMMUCON is developing will be taken once a month. Researchers at IMMUCON are also working on a female contraceptive pill that would be taken once a month and would have efficacy comparable to existing oral contraceptives while lacking the primary side-effects of progesterone and estrogen based formulas.

The president of IMMUCON is Alain Bosse. The Director of Research and Development is Dr. Robert Sullivan.

Innovation Place

114-15 Innovation Boulevard
Saskatoon, Saskatchewan
S7N 2X8

Founded: 1977
Employees: 2000 (employed by 100 organizations)

Innovation Place is one of the most successful research parks in North America. A development of SOCO, Innovation's role is to supply facilities, on a commercial basis, to support the research and development community in Saskatchewan. The 21 buildings comprising the research and development park are adjacent to the University of Saskatchewan and builds on the strengths of the University in agriculture, information technologies, resources and the life sciences, as well as the strengths of the Federal and provincial agencies either in or immediately adjacent to Innovation Place. Innovation Place houses over 100 companies who contribute over $195 million annually to the economy of Saskatoon and Saskatchewan.

Innovation Place was created by an agreement between the Government of Saskatchewan and the University of Saskatchewan in 1977 and in 1980 the first buildings were occupied. Over the past two years the Park spent over $35 million on construction to supply additional greenhouse, laboratory and fermentation support facilities, more office and support facilities, as well as an energy centre for operating cost control and management.

The President of Innovation Place is Dr. Doug Tastad. Tenants in the medical/ pharmaceutical sector of Innovation place include Merck Frosst Canada Inc., Alviva BioPharmaceuticals, Bregma International, PharmaDerm Laboratories Inc., and Saskatchewan Drug Research Institute.

International Wex Technologies

#2000-777 Hornby Street
Vancouver, British Columbia
V6Z 1S4

Founded: 1992

International Wex Technologies (IWT) has developed several patented products in the health care field. One is an inexpensive, portable, multi-dimensional heart-monitoring machine that is produced at Wex's Hong Kong manufacturing facility.

The second fully developed and patented product is a pharmaceutical called TETRODIN(HT). It is a breakthrough in the treatment of opiate addiction withdrawal. IWT's Tetrodin(HT) has been developed by the company primarily as a treatment for the symptoms associated with withdrawal from all opiate addictions such as morphine, opium, heroin and methadone. It is a non-narcotic pharmaceutical that has proven to be safe and effective and functions well in both primary

withdrawal treatment and abstinence maintenance of drug addiction. TETRODIN(HT) has had extensive testing in China using similar, if not identical, test methods to those used in Europe & North America. This and other healthcare products will be manufactured and packaged at IWT's world standard (GMP) licensed facility in Nanning, China.

The majority of IWT's products are not available in most countries. The company sells instrumentation equipment, pharmaceutical and homeopathic/herbal remedies & teas in China. The international marketing and head office of IWT (located in Vancouver) is currently focused on negotiating sales and marketing relationships internationally.

IWT's management includes Frank Shum, President and CEO, and directors Chi Tang Tang and Yuen Chau Tsui.

Key Molecular Corp.

347 Collge St., Suite 309
Toronto, Ontario
M5T 2V8

Founded: 1988

Key Molecular Corp. is focused on the design and synthesis of novel bioactive drugs and biochemicals in basic research and on the development of mathematical models and computer programs for molecular modeling. The company's objective is to bring technology to practitioners.

Joseph L. Tedesco is the company's Co-Founder & President.

Lorus Therapeutics Inc.

7100 Woodbine Avenue, Suite 215
Markham, Ontario
L3R 5J2

Employees: 21

Lorus Therapeutics Inc. specializes in the research, development, and commercialization of pharmaceuticals and technologies for the treatment of cancer. The company primary focus is on the discovery and development of different classes of anticancer compounds. Products in development include NuChem Analogs (licensed from Harvard University) and Virulizin, a pancreatic cancer treatment. Lours is targeting other products for the treatment of malignant melanoma, Kaposi's sarcoma, and other cancers. Formerly Imutec Pharma, Lorus Therapeutics had changed its name in response to its narrowing focus; in addition to anticancer drugs, the company had previously worked on the development of treatments for viral infections and other immune system disorders. Lorus purchased Canadian antisense technology developer GeneSense Technologies to expand its product pipeline.

Lorus Therapeutics management includes Philippe Lacaille, Chair and CEO, Jim Wright, Presidnet and Chief Scientific Officer, and Guy Ely, Vice-President of Drug Development.

MethylGene Inc.

7220 Frederick-Banting, Suite 200
Montreal, Quebec
H4S 2A1

Founded: 1997
Employees: 36 (31 in R&D)

MethylGene Inc. is a drug design company specializing in research on genetic anti-cancer drugs and on small-molecule inhibitors able to treat antibiotic-resistant cancer and infectious diseases. The chemistry-driven drug discovery company focuses on the application of mechanism-based small-molecule, mRNA inhibitor drug design and functional genomic technologies to discover, patent, develop and commercialize medicines for the treatment of cancer and infectious diseases.

The company's core competencies include rational and mechanistic drug design, medicinal, combinatorial and analytical chemistry, enzymology, molecular biology, small molecule and mRNA inhibitor synthesis, high throughput screening, isotypic pharmacology and functional genomics and drug development. Other competencies secured through collaboration include X-ray crystallography and molecular modeling.

MethylGene's strategy is to use its chemistry platform to inhibit novel enzyme targets by (i) designing mechanism-based small molecule inhibitors directed against the protein/enzyme product of the target, and/or (ii) developing novel inhibitors directed against the messenger RNA of the molecular/gene target (iii) and utilizing its functional genomic technology to obtain phenotypic and target validation information.

In May of 1999, the company began Phase 1 clinical trials in Canada and the U.S. for its lead anti-cancer candidate, MG98, a DNA MeTase inhibitor. MethylGene has three new preclinical research and development programs, with IND filings planned for as early as this year, based in small molecule inhibitors and combination strategies developed by the company.

MethylGene's primary anti-bacterial target is beta-lactamases, a family of enzymes that represents the major mechanism of bacterial resistance to beta-lactam containing antibiotics (75% of antiobiotics used today – a large market opportunity for MethylGene). The company has discovered and developed small molecule beta-lactamase inhibitors.

Created in 1997, MethylGene was a spin-off from the American company Hybridon. MethylGene owns, licenses, sublicenses or maintains options to over 30 US patents and patent applications including 8 issued or allowed US patents.

MethylGene has secured over $33 million in financing from U.S., European and Canadian investors. The Canadian government contributed $4.8 million for the clinical trials of MG98. The company is planning an IPO as early as this year or the next. MethylGene's current valuation for

this round is $25 million. Institutional investors include Innovatech, FSTQ, Sofinov, GeneChem, BioCapital, CMDF (MDS), Royal Bank Capital Corporation, and Dacha Capital.

Management includes Donald Corcoran, President and CEO, and Jeffrey Besterman, Senior Vice President of Research and Development.

Mycota Biosciences Inc.

225 President Kennedy Ave. W., Ste 2550
Montreal, Quebec
H2X 3Y8

Year founded: 1999
Number of employees: 12

Mycota Biosciences' expertise is the coupling of functional genomics to antifungal drug discovery. The company specializes in the research of protein targets for the treatment of fungal infections in humans. Combining functional genomics and cell wall molecular biology, the company's goal is to develop a therapy that will target the cell wall of fungus while not affecting human cells. Mycota researchers are currently working to identify and validate a range of new targets in the most common human fungal pathogen, Candida albicans. These findings are applied to fungal-specific targets to develop high-throughput drug screens and a compound screening program.

