

# Canada – A Strategic Choice

Canada as an investment destination for biotechnology



## Canada's biotech industry

Canada is a significant and growing player in the global biotech industry.

Ernst & Young reports that in 2006, 82 Canadian publicly traded biotech firms accounted for US\$3.2 billion<sup>1</sup> in revenue, representing an increase of 25% over 2005 and accounting for 4.4% of global biotech revenues. R&D expenditures by these public companies amounted to US\$885 million, representing more than 3% of global biotech R&D expenditures. Including Canada's 465 private firms, Canada is home to nearly 11% of the world's biotech companies.

PricewaterhouseCoopers has recently identified Canada as having the highest rate of growth among G7 countries in terms of biotech R&D workers, number of external patent applications, and business expenditures on R&D.

The majority of Canadian biotech firms focus on human health products and applications, but agricultural and environmental/industrial segments are also significant. Canada is home to many firms that are active in the application and commercialization of innovative biotech.

## Competitive strengths and capabilities

Within the global value chain, Canadian biotech firms have developed a number of product and technology specializations. These competitive strengths translate into potential opportunities for firms looking to benefit from Canadian biotech capabilities:

- **Human health** is the largest segment of the Canadian biotech industry, representing over half of all biotech companies, 70% of all biotech revenues, and close to 90% of all biotech R&D. Therapeutics account for the largest segment within human health, followed by diagnostics and drug delivery. Canadian-based firms engaged in human health biotech include Angiotech Pharmaceuticals, QLT, Tm Bioscience, Cangene, Biovail, Apotex Fermentation Inc., Medisure Inc, and Trillium Therapeutics.
- **Bioinformatics** is another key capability of the Canadian biotech industry. This segment includes genomics and related activities, tissue engineering, and drug discovery technology and services. Canadian bioinformatics firms include Bioinformatics Solutions, DNA LandMarks, and Kinexus Bioinformatics.
- **Agriculture and food processing** is the core capability for more than one quarter of all Canadian biotech firms – one of the highest proportions among all countries active in biotech. This strength reflects Canada's strong agricultural base and history of agricultural innovation. Major agricultural biotech firms in Canada include Dow AgroSciences and Monsanto.
- **Aquaculture** is another industry segment where Canada's biotech R&D capabilities are complemented by significant commercial aquaculture operations. The National Research Council Institute for Marine Biosciences in Halifax represents a major resource for Canada's aquaculture biotech industry.
- **Environmental and natural resource** applications represent segments in which Canada's biotech industry works closely with Canada's traditional primary resource economy.

## Leading biotech firms operating in Canada include:

Angiotech Pharmaceuticals Inc.  
[www.angiotech.com](http://www.angiotech.com)

AstraZeneca Canada Inc.  
[www.astrazeneca.ca](http://www.astrazeneca.ca)

Baxter Corporation  
[www.baxter.ca](http://www.baxter.ca)

Bayer Inc.  
[www.bayer.ca](http://www.bayer.ca)

Biomira  
[www.biomira.com](http://www.biomira.com)

Biovail  
[www.biovail.com](http://www.biovail.com)

Cangene  
[www.cangene.com](http://www.cangene.com)

Cardiome Pharma Corp  
[www.cardiome.com](http://www.cardiome.com)

Dow AgroSciences Canada Inc.  
[www.dowagro.com](http://www.dowagro.com)

Dow Pharmaceuticals Sciences Inc  
[www.dowpharm.com](http://www.dowpharm.com)

DSM Biologics  
[www.dsmbiologics.com](http://www.dsmbiologics.com)

Fisher Scientific Company  
[www.fishersci.ca](http://www.fishersci.ca)

Merck Frosst Canada & Co  
[www.merckfrosst.ca](http://www.merckfrosst.ca)

Monsanto Canada  
[www.monsanto.ca](http://www.monsanto.ca)

Novartis  
[www.novartis.ca](http://www.novartis.ca)

Pfizer Canada  
[www.pfizer.ca](http://www.pfizer.ca)

ProMetic Life Sciences Inc.  
[www.prometic.com](http://www.prometic.com)

QLT Inc.  
[www.qltinc.com](http://www.qltinc.com)

Tm Bioscience  
[www.tmbioscience.com](http://www.tmbioscience.com)

Trillium Therapeutics Inc.  
[www.trilliumtherapeutics.com](http://www.trilliumtherapeutics.com)

Wyeth  
[www.wyeth.ca](http://www.wyeth.ca)

<sup>1</sup> Dollars are expressed in Canadian currency unless otherwise specified.