Mycota currently has one patent and 5 patent applications. The company's corporate partners include T2C2/Bio, GeneChem Technologies Venture Fund, Innovatech Grand Montreal, and Lallemand Inc.

Marc Lussier is the company's Founder & Director of Scientific Operations.

Neurotrophic Bioscience Inc.

96 Skyway Ave.
Etobicoke, Ontario
M9W 4Y9

Founded: 1998
Employees: 11

Neurotrophic Bioscience Inc. (NTB) is a privately owned 'trophic factor company' that uses a unique and proprietary cellular bioassay to exploit information linking biochemical deficiencies and nerve cell survival, with unmet medical needs in neurodegenerative disorders. The company has expertise in functional neurobiology and cell-type-specific functional assays which provide the capability to deliver clinically relevant information and novel proteins.

NTB's focus is to develop a means of significantly slowing the progression of neurodegenerative diseases, such as Parkinson's, Alzheimer's and ALS, through trophic factors. Prior to NTB's establishment and its cell-type-specific functional assays, trophic factor discovery and

development was focused on pleiotrophic (broad spectrum) factors. The company currently has three products in the pre-clinical stage of development.

The CEO and CFO of Business Development is Anthony Giovinazzo. Neurotrophic Bioscience has collaborations with Genetics Institute, Salk Institute, Teva Pharmaceuticals, Ocata Inc., National Research Council of Canada, Southern Research Institute, and the University of Virginia.

Nortran Pharmaceuticals Inc.

3650 Wesbrook Mall
Vancouver, British Columbia
V6S 2L2

Founded: 1986
Employees: 30+

Nortran Pharmaceuticals Inc. is a drug discovery company specializing in the area of ion channels. Nortran is focused on cardiovascular, pain and respiratory areas with its lead work in the area of cardiac arrhythmia drugs and acute unproductive cough.

Nortran develops drugs for pathologies mediated by cellular ion channels. Inappropriate ion-channel activity is responsible for many human pathologies, including cardiac arrhythmia, hypertension, acute or chronic pain, epilepsy. Nortran's core expertise is the development of drugs that regulate such ion channels.

Nortran currently has six active project areas: atrial and ventricular arrythmias, pro-erectile/male sexual dysfunction, local anesthesia, intractable cough, and intractable pain. Three of the company's current projects are related to the significant antiarrhythmic program which is the company's primary focus. In November of 1998, Nortran entered into a collaborative research agreement with Astra Hassle AB for research on ventricular antiarrhythmic. Nortran and Astra plan to test antiarrhythmic compounds developed by both companies. Nortran successfully completed a Phase I trial in the United Kingdom for CP1, a drug candidate targeted at treating intractable cough. A Phase II clinical trial will begin in the first half of 2000 for CP1 which will determine if CP1 is effective in suppressing induced cough in patients with chronic idiopathic cough. In the area of antiarrhythmics the company has entered into its second collaborative agreement. Both collaborators, Aventis Pharma and AstraZeneca, are testing Nortran's drugs with an interest in licensing them.

Nortran's management includes Robert Rieder, President and CEO, Gregory Beatch, VP of Research, and Shiela Grant, Director of Finance and Administration.

Nova Molecular Inc.

5252 de Maisonneuve West, Suite 105
Montreal, Quebec
H4A 3S5

Founded: 1995

Nova Molecular Inc is involved in the commercialization of technologies and research concepts based on the link between genetic markers for diseases of the Central Nervous System, disease progression, and response to therapy. The Company initially focused on the role of Apolipoprotein E in Alzheimer's Disease, resulting in a comprehensive model of neuron degeneration and repair mechanisms.

The company has evolved from pharmacogenomics to functional genomic strategies for drug discovery. NMI believes that "promoting neuron repair by stimulating and enhancing the underlying biochemistry needed to promote the formation of new dendrite networks, and increased numbers of synapses, will help improve the overall effect of standard therapies, discovery of new drug entities (NDEs) and neural grafts in transplantation".

NMI has developed several proprietary markers for age of onset, disease progression and response to standard therapies, in degenerative disease and stroke, all associated with the neuron repair pathway. The company has also established and a therapeutic program using functional assays (CNS-HTS™) for the identification of new drug targets and compounds, based on astrocyte biology, to provide key components to sustain neuron survival.

NMI is currently approaching partners to promote research and drug development through early access to its innovative technologies and expertise in the pathophysiology of CNS diseases.

President and CEO of Nova Molecular Inc is Margaret Bywater.

Paladin Labs Inc.

6111 Royalmount Avenue
Montreal, Quebec
H4P 2T4

Founded: 1995

Paladin Labs' mission is to acquire and in-license late-stage pharmaceuticals that meet the needs of Canadian specialist physicians. The company has established comprehensive product portfolios in urology, dermatology, rheumatology and palliative Care. Paladin has significantly grown revenues and profits to become one of the most profitable publicly traded pharmaceutical companies in Canada. Their goal is to broaden their current product lines as well as venture into new therapeutic areas.

Paladin currently markets and sells 24 products in the categories of urology, rheumatology, palliative care, ER and hospital products, as well as generics. The company also has 3 products awaiting Canadian regulatory approval and 8 products in phase II and phase III clinical trials.

Paladin management includes Chairman Theodore Wise, President Jonathon Goodman, and VP of Business Development David MacNaughton.

PharmaDerm Laboratories Ltd.

411 Downey Road
Saskatoon, Saskatchewan
S7N 4L8

Founded: 1991
Employees: 15

PharmaDerm is a biopharmaceutical/pharmaceutical research and development company focusing on novel drug delivery systems research. Helix Biopharma Corp, a national pharmaceutical firm located in Aurora, Ontario has recently made a multimillion dollar investment to acquire the University of Saskatchewan spin-off. With the outstanding progress of PharmaDerm's BIPHASIX delivery system for products such as insulin and interferon, Helix views PharmaDerm as a strategic acquisition.
Dr. Marianna Foldvari will continue as President of PharmaDerm in addition to playing a key research role for Helix. PharaDerm's technology centers on the development of injectionless delivery of large therapeutic molecules such as proteins and DNA. Dr. Foldvari has designed a cellular vesicle that will encapsulate these large molecules and deliver them to the body through patches. The company's technology, BIPHASIX has been successfully demonstrated with insulin and interferon.
Helix will focus primarily on three products for development - an insulin patch for the treatment of diabetes, interferon (a cream for the treatment of topical viral infections), and a vaccine delivery system.
Helix intends to keep PharmaDerm in Saskatoon and plans to update and expand its laboratory facilities. The companies are committed to advancing their injectionless therapies. PharmaDerm also does contract products development for client companies - dermatological products.

Phenogene Therapeutics Inc.

6100 Royalmount Avenue
Montreal, Quebec
H4P 2R2

Founded: 1997

Phenogene's goal is to relate genetic information to disease phenotypes. The company is developing cell-based assays to screen for disease-related genes. Phenogene Therapeutics has developed a tool to address the hurdle in the genomics-based drug discovery: the GeneSelector, a versatile function-based screening tool. Phenogene's GeneSelector accelerates the drug discovery process by allowing to by-pass the systematic sequencing of genes. GeneSelector is a cell-based gene screening tool. It therefore avoids the complexity of hardware integration and the complexity of keeping large colonies of animal models inherent to current gene screening systems.

Phenogene Therapeutics' corporate strategy is to conclude alliances with pharmaceutical and biopharmaceutical companies committed to genomics-based drug discovery. Phenogene provides

its partners not only with the tools used to perform screens tailored to their needs, but also with sets of unique gene libraries.

The Phenogene management and research team includes Robert Knapen, CEO, Christian Lanctot, Chief Scientific Officer, and Jacques Drouin, Scientific Director.

QuantaNova Canada Ltd.

15 Chipman Drive, P.O. Box 818
Kentville, Nova Scotia
B4N 4H8

Founded: 1983

QuantaNova Canada is focused on the search of drug targets for the development of new therapies for diabetic neuropathy. QuantaNova's parent company is Scotia Holdings PLC, located in the United Kingdom. Previously known as Efamol Research Inc., or Scotia Pharmaceuticals Ltd., QuantaNova has altered its previous focus to position itself as a leader of lipid genomics.

QuantaNova Canada employs a genomics-based approach to the study of lipid metabolism integrating a broad range of research information to understand disease-specific changes in lipid metabolism. In this way the company seeks to develop therapeutic molecules for the treatment of diabetic neuropathy and other diseases based on abnormal lipid metabolism. The stages of research include gene discovery, gene function, gene regulation, and diabetes population studies.

Michael D Winther is the President and Director of QuantaNova Canada.

REPLICor Inc.

1550 Metcalfe St., Suite 502
Montreal, Quebec
H3A 1X6

Founded: January 1999
Employees: 5

REPLICor Inc. is a relatively new company that is focused on discovering and developing applications of technologies based on the regulation of DNA replication. The company's platform technologies are exclusively licensed from McGill University and include three major applications:

(1) The mammalian origin of replication consensus, consisting of a 36-base-pair segment of DNA, which permits the replication of any piece of DNA in mammalian cells including human. This can be used as a platform in gene therapy through incorporation in expression vectors.

(2) Compounds for modulating DNA replication at the level of initiation. This can lead to the development of therapeutic agent against normal cell proliferation diseases such as inflammatory diseases and cancer. Applications of DNA replication modulation may also

include tissue repair and organ regeneration and increased expression of recombinant protein.
(3) A functional method for screening and designing compounds using an in vitro human DNA replication system and mammalian DNA origins as controlling elements.

The next step for the research-oriented company is to establish strategic alliances with gene therapy companies to provide funding and development resources for SYNSORB to grow and compete on a global level.

The company is a spin-off from McGill University and is lead by Jean-Marc Juteau, the Chief Executive Officer, and scientists Dr. G.B. Price, Dr. M. Zannis-Hadjopoulos both from McGill University, and Dr. I Wainer from Georgetown University. REPLICor was launched with $450, 000 of venture capital from Montrel-based T2C2 whose partners include Sofinov, the Canadian Medical Discoveries Fund, and Innovatech Montreal, and the Business Development Bank of Canada.

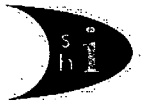
Rx & D Canada

302-1111 Prince of Wales Drive
Ottawa, Ontario
K2C 3T2

Members (Association): 18,000

Canada's Research-based Pharmaceutical Companies, known as Rx & D Canada, is a national association representing 18,000 Canadians who work for Canada's 62 research-based pharmaceutical companies. Rx & D Canada is made up of companies of diverse sizes, each of which is dedicated to the discovery, development, and availability of novel new medicines to improve the quality of health care available for every Canadian. The association's objectives as described on the Rx & D website is as follows:

- To conduct and promote health research in Canada
- To strive for full access to innovative medicines for all Canadians
- To inform Canadians about the contribution of the research-based pharmaceutical companies in improving their quality of life
- To communicate the role of Canada's research-based pharmaceutical companies in the advancement of an effective, integrated and accessible health care system
- To work cooperatively with our partners in Canada's health care system
- To promote a competitive intellectual property protection and regulatory framework that encourages the discovery and development of new medicines in Canada
- To communicate high standards of safety and quality of medicines
- To educate health professionals and consumers in the optimal use of medications



Andre Marcheterre is Chairman of the Board of Canada's Research-Based Pharmaceutical Companies.

Samuel Lunenfeld Research Institute

Mount Sinai Hospital
600 University Avenue
Toronto, Ontario
M5G 1X5

Founded: 1985

The Samuel Lunenfeld Research Institute of Mount Sinai Hospital (SLRI) is one of the world's leading biomedical research facilities. Led by scientist Dr. Alan Bernstein, the SLRI is characterized by extraordinary peer-reviewed publications, prestigious awards and an unparalleled number of international trainees. Occupying over 100,000 square feet of laboratory space, the SLRI has an annual budget in excess of $25 million, most of which is derived from granting agencies and corporate sponsorships.

The SLRI has three primary areas of research: Molecular Biology and Cancer, Development & Fetal Health, and Epidemiology & Biostatistics. The goal of these interrelated programs is to understand the function of human genes and how these complex pathways lead to disease such as cancer, asthma, diabetes, hypertension, premature labour and inflammatory bowel disease. Other areas of research include connective tissue research and proteomics & bioinformatics.

In 1997 the Joseph and Wolf Lebovic Centre for Molecular Medicine was established at the SLRI representing a unique partnership between four levels of government and private industry to further basic genetic research. The centre focuses on the application of molecular genetic techniques to human disease.

Spectral Diagnostics

135-2 The West Mall
Toronto, Ontario
M9C 1C2

Founded: 1991
Employees: 100+

Spectral Diagnostics Inc. specializes in the development of cardiac diagnostic products. The company's products are designed to assist healthcare professional in making accurate, timely decisions by providing decision point information in a format accessible to chest pain patient sites throughout the healthcare system.

Spectral's leading products are from its Cardiac STATus™ line of diagnostic panel tests including the patented Cardiac Panel™. The three-analyte Cardiac Panel™ is a one panel test containing Troponin I, CK-MB and Myoglobin and provides both sensitivity and

cardiospecificity in a single test.

Spectral is a public company and has over twenty partners worldwide. Spectral Diagnostics Inc. has locations in Canada, the United States and Europe.

Spectral's management includes Douglas Ball, Chairman and CEO, Jospeh Keffer, Vice-President, and Christopher Plaxton, Executive Vice-President.

StemCell Technologies Inc.

808-777 W. Broadway
Vancouver, British Columbia
V5Z 4J7

StemCell Technologies Inc. is a leading provider of high quality tissue culture reagents, cell separation products, and software supporting research. Products and services offered by StemCell include:

- **Instructional materials and training courses** - Instructional materials in the form of technical manuals and visual aids such as a colony atlas and colony slides are designed to assist researchers in becoming more proficient at identification of hematopoietic colonies. Training courses provide customers with the latest information and personalized instruction for performing various in vitro hematopoietic colony assays. StemCell's proficiency testing program will allow comparisons of progenitor enumeration between laboratories.
- **Hematopoietic progenitor growth and expansion**
- **Hematopoietic colony assays**
- **Cell seperation** – StemCell technologies offers two alternatives for the enrichement of cells: StemSep and RosetteSep.
- **Hybridoma generation**
- **Antibodies**
- **Embryonic stem cells**
- **"StemSoft" software** - Oncology software for healthcare organizations and physicians for cancer therapy. StemSoft provides solutions for patient data management, research, outcome analysis, registry reporting, FAHCT accreditation, and more.
- **Tissue culture reagents and supplies**
- **Society/conference management services**
- **Product literature**

Eric Atkinson is Product Manager of StemCell Technologies.