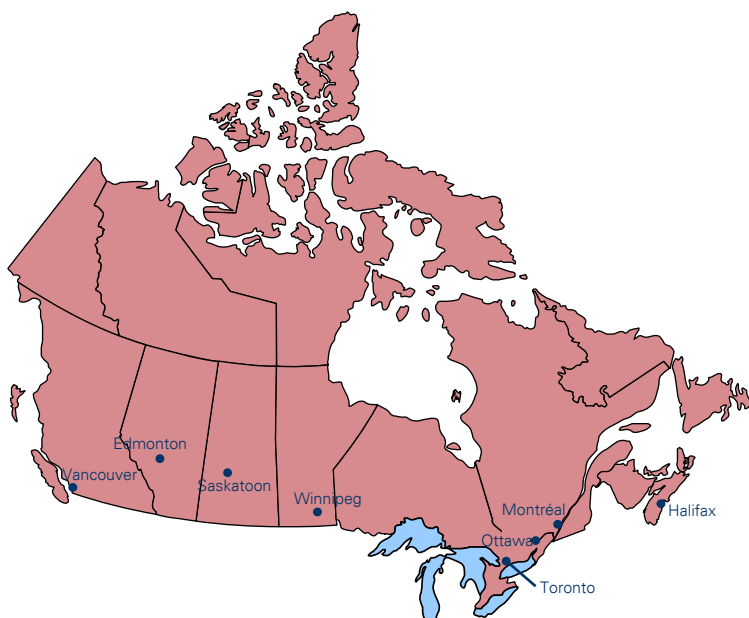
## Key Canadian clusters

**Montréal, Quebec** represents Canada's leading biotech cluster. Quebec has more than 180 public and private biotech companies employing 4,500 workers, with annual biotech R&D expenditures of \$560 million in 2005<sup>1</sup>.

Montréal is a particularly strong international hub for genomics development. World-class research centers include the McGill University and Genome Quebec Innovation Centre, the Biotech Research Institute, the Centre Robert-Cedergren, and the Quebec Proteomics Centre.

Major firms engaged in biotech in Montréal include AstraZeneca, DSM Biologics, Merck Frosst, and ProMetic Life Sciences.

1. Statistics Canada, *Biotechnology Use and Development Survey*, January, 2007.



**Saskatoon, Saskatchewan** is one of the leading agricultural biotech research centres in North America, and is home to North America's largest legume and cereal microbial inoculant manufacturing centre. The University of Saskatchewan is recognized as a leader in agricultural crop research and offers strong research support to private firms in the ag-biotech sector. Major firms based in Saskatoon include BASF Canada, Bayer CropScience, and Dow AgroSciences.

**Ottawa, Ontario** is home to a dynamic biotech sector, with more than 40 research centres and institutions, and employing approximately 5,000 people. The Ottawa cluster specializes in human health and biomedical sciences, such as bioinformatics, proteomics, biochips, stem cells, and medical devices. Other biotech activities include advanced agricultural technologies and bio-product sciences. Ottawa is also home to several national research organizations, including the National Research Council of Canada, the Canadian Institute of Health Research, and the National Sciences and Engineering Research Council.

**Halifax, Nova Scotia** is the largest biotech centre in Atlantic Canada. Most of Halifax's biotech activities are in human health. Other niche areas include aquaculture, fisheries, marine sciences, agriculture, forestry, and environmental management.

**Toronto, Ontario** is the hub for Canada's second largest biotech cluster. Ontario is home to more than 140 public and private biotech companies, with over 5,200 employees. Ontario's annual biotech R&D expenditures are \$650 million.

Toronto's biotech cluster is centered in downtown Toronto, close to the University of Toronto, numerous research hospitals, and specialized institutions such as the Centre for Cellular and Biomolecular Research and the Medical and Related Sciences (MARS) Discovery District.

Toronto is also the financial and business capital of Canada, home to the Toronto Stock Exchange, and plays an important role as a financing centre for biotech firms.

**Vancouver, British Columbia** is Western Canada's largest biotech hub, with more than 90 public and private biotechnology firms. Cluster employment totals more than 1,900, with annual R&D expenditures of \$285 million.