Supratek Pharma Inc.

275 St-Jacques Ouest, Suite 700
Montreal, Quebec
H2Y 1M9

Founded: 1994
Employees: 15+

Supratek Pharma Inc specializes in innovative drug delivery technology. Supratek's breakthrough Biotransport™ technology was discovered ten years prior to the company's establishment by a multidisciplinary group of scientists who are associated with the company as employee-shareholders and key collaborators. The Biotransport technology is based on a ground-breaking concept that produces Supramolecular Membrane Active Regulated Transporters (SMART) which improves the performance of drugs and delivers them to the critical disease site.
Supratek's Biotransport technology is applicable to both existing drugs as well as drugs under development including gene therapy and DNA vaccines. The unique Biotransport™ carrier technology improves a drug molecule's biological and therapeutic activity while making it less toxic by giving it a desired molecular property without changing its molecular structure. The technology has solved many obstacles encountered in drug development including:
1) Increasing the bioavailability of drug molecules without changing their molecular structure;
2) Specific tissue and organ targeting;
3) Avoiding drug resistance mechanisms;
4) Delivering drugs across the blood brain barrier;
5) Providing drugs with oral bioavailability.

Supratek currently has nine products in its pipeline: seven for the treatment of cancer, one for CNS and one for viral diseases.

The company has an extensive and growing profile of intellectual property protected worldwide. Patents cover composition, process and use providing Supratek's products and technology with a strong and broad protection.

Supratek management includes Oleg Romar, President and CEO, and Valery Alakhov, VP of Research & Development.

TAI-CAN Biotechnologies Inc

4028 West 29th Avenue
Vancouver, British Columbia
V6S 1V5

Founded: 1999

Tai - Can is focused on the isolation, identification, and evaluation of pharmacologically active substances contained from plants and local medicines found in Central America, South America and Asia.

The young company has made substantial progress in three therapeutic areas: a novel systemic anti-microbial agent, a substance that appears to reduce atherosclerotic plaque, and one that reduces lung and nasal congestion when inhaled. Tai-Can is also developing specialized

equipment for laboratory and field use, with focus on easily transportable equipment that can be used to screen and provide initial evaluation of phytochemicals in remote locations and jungles.

Tai-Can's research facility is designed and equipped to extract and process phytochemicals, which can be characterize in their biochemistry, phytochemistry and microbiology laboratories. The extracted phytochemicals and biochemicals will be evaluated for pharmacological activity. The company is also developing tests using DNA based PCR to create probes specific to pathogens pandemic in the aquaculture industry throughout the world. These tests will provide an efficient method of identifying the specific pathogen or pathogens in a pond or tank so that contaminated waters can be treated before all inhabitants are affected.

TerraGen Diversity Inc.

2386 East Mall, Suite 300
UBC Campus
Vancouver, British Columbia
V6T 1Z3

Founded: 1996
Employees: 40+

TerraGen Diversity, Inc. is develops and applies innovative drug discovery capabilities based on the generation and screening of novel small molecules derived from traditionally inaccessible microbes. Using the company's recombinant genetic approach, DNA is first extracted from environmental samples. Initially, TerraGen is focused on two primary sources for product discovery: soil and lichens.

TerraGen developed from the West-East Centre for Microbial Diversity, research collaboration between the University of British Columbia's Department of Microbiology and Immunology, and the National University of Singapore's Institute of Molecular and Cell Biology.

TerraGen's core technology involves the use of molecular biology techniques to "splice" genetic material from an unculturable organism into the genetic material of a culturable organism. Using these advanced methods, Terragen is able to identify, explore and understand the biochemical make-up of countless novel natural products. The knowledge acquired by Terragen can then be sold to companies wanting to develop new generation pharmaceutical medicines and industrial enzymes. Their research is pursuing not only single gene products but also products of known and novel biosynthetic gene pathways.
TerraGen's technologies for accessing previously inaccessible microbes can be applied to virtually any environmental source for the discovery of novel bioactive compounds.

TerraGen is generating extensive genetic libraries derived from their technology. They will enter into collaborative agreements with major pharmaceutical and biotechnology companies around the world to utilize these libraries in their search for potential novel bioactive compounds. In exchange, the TerraGen will receive a financial return in the form of licensing fees, milestones, and eventual royalty payments.

TerraGen's high throughput capabilities are specifically designed to complement its combinatorial biology libraries. With expertise in natural product screening in a wide range of assay formats, particularly time resolved fluorescence, the Company's highly automated high throughput bioassay system uses time resolved fluorescence to ensure the rapid and accurate detection of even the smallest amounts of active chemicals. TerraGen' proprietary macrodroplet screening technology is an integrated high throughput screening technology that can efficiently screen millions of recombinant strains annually against a broad panel of antibacterial, antifungal, and promoter activation bioassays. This technology can be adapted for different host organisms and for a wide range of applications.

TerraGen is a privately held, venture-backed biotechnology company with operations in Slough, U.K and is headquartered in Vancouver.

Investors include MDS Capital Corp., Biotechnology Investments Ltd., (advised by Rothschild Asset Management Ltd., UK), S.R. One Ltd. (SmithKline Beecham's venture capital subsidiary), Business Development Bank of Canada and Technology Development Fund Pte. Ltd. (Singapore). TerraGen also has major corporate partnerships with Schering Plough, Warner Lambert/Parke-Davis and Bristol-Myers Squibb for the discovery of novel pharmaceuticals.

Management includes Mario Thomas, President and CEO, and Julian Davies, Chief Scientific Officer.

Theratechnologies

2310 Alfred-Nobel Blvd.
Saint-Laurent, Québec
H4S 2A4

Founded: 1993

Theratechnologies specializes in the development of innovative therapeutic products. The company's two lead products include the photodynamic treatment (PDT) of cancers affecting bone marrow, and Growth Hormone-Releasing Factor (GRF) analogues. Theratechnologies' other developments include a Vpr technology, a cardioprotective agent Protectazem, a platelet-derived growth factor cocktail, an anti-biofilm solution and a nioactive coating for dental and orthopedic implants.

Theratechnologies has created three companies:

Andromed – specializing in medical instrumentation and devices
Ecopia BioSciences – focused on the discovery of novel antibiotics through the study of bacterial genomes
Pepco – focused on the development and synthesis of therapeutic peptides

The management of Theratechnologies includes A. Jean de Grandpre, Chairman, Dr. Andre de Villers, President and CEO, and Luc Tanguay, Senior Vice-President and CFO.

The University of Alberta

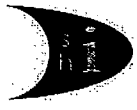
114 Street - 89 Avenue
Edmonton, Alberta
T6G 2M7

Founded: 1908

Univeristy of Alberta researchers are involved in all fifteen of the Federal Networks of Centres of Excellences (NCEs). The NCEs are networks linking leading research with industrial expertise and practical investment. Two of the networks, including the Protein Engineering Network (PENCE) have their national scientific and administrative headquarters at the University of Alberta.
The University of Alberta is the largest research institution in the province and is continuing to expand its partnerships and research capabilities. A significant number of the world's major healthcare related companies already sponsor research at the U of A for the development of new drugs, treatments, applications, and clinical trials.

Research at the University of Alberta includes:

- **Control of Viral Diseases**
  - Molecular biology of animal viruses
  - Studies of DNA replication
  - Chemistry of nucleotides
  - Synthetic organic chemistry
- **Improved Health**
  - Relationship of stress and disease
  - Exercise physiology
  - Medical genetics
- **Surgical Lasers**
  - Guided wave structures
  - Tissue dynamics
  - Molecular spectroscopy
  - Gas discharge physics
  - Quantum mechanics
- **Current Research Includes:**
  - Design/evaluation of novel antiviral agents for HIV and herpes virus
  - Genetic factors of liver disease
  - Functional, structural and metabolic studies of the failing and infarcted heart
  - Sex steroids and vascular function
  - Application of molecular biology to develop new tools for genomic research
  - Design/investigation of novel anti-Tuberculosis agents
  - Genetic analysis of Prade-Will syndrome: implications for normal human brain development
  - Spinal cord microstimulation to activate paralyzed muscles
  - Design, implementation and evaluation of a computerized injury surveillance system for hospital Emergency Depts.
  - Development of human skin equivalent as a wound coverage and its efficacy in the quality of healing
  - Development of microsatellite markers



- Echinacea: its health potential in boosting immune response

The Faculty of Pharmacy and Pharmaceutical Sciences at the University of Alberta established the Noujaim Institute for Pharmaceutical Oncology Research to promote 'bench-to-bedside' research into drug-based cancer diagnosis and therapy. The institute's mission is to develop and maintain high quality research into the discovery and application of pharmaceuticals for the diagnosis and treatment of cancer.

Vice-President of Research and External Affairs at the University of Alberta is Dr. Roger Smith. Dr. Jim Murray is the Senior Associate Vice-President for Partnerships and Innovation and Dr. Bill McBlain is Associate Vice-President of Research.

Vancouver Hospital and Health Sciences Centre

855 West 12th Ave.
Vancouver, Bristish Columbia
V5R 1M9

The research priorities of Vancouver Hospital Health Sciences Centre (VHHSC) are linked directly to the major clinical priorities of the hospital. The goal of the institute's research is to link advances in fundamental biologic research to applications at the bedside. The Centres of research emphasis are:

- Brain and Spinal Cord Research Centre
- Cancer Research Centre
- Lung Disease Research Centre
- Immunology Research Centre
- Clinical Epidemiology and Evaluation Centre
- Discipline Development Program

VHHSC neuroscience research focuses on Multiple Sclerosis (genetic mechanisms), Schizophrenia, neural regeneration, and opthamology (cancer, glaucoma, orbital disease, etc.). Topics in cancer research include the effects of hormone treatment for prostate cancer, the production of prostate-specific antigen, all aspects if skin cancer from genetics to innovative treatments, target gene therapy for brain cancer, and surgery for liver cancer treatment.

VHHSC has also conducted valuable research in immunology and transplantation specifically in the prevention and treatment of rejection and genetic engineering of blood cells for chemotherapy radiation. The research centre also pioneered autologous transplants.

The VHHSC was the first in the world to research and develop an antibiotic-filled implant for the treatment of damaged and infected joints. VHHSC researchers have also developed an oral appliance to keep the airway open during sleep.

The VHHSC's contributions to cardiac research include the development of a new tool in angioplasty called the stent. Researchers are currently working on the development of a uniform

standard of digital cardiac image saving software that can be applied to hospitals throughout the world to allow heart specialists to access cardiac images electronically.

The Vice President of Research at the Vancouver Hospital and Health Sciences Centre is Dr. David I. McLean.

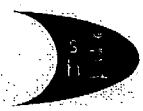
6. Academic Institutions and Networks

The following table contains the data compiled from 33 academic and research institutions and networks specializing in health research.

Academic and Research Institutions By Technology Platform

Toronto	Bioinformatics/Genomics	Proteomics	Angiogenesis	Immunotherapy	Drug Delivery	Therapeutics	Diagnostics	Vaccines	Gene Therapy	Comb. Chem/High Throughput Screening
University of Toronto										
Samuel Lunenfeld Research Institute	x	x	x	x	x	x	x	x		x
Hospital for Sick Children	x	x			x	x	x			
University Health Network (TTH, OCI & PMH)	x	x			x	x	x	x	x	
Sunnybrook & Women's Health Sciences Centre	x	x		x	x		x			x
	x					x	x			
Hamilton										
McMaster University										
	x				x	x			x	
Ottawa										
University of Ottawa										
Loeb Health Institute	x			x			x	x		x
NRC Institute for Biological Sciences		x				x	x	x		
	x	x		x	x	x	x	x		
Montreal										
McGill University										
Clinical Research Institute of Montreal (ICRM)	x	x		x		x	x		x	x
Montreal Neurological Institute	x	x		x	x	x	x	x		x
McGill University Clinical Research Centre (MUHC)				x		x	x		x	
Institut de Cardiologie de Montreal										
University de Montreal						x	x			
NRC Biotechnology Institute										
	x	x	x	x	x	x			x	

	Bioinformatics/Genomics	Proteomics	Angiogenesis	Immunotherapy	Drug Delivery	Therapeutics	Diagnostics	Vaccines	Gene Therapy	Comb. Chem/High Throughput Screening
London										
University of Western Ontario	x	x					x	x	x	
London Health Sciences Centre				x		x	x			
Lawson Research Institute						x	x			
Halifax										
Dalhousie University	x			x	x	x	x	x		x
Quebec City										
Universite Laval						x	x			
Centre Recherche de l'Universite Laval										
Vancouver										
University of British Columbia	x	x								x
Vancouver Hospital and Health Sciences Centre	x			x		x			x	
Providence Health Care, St. Paul's Hospital Site	x						x		x	
Canadian Genetic Diseases Network (NCE)	x	x		x		x	x		x	
Centre for Molecular Medicine and Therapeutics	x					x				
Edmonton										
University of Alberta	x						x			
Protein Engineering NCE		x								
Calgary										
University of Calgary	x	x				x	x	x		
Canadian Bacterial Diseases Network (NCE)	x					x	x			
Winnipeg										
University of Manitoba	x	x				x				
NCR Institute for Biodiagnostics						x	x			



7. Company Technology Platform Overview

The following table contains data from an overview of the technology platforms of 146 biopharmaceutical companies across Canada.

	Genomics	Functional Genomics	Recomb.DNA/Transgenics	Comb.Chem/HI Through-put Screening	Proteomics	Synthetic Biomaterials	Polymer Chemistry	Orthobiologics	Bioinformatics	Angiogenesis Inhibitor	Ab-based Immunotherapy	Drug Discovery Tech/Design	Drug Delivery	Therapeutics	Gene Therapy	Immuno-Therapeutics	Photodynamic Therapy	Diagnostics	Radiopharmaceuticals	Pharmacogenomics	Vaccines	Anti-Sense Therapeutics
Accutec Technologies Inc.									■													
Active Pass Pharmaceuticals Inc.	■																					
Aeterna Laboratories Inc.										■												
Alberta Peptide Institute					■													■				
Allelix Biopharmaceuticals	X				■																	
AltaRex Inc.											■											
Amersham Pharmacia	■														■							
Anagenis Inc.												X		X								X
Angiogene Inc.																			■			
Angiotech Pharmaceuticals Inc.					X					■												
AnorMed Inc.												■										
Antalium Inc.	■																					
Apoptogen Inc.	■				X										X							
Atlantic Biochemincal Research												X		X								
Aurelim Bipharma Inc.					X																	
Axcan Pharma Inc.					X							X		■								
Base 4 Bioinformatics Inc.									■			■										
BCM Development Inc.												X										
BioChem Pharma														X							■	
BioChem Therapeutic Inc.														X							■	
BioChem Vaccine														X							■	
Biolyse Pharmacopee Internationale														■								
Biomatrix Medical Canada Inc.							■							X								
Biomep Inc.												X		X								
Biomira Inc.											■	X										
Bioniche Inc.					■																	
Bio-Rad Laboratories (Canada)																		■				
Biosignal Inc.															■							
Biostar Inc.																		■				