Many Vancouver biotech firms work in close association with major university agencies, including the University of British Columbia, Vancouver Coastal Health Research Institute, and the BC Cancer Research Agency. Leading Vancouver biotech companies include Angiotech Pharmaceuticals, Cardiome Pharma, Inflazyme Pharmaceuticals, and QLT.

Comprising over 40 companies and 2,300 employees, **Winnipeg, Manitoba** offers significant capabilities in pharmaceutical and biopharma R&D and production, and in agricultural biotech.

The cluster is also a centre of excellence in infectious disease identification and management, with activities concentrated in the Canadian Science Centre for Human and Animal Health, the Public Health Agency of Canada, and the International Centre for Infectious Diseases.

**Edmonton, Alberta** is Canada's fourth largest biotech cluster, with a diverse group of private and public companies employing more than 1,400 people.

Edmonton boasts one of Canada's leading research and teaching institutions in the University of Alberta with over \$400 million in sponsored research in 2006. Leading Edmonton biotech companies include Biomira, BioMS Medical, Isotechnika, Dynacare Kasper Medical Laboratories, and Gilead Alberta ULC.

## Biotech investment location drivers

To understand the main investment location drivers for the biotech industry, KPMG LLP (Canada) completed a series of in-depth confidential interviews with senior executives from leading biotech firms operating in North American and international jurisdictions. In these interviews, biotech executives identified and ranked the most important location drivers considered by their firms when choosing among potential investment locations. Individual responses were then analyzed by MMK Consulting Inc., to determine and rank the top location drivers, as detailed below.

Top-ranked Investment Location Drivers	Canada's Value Proposition	Investor Benefits
<b>1. Availability of skilled labour</b>	<ul style="list-style-type: none"> <li>• More than 75,000 people employed in the biotech industry, including 13,400 with direct biotech technical responsibilities</li> <li>• Strong supply of new talent from universities and research institutes</li> </ul>	<ul style="list-style-type: none"> <li>• Excellent supply of highly educated researchers and professional staff</li> </ul>
<b>2. Labour costs</b>	<ul style="list-style-type: none"> <li>• Lowest biotech labour costs among G7 countries</li> </ul>	<ul style="list-style-type: none"> <li>• Labour cost savings reduce the cash burn rate on R&amp;D projects</li> </ul>
<b>3. Corporate tax rates</b>	<ul style="list-style-type: none"> <li>• Over a decade of cuts to Canadian federal and provincial corporate taxes</li> <li>• Corporate tax rates that are now generally lower than US rates</li> </ul>	<ul style="list-style-type: none"> <li>• Corporate tax savings in most jurisdictions</li> <li>• Improved net profit after tax</li> </ul>
<b>4. Tax exemptions and incentives</b>	<ul style="list-style-type: none"> <li>• Federal and provincial R&amp;D tax incentives that are among the most generous in the world</li> <li>• R&amp;D credits may be refundable for some locations and/or firms</li> </ul>	<ul style="list-style-type: none"> <li>• Lower after-tax cost of R&amp;D</li> <li>• Improved cash flow during critical early stage research</li> </ul>
<b>5. Proximity to research/technical universities</b>	<ul style="list-style-type: none"> <li>• Canadian clusters all have major research universities and institutes</li> <li>• Extensive cooperation and joint development work between biotech firms and public agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing supply of new, highly educated biotech professionals</li> <li>• Access to publicly funded equipment, services, and expertise</li> </ul>
<b>6. Access to financing</b>	<ul style="list-style-type: none"> <li>• Public financing at all-time high of US\$1.8 billion in 2006</li> <li>• Venture capital financing of \$493 million in 2006</li> </ul>	<ul style="list-style-type: none"> <li>• Vibrant private and public biotech funding market</li> </ul>
<b>7. Highway accessibility</b>	<ul style="list-style-type: none"> <li>• Coast-to-coast major highway network serving all major clusters</li> <li>• Direct integration to US Interstate system at border crossings</li> </ul>	<ul style="list-style-type: none"> <li>• Flexible road-based options for movement of products or personnel</li> </ul>
<b>8. Accessibility to a major airport</b>	<ul style="list-style-type: none"> <li>• International airports exist in all major Canadian biotech clusters</li> <li>• Canadian airports offer three times higher proportion of international flights than US airports</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced travel time and costs</li> <li>• Convenient direct access to international locations</li> </ul>

## Canada as an investment destination

The rapid growth of Canada's biotech industry in the past decade is proof of Canada's attractiveness as a location for biotech investment. What value proposition does Canada provide to global investors in the biotech industry?