	Genomics	Functional Genomics	Recomb.DNA/Transgenics	Comb.Chem/Hi Through-put Screening	Proteomics	Synthetic Biomaterials	Polymer Chemistry	Orthobiologics	Bioinformatics	Angiogenesis Inhibitor	Ab-based Immunotherapy	Drug Discovery Tech/Design	Drug Delivery	Therapeutics	Gene Therapy	Immuno-Therapeutics	Photodynamic Therapy	Diagnostics	Radiopharmaceuticals	Pharmacogenomics	Vaccines	Anti-Sense Therapeutics
Biotech Holdings Inc.					■																	
Biotechnology Service Centre					■							■										
BioTools Inc.	■																	■				
Biovail Corp. International					X							X	■									
Bles Biochemicals Inc.														■								
Boehringer Ingelheim (Canada) Ltd. Bio-Mega Research Division														■								
Borealis Biosciences Inc					■																	
BR Centre Ltd.									■													
Briana Bio-Tech														■		X		X				
Cangene Corp.					X						■											
Centrapharm Ltd.													■									
Centre for BioMaterials						■																
Centre for Cardiovascular Research												■										
Chemical Computing Group			■									■										
Chemokine Therapeutics												■										
Chromos Molecular Systems									■													
Compatigene Inc.														■								
ConjuChem Inc.													■									
CV Technologies Inc.										■												
DiagnoCure Inc.													X	X				■			X	
Diazans Ltd.														X			■					
Dimethaid Research Inc.					■																	
Draxis Pharma Inc.																			■			
DUSA Pharmaceuticals Inc.														■				■				

	Genomics	Functional Genomics	Recomb.DNA/Transgenics	Comb.Chem/Hi Through-put Screening	Proteomics	Synthetic Biomaterials	Polymer Chemistry	Orthobiologics	Bioinformatics	Angiogenesis Inhibitor	Ab-based Immunotherapy	Drug Discovery Tech/Design	Drug Delivery	Therapeutics	Gene Therapy	Immuno-Therapeutics	Photodynamic Therapy	Diagnostics	Radiopharmaceuticals	Pharmacogenomics	Vaccines	Anti-Sense Therapeutics
Ecopia Biosciences Inc.			■									■		X								
Exogen Neursoscience Inc.														■								
Forbes Medi-Tech Inc.													■									
Gelkem Inc.		■			X							X		X	X							
GeminX Biotechnologies Inc.																■						
GEMMA Biotechnology Inc.		■		X																		
Geneka Biotechnology Inc.												■										
GeneScape Inc.														X				X				
Genomics One Corporation	■							■						X								
GenSci Regeneration Sciences												■		X								
Glucogenics Pharmaceuticals Inc.														■								
GlycoDesign Inc.	X			X										■								
Haemacure Corp.																		■				
Helix BioPharma Corp.					X								■									
Hemosol Inc.												■										
Hyal Pharmaceutical Corp.			■		X									X				X				
Hybrisens Ltd.					X									X				X				
IBEX Technologies Inc.																		X		X		
ID Biomedical Corp.				X								X		X								
IGT Pharma Inc.														■								
I-Med Pharma Inc.											■											
ImmGenics Pharmaceuticals Inc.														■				■				
Immucon Inc.									■		■											
Immune Network Research Ltd.													X	X								■
Inex Pharmaceuticals Corp.																						

	Genomics	Functional Genomics	Recomb.DNA/Transgenics	Comb.Chem/Hi Through-put Screening	Proteomics	Synthetic Biomaterials	Polymer Chemistry	Orthobiologics	Bioinformatics	Angiogenesis Inhibitor	Ab-based Immunotherapy	Drug Discovery Tech/Design	Drug Delivery	Therapeutics	Gene Therapy	Immuno-Therapeutics	Photodynamic Therapy	Diagnostics	Radiopharmaceuticals	Pharmacogenomics	Vaccines	Anti-Sense Therapeutics
Inflazyme Pharmaceuticals Ltd.																						
IntelliGene Expressions Inc.																						
Intellivax International Inc.														X								
International Wex Technologies																						
IPS Pharma Inc.																						
ISG Technologies																						
Key Molecular Corp.									X							X						
Kinetek Pharmaceuticals Inc.																						
Kinsmor Pharmaceuticals																						
Labopharm Inc.																						
Lorus Therapeutics Inc.											X					X						
Maxaam Analytics																						
Medicago Inc.																						
Medicorp Sciences Inc.																						
Medicure Inc.																						
Methylgene Inc.				X																		
Micrologix Biotech Inc.					X																	
Micrologix Biotech Inc.			X		X																	
Millenium Biologix Inc.														X			X					
Molecular Mining Inc.																						
Mycota Biosciences Inc.	X	X		X										X								
Nanodesign Inc.																						
Neokemia														X								
NeuroArt Pharmaceuticals Inc.				X																		
Neurochem Inc.				X							X											
Neuroscience Biopharma Inc.									X													
Neurotrophic Bioscience Inc.																						
NeuroVir Inc.			X			X								X								

	Genomics	Functional Genomics	Recomb.DNA/Transgenics	Comb.Chem/HI Through-put Screening	Proteomics	Synthetic Biomaterials	Polymer Chemistry	Orthobiologics	Bioinformatics	Angiogenesis Inhibitor	Ab-based Immunotherapy	Drug Discovery Tech/Design	Drug Delivery	Therapeutics	Gene Therapy	Immuno-Therapeutics	Photodynamic Therapy	Diagnostics	Radiopharmaceuticals	Pharmacogenomics	Vaccines	Anti-Sense Therapeutics
Nexia Biotechnologies Inc.			■		■																	
Nortran Pharmaceuticals Inc.												■										
Nova Molecular Inc.				■									X	X						■		
Novopharm Biotech											■			X				X				
Novoscience Pharma Inc.				X								X		X								
NPS Allelix Inc.					■																	
Organogel Canada Ltd.							■							X								
Paladin Labs Inc.														■								
PE Biosystems					■																	
Phagetech Inc.	X	X							X							X						
Pharmacor Inc.												■										
PharmaDerm Laboratories Ltd.														■								
Pharmagene Inc.												■										
Phenogene Therapeutics Inc.		■	■																			
Phoenix International Life Sciences												■										
Phytogen Life Sciences														■								
Procrea Biosciences Inc.														X				■				
Procyon Biopharma Inc.					X	X					X			X				X				
QLT Phototherapeutics Inc.																	■					
Replicor Inc.			■												■							
Resolution Pharmaceuticals Inc.														■				■				
Rougier BioTech Ltd.														X				X			X	
RTP Pharma Inc.													■	X								
Sciex					■								■									
Scotia Pharmaceuticals (Canada) Ltd./Efamol Research Inc.																	■					

8. Glossary of Terms

(Adapted from Rickwood & Southworth, *New Technologies in Biopharmaceuticals*, Financial Times Pharmaceuticals and Healthcare Publishing, 1995).

Amino acids	Building blocks of proteins
Antibody	Complex protein produced by the immune system in response to a foreign body
Antisense	Complementary product, typically a gene product designed to block gene expression
Apoptosis	Disintegration of cells into membrane-bound particles that are then phagocytosed by other cells
Bioassay	Determination of the strength or biological activity of a substance, such as a drug or hormone, by comparing its effects with those of a standard preparation on a test organism.
Biochip	Thumbnail size chip containing thousands of DNA probes used in medical diagnostics and in gene expression analysis.
Clone	A group of cells descended from a single cell.
DNA	Deoxyribonucleic acid, the chemical basis of heredity and the carrier of genetic information.
Ex vivo	Outside of the living body or organism.
Express	Ability of a cell to produce a given product.
Gel electrophoresis	Movement of suspended particles through an agar or agarose gel under the action of an applied electromotive force which separates particles based on molecular weight. Used to identify proteins, isolate DNA fragments, and gene mapping.
Gene	The basic unity of heredity, each gene occupies a certain location on a chromosome and is a portion of DNA that codes for a single polypeptide sequence.
Genome	The entire genetic information present in a cell.
In vivo	In the living body or organism. A test performed on a living organism.
Monoclonal antibodies	Antibodies derived from hybridoma cells, used as an identification tool and in diagnosis.

Mutation	A variation or change in genetic structure.
Nucleic Acids	A group of high molecular weight substances found in all living cells.
Nucleotide	The structural unit of nucleic acid, consisting of phosphoric acid, a sugar, and a purine or pyrimidine base.
Oligonucleotide	A compound made up of a small number of nucleotide units.
Phagocytosis	Ingestion and digestion of bacteria and particles by specialized cells called phagocytes.
Peptide	A macromolecule composed of 50 amino acids or less. Longer peptide chains are called **polypeptides** or proteins.
Protein	A large molecule composed of 50 or more chains of amino acids in a specified order which is specified via the genetic code and when folded into its natural shape will have a unique biological activity. Proteins are required for the structure, function, and regulation of cells, tissues, and organs.
Receptor	A binding site located on the membrane of a cell that responds to a specific molecule resulting in a physiological effect.
RNA	Ribonucleic acid. Genes in DNA are copied into an RNA molecule through a process called **transcription** and the RNA is then decoded (**translated**) into amino acids that make a protein.
Sequencing	Process of determining the exact order of the four bases in part of a DNA molecule.
Stem Cell	A cell that gives rise to a specific type of cell as in haematopoiesis.
Vector	A carrier.
Virus	Any of a large group of submicroscopic agents infecting plants, animals, and bacteria, and unable to reproduce outside the tissue of a host. To replicate it must invade another cell and use parts of that cell's reproductive system. A **retrovirus** is a type of virus that has the ability to live dormant within the cell's genetic code.

9. References

"Funding the future of biotechnology." June 1998. *Managing Intellectual Property* 80. Euromoney Publications.

"Sector Competitiveness Frameworks: Biopharmaceuticals. Part I: Overview and Prospects." Revised, 1999.

"Chemical and Engineering News," 2000.

BC Biotechnology Alliance (BCBA). March 1998. "1997 Industry Economic Survey."

BCG Report. January 1999. "The Pharmaceutical Industry into Its Second Century: From Serendipity to Strategy."

Beaudette, Mary Anne. March 2000. "Drug Advances Launch Parteq into Profit Mode," *Queen's Gazette.*

Biotechnology Council of Ontario. 1994. *Enabling Biotechnology: A Strategic Plan for Ontario.* Toronto.

Biovista, 1999. *Industry Review and Company Database.*

Buist, Matt. n.d. *Trends in the Medical, Pharmaceutical & Biotechnology Industry.* Economic Development, Culture & Tourism. Business Development, Medical & Biotechnology, City of Toronto.

Burrill, G, "Biotech 99: Life Sciences into the Millennium," 1999.

Burstall, M.L. et al. October 1999. "The Outlook for the World Pharmaceutical Industry to 2010." DR Reports. Decision Resources, Inc. Waltham.

Campbell, Michelle. February 1997. "Health Research & Development in Canada: An Overview." Prepared for Pharmacia & Upjohn. Medical Research Council. Ottawa.

Campbell, Wayne. 1998. "The Crossroad of Biotechnology 98: A Report of the Proceedings. Montreal, September, 29 and 30." NRC Biotechnology Research Institute.

Canada's Research-Based Pharmaceutical Companies. *Annual Review: 1999-2000.* Ottawa.

Canada's Research-Based Pharmaceutical Companies. November 1999. "Drug Approval Times in Canada 1998." Ottawa.

Canada's Research-Based Pharmaceutical Companies. November 1999. "Ontario Profile: The pharmaceutical industry in Ontario." Ottawa.

Canada's Research-Based Pharmaceutical Companies. October 1999. "Backgrounder: The Value of New Medicines." Ottawa.

Canadian Biotech News 8, no. 39. October 1, 1999.

Canadian Institute of Advanced Research. June 1995. "The Commercialization of University Research in Canada: A Discussion Paper." Toronto.

Chapman, Hayley. February 1999. "Disease Management." PricewaterhouseCoopers LLP. Toronto.

Coopers & Lybrand (PricewaterhouseCoopers). January 1998. "High-Performing Strategic Alliances in the Pharmaceutical, Biotechnology and Medical Technology Sectors." Thought Leadership Series.

Coopers & Lybrand LLP. 1998. "Biotechnology Corporate Structure: Searching for a New Paradigm."

Coopers & Lybrand LLP. 1998. "The Biotechnology Public Market." 1998 Edition.

Danheiser, Susan L. July 1999. "The Outlook for Cytokine and Anticytokine Therapeutics." DR Reports. Decision Resources, Inc. Waltham.

Department of Foreign Affairs and International Trade and Industry Canada. n.d. "The Case for Investing in Canada: Accessing Excellence in Canadian Pharmaceutical Research and Development.

Department of Foreign Affairs and International Trade. March 1994. *The Case for Investing in Canada: The Canadian Pharmaceutical Industry.*

Dibner, Mark D. September 1997. "Biotechnology and Pharmaceuticals 10 Years Later." *Biopharm.* pp. 24-30.

Dillon Read Equity Research, www.ubswarburg.com

Economist, *Pharmaceutical Industry Survey*, 1998

Eli Lilly Canada Inc. n.d. *Discovery: A focus on basic research.* Profiles in Canadian Biomedical Research. Volume 1.

Expert Panel on the Commercialization of University Research, 1999. *Public Investments in University Research: Reaping the Benefits.*

Frost and Sullivan, www.frost.com/healthcare.

Gerber, Monica R. October 1999. "Outlook for Antisense Therapeutics: Cancer, Inflammatory Disorders, Infectious Disease, and Restenosis." DR Reports. Decision Resources, Inc. Waltham.

Gilomen-Stüdy, Gina. November 1999. "Two New Primary Analyses of the Factors Influencing Formulary Placement: Launching New Drugs in Managed Care & Disease-Preventive Drugs in Managed Care." DR Reports. Decision Resources, Inc. Waltham.

GLYCODesign Inc. August 1999. "GLYCODesign Acquires Vascular Therapeutics." Press Release. Toronto.