The following sections present Canada's value proposition for biotech firms by comparing Canada's leading biotech clusters – Montréal, Toronto, and Vancouver – to leading US clusters located in Boston and San Jose, as well as key international clusters in the United Kingdom (Edinburgh) and Singapore.

### 1. Availability of skilled labour

In a recent KPMG survey, biotech industry executives ranked the availability of skilled labour as the most important factor in comparing biotech business locations.

Canadian clusters offer biotech firms a large, productive, and highly skilled workforce. With the growth of Canada's biotech sector over the past decade, innovative biotech companies in Canada now employ more than 75,000 people, including more than 13,000 with direct biotech-related technical responsibilities. PricewaterhouseCoopers has identified the Canadian biotech industry as having the fastest growth rate of R&D workers among the G7 countries.

All of the Canadian biotech industry clusters are close to publicly funded major universities and research institutes that specialize in health sciences and/or agri-food. These institutions create a steady supply of new highly skilled entrants into the biotech workforce. In addition, flexible Canadian immigration rules for skilled workers assist international biotech firms in relocating key staff to Canadian operations.

The World Economic Forum's 2005-2006 *Global Competitiveness Report* also recognizes Canada's availability of skilled labour, ranking Canada 8<sup>th</sup> in the availability of scientists and engineers, ahead of both the US and the UK (see chart at top right).

### 2. Labour costs

A KPMG comparison of biotech R&D costs has found that Canada's labour costs are above Singapore's, but are significantly lower than in leading US and international clusters such as Edinburgh, San Jose, and Boston (see chart at centre right). Savings vary by location, but the Canadian biotech clusters offer labour savings of up to 21%.

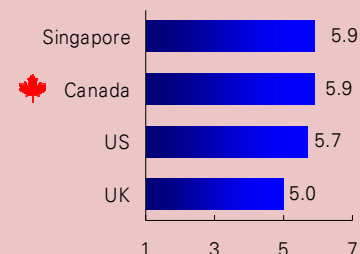
A significant component of Canada's cost advantage relative to the United States is the lower cost of providing employee benefits in Canada, due mainly to Canada's publicly funded system for many healthcare services.

### 3. Corporate tax rates

Progressive reductions in both federal and provincial tax rates in Canada over the last decade mean that corporate income tax rates are now generally lower in Canada than in the United States.

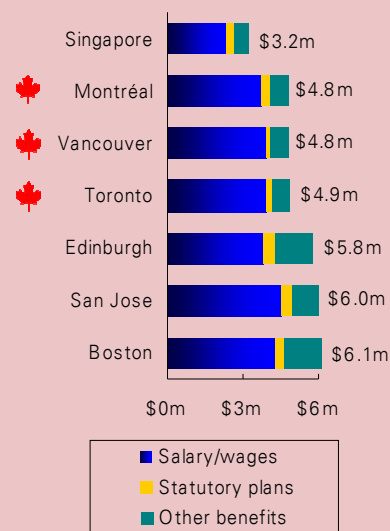
In a comparison of effective income tax rates for biotech R&D by KPMG (see chart at right), Canada's leading biotech clusters were found to offer lower effective corporate income tax rates than competing clusters in Singapore, the US, and the UK. Low, or even negative, effective tax rates in Canada are the result of significant R&D tax credits, which are fully refundable in some Canadian jurisdictions.

Availability of scientists and engineers<sup>1</sup>

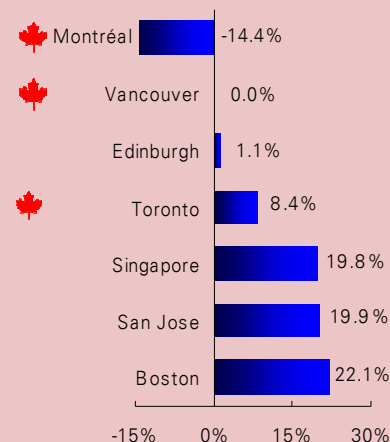


1: *The Global Competitiveness Report, 2005-2006*, World Economic Forum. Scientists and engineers are: 1 = nonexistent or rare, 7 = widely available.

Biotech R&D, Annual labour costs, US\$m<sup>2,3</sup>



Biotech R&D Effective corporate income tax rate<sup>2,4</sup>

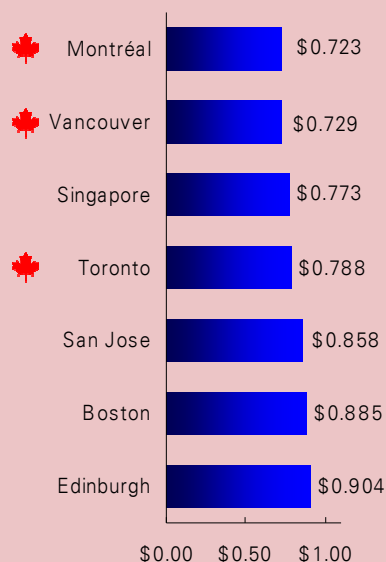


2: *Competitive Alternatives*, KPMG LLP, 2006. Data for Manchester is used as a proxy for Edinburgh.

3: Figures represent total annual labour costs for a representative biotech R&D firm of 66 employees.

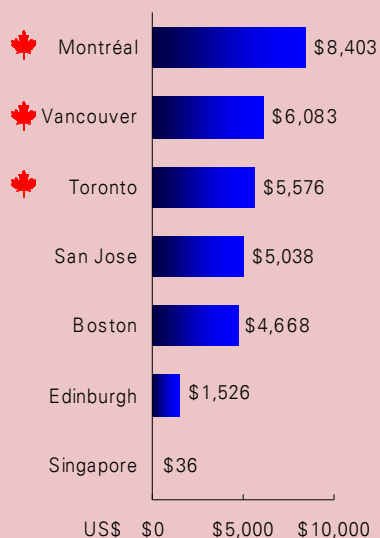
4: Figures represent combined federal/regional/local

### After-tax cost of R&D B-index<sup>1</sup>



<sup>1</sup> The OECD-standard B-index measure represents the present value of before-tax income that a firm needs to generate to cover a \$1 (after tax) investment in R&D activities. B-index of less than 1.00 indicates that the tax system is subsidizing the cost of R&D. Rates shown are applicable to large and foreign firms. *Canada's R&D Tax Advantages, An International Comparison*, JPW Innovation Associates Inc., 2007.

### Biotech R&D Non-discretionary tax incentives US\$ per employee<sup>1,2</sup>



<sup>1</sup> *Competitive Alternatives*, KPMG LLP, 2006. Non-discretionary tax incentives per job (US\$), after estimated tax effects, for a representative biotech R&D firm.

<sup>2</sup> Data for Manchester is used as a proxy for Edinburgh. Singapore incentives are primarily discretionary.

## 4. Tax exemptions and incentives

Incentives represent another significant factor in biotech location and investment decisions. Canada's competitive tax environment is complemented by a number of relevant incentives for biotech R&D, including both R&D tax credits and public support for biotech R&D.

### Research and development incentives

Canada's federal and provincial R&D tax credit programs are considered to be among the most generous in the world.

The OECD's standard measure for competitiveness of R&D tax incentives is the "B-index", which represents the amount of pre-tax income (or funding) required to undertake each dollar of R&D expenditure (after tax). Using this measure, two of Canada's leading biotech clusters offer a lower after-tax cost of R&D than Singapore (see chart at left), and all Canadian biotech clusters offer a much lower after-tax cost of R&D than the leading US and UK clusters.

These favourable R&D tax incentives drive the very low, or even negative, effective corporate income tax rates for Canadian biotech clusters (see previous page). Due primarily to these R&D tax credits, on a per-employee basis, the Canadian biotech clusters offer the highest levels of non-discretionary incentives, averaging US\$5,576 to US\$8,403 annually per biotech employee (see chart at bottom left).

### Public support for biotechnology

Canada is also a world leader in supporting its biotech industry with publicly funded biotech research. Federal government biotech R&D expenditures totalled \$823 million in 2006. According to OECD statistics<sup>1</sup>, Canada invests more than twice as much as the United Kingdom in publicly funded biotech R&D, with biotech representing 12.4% of total public R&D expenditures in Canada as compared to only 1.6% in the United Kingdom. Among 10 reporting countries, only Korea exceeds Canada both in absolute dollars and percentage of public funding for biotech R&D.

A wide range of other specific incentives and benefits are also available at the provincial and local level. These are delivered both directly by government and via publicly supported universities and research institutes, through mechanisms such as:

- Publicly provided office and research facilities, often located in research parks and "incubator" facilities adjacent to major public research institutes.
- Access to publicly funded biotech research centres, research laboratories, and testing equipment.
- Administrative support for clinical trials (e.g. ethics review services), plus participation and assistance in jointly-conducted trials.
- Publicly funded staff training and educational programs.

<sup>1</sup> *OECD Biotechnology Statistics 2006*, reporting 2003 data. US and Singapore data not available.

## 5. Proximity to research/technical universities

Leading research and technical universities in Canadian biotech clusters include:

- Toronto: University of Toronto, York University, and Ryerson University.
- Montréal: McGill University, Concordia University, Université du Québec à Montréal, École Polytechnique Montréal, and École de Technologie Supérieure.
- Vancouver: University of British Columbia, Simon Fraser University, and the British Columbia Institute of Technology.

Canadian biotech clusters also feature strong provincial and local biotech industry associations, with cooperative participation from biotech firms, major universities, research institutes, and government.

The World Economic Forum's 2005-2006 *Global Competitiveness Report* ranks Canada among the top ten countries globally for local availability of specialized research and training services. In addition, OECD statistics report that Canada has:

- The highest level of post-secondary (tertiary) education among OECD member countries (see chart at top right).
- One of the highest ratios of science and life science degrees as a percentage of all university degrees granted (see chart at bottom right).

## 6. Access to financing

Given the long lead times involved in bringing biotech products to market, access to financing is a key issue for the biotech industry. Canada provides the full range of financing options and mechanisms for biotech firms at various development stages, from private financings, to initial public offerings, and new stock issues.

Total financing for biotech in Canada has grown significantly in recent years:

- Ernst and Young have estimated the industry raised US\$1.8 billion in capital and spent US\$900 million in R&D in 2006.
- Thompson Financial reports Canadian venture capital investments in life sciences of \$493 million in 2006, up 13% from 2005.

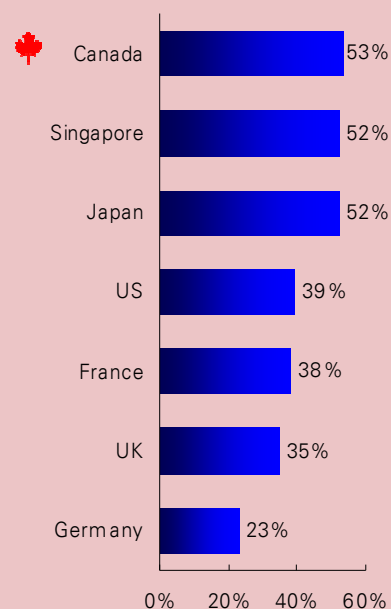
## 7. Highway accessibility

Canada's coast-to-coast major highway network is fully interconnected with that of the United States, providing direct integration to the US Interstate highway system at Canada/US border crossings. Canadian biotech cluster cities also feature well-developed urban transportation networks, including highways, roads and transit.

## 8. Accessibility to a major airport

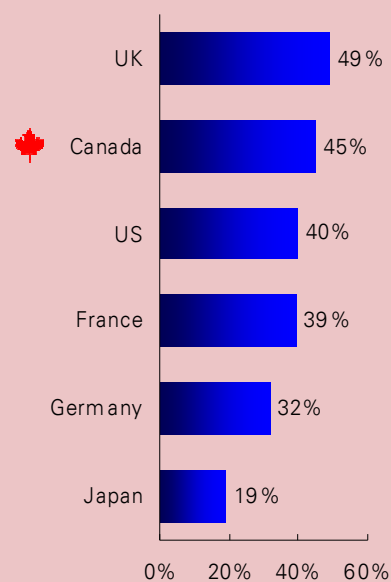
Major international airports at Toronto, Montréal, and Vancouver, provide excellent direct international connections to the United States and overseas destinations. As a proportion of total flights, Canadian airports offer three times greater intensity of international flights than US airports.

**Population that has attained post-secondary education<sup>1</sup>**



1: *Education at a Glance*, OECD, 2006, and *IMD World Competitiveness Online*, 2006. Percentage of the population that has attained tertiary education in the 25-34 age group.

**Sciences and life sciences university degrees as a percentage of total university degrees<sup>1</sup>**



1: *Graduates by Field