Godin, Benoit. October 1998. "Bibliometric Analysis of Health Research in Canada, 1980-96." Observatoire des sciences et des technologies.

Goudey, John et al. 1997. *Canadian Biotech '97: Coming of Age.* Ernst & Young's Fourth Report on the Canadian Biotechnology Industry. Ernst & Young.

Goudey, John. June 1998. "Canadian Biotech '98. Northern Reflections: The Canadian Experience. Overview of the Biotech Industry." Ernst & Young. Toronto.

Government of Canada. "Canada's International Business Strategy 1997-1998: Health Industries."

Government of Canada. 1996. "Canada—U.S., Canada: North America's Choice Investment Location. The Place for R&D Investment."

Government of Canada. January 1999. "The Case for Investing in Canada: Pharmaceuticals & Biopharmaceuticals."

Government of Canada. June 1999. "The Case for Investing in Canada: Medical Devices."

Government of Canada. October 1998. "Targeted Growth Strategies for Health Industries: The Road to a Higher Standard of Living and a Better Quality of Life." Presentation to NSERC.

Groote, Joyce et al. 1999. *Canadian Biotechnology '98: Success from Excellence.* BIOTECanada's First Report on the Canadian Biotechnology Industry. In collaboration with Industry Canada, Statistics Canada, Agriculture and Agri-Food Canada.

Health Industries Branch. 1997. *Sector Competitiveness Frameworks: Pharmaceutical Industry, Part 1—Overview and Prospects.* Industry Canada.

Health Industries Branch. October 1997. "Health Industries: Industrial Development Strategy."

Health Industries Branch. October 1997. "Health Industries: Industrial Development Strategy."

Honsberger, Lynn. April 1997. "Canadian Bio-medical Spin-offs."

Industry Canada. November 1998. "Technology Roadmaps: Presentation for Networks of Centres of Excellence Meeting."

Investment Partnerships Canada. January 1999. "Company Profile: American Home Products."

Investment Partnerships Canada. January 1999. "Company Profile: Warner Lambert Company."

Kaihla, Paul. May 2000. "Patron Saint of Start-ups." *Canadian Business.*

KPMG Canada. October 1997. *The Competitive Alternative: A Comparison of Business Costs in Canada, Europe and the United States.* International Edition. Prospectus Inc.

KPMG Peat Marwick LLP and California Health Care Institute. 1996. *California's Industry of the Future: 1996 Report on California's Health Care Technology Industry.*

Lee, Kenneth B., Jr. et al. 1996. *Biotech 97 Alignment.* The Eleventh Industry Annual Report. Ernst & Young LLP. Palo Alto.

Lehman Brothers, "Pharmaceutical Research."

Life Sciences Research Investments (Joint Venture of Investment Partnerships Canada, Industry Canada and the Medical Research Council of Canada). January 2000. *Canadian Biopharmaceutical Companies: Status of Research, Development & Clinical Trials.* Ottawa.

Life Sciences Research Investments. n.d. "Canadian Basic Medical Research (funded by the Medical Research Council of Canada): University of Toronto & Toronto Research Institutions, Project Titles 1993-1997." Ottawa.

Macdonald & Associates Limited. January 2000. "Venture Capital and Life Sciences: An Analysis of Canadian Venture Capital Investment Trends in the Life Sciences Sector, First Nine Months, 1999." Prepared for Medical Research Council, Canadian Medical Discoveries Fund, Industry Canada.

Mandelker, Jeannie. May 1999. "Healthy Living: Feeling Blah? Personal Health Agents Can Cure What Ails You." PricewaterhouseCoopers LLP.

McCarthy, Bob. February 1999. "Roadmapping as a Planning Tool to Assess Strategies in a Rapidly Changing Market: Application to the Genomics Revolution." Roche Molecular Biochemicals.

McNiven, Chuck. March 1999. "Canadian Biotechnology Statistics: In support of the implementation of the Canadian Biotechnology Strategy." CBS Theme 9. Science and Technology Redesign Project, Statistics Canada. Ottawa.

Minter, Brian. January 2000. "Pharmaceutical Product Reformulation Strategies: Markets and Technologies." DR Reports. Decision Resources, Inc. Waltham.

Montréal Business Report 8, no. 2. Autumn 1999. News Bulletin from the Montréal Urban Community's Economic Development Office.

Morrison, Scott W. et al. 1999. *Biotech '99: Bridging the Gap.* Ernst & Young's 13th Biotechnology Industry Annual Report. Ernst & Young LLP.

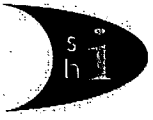
MRC/Rx&D 1998 Annual Report. Research Program.

Müller, Alfred et al. April 1999. *Ernst & Young's European Life Sciences 99 Sixth Annual Report: Communicating Value.* Ernst & Young International Ltd. London.

National Biotechnology Advisory Committee. *Sixth Report 1998: Leading in the Next Millennium.* Ottawa.

NRC Biotechnology Research Institute. n.d. "Partnering: Our Research, Your Business." National Research Council Canada.

Odyssey: The Glaxo Wellcome Journal of Innovation in Healthcare 5: no. 2. 1999.



Ontario Biotechnology Task Force. December 1998. "Ontario Biotechnology Task Force Report." Prepared for The Honourable Jim Wilson, Minister of Energy, Science and Technology.

Ontario Jobs and Investment Board. March 1999. "A Road Map to Prosperity: A Summary of the Economic Plan for Jobs in the 21st Century."

PhRMA, "Pharmaceutical Industry Profile,"1999.

Pharmaceutical Manufacturers Association of Canada. *1997-1998 Annual Review: Medicines and the New Millennium*. Ottawa.

PricewaterhouseCoopers LLP. February 2000. *Pharmaceutical Industry Views*. "Key Issues in the Pharmaceutical Industry."

PricewaterhouseCoopers LLP. November 1999. *Pharmaceutical Industry Views*. "From Pharmacovigilance to Pharmacoperformance."

Price Waterhouse Coopers Lybrand, 1998. *High-Performing Strategic Alliances in the Pharmaceutical, Biotechnology and Medical Technology Sectors.*

PricewaterhouseCoopers. 1998. "Pharma 2005: An Industrial Revolution in R&D."

PricewaterhouseCoopers. 1999. "Pharma 2005: Silicon Rally: The Race to e-R&D."

PricewaterhouseCoopers. October 1999. "Key Issues Facing the Pharmaceutical and Health Care Products Industry."

Rickwood, Sarah and Southworth, Amanda, 1995. *New Technologies in Pharmaceuticals*, Financial Times Pharmaceutical and Healthcare Publishing.

Rx&D, *Annual Review 1999-2000*, 1999.

Rosen, Shara, 1999. *New and Breaking Technologies in Pharmaceutical and Medical Device Industries*. Theta Reports.

Sofinov (Société Financière d'Innovation). 1999. "Biotechnology and Health Care." Caisse de Dépôt et Placement du Québec.

Stiller, Calvin et al. n.d. "Strategies for Investing in Canadian Health Research."

Theta Reports, September, 1999. *New and Breaking Technologies in Pharmaceutical and Medical Device Industries.*

Unknown. "Canada Needs Life Science Research."

Unknown. "Case for Canada." Cites PMPRB, Annual Reports.

Unknown. "Worldwide: Global Context."

Viner, Earl. November 1999. "Canadian Healthcare Licensing Association (CHLA): Financial Leveraging/Tax Benefits of Scientific Research & Experimental Development." KPMG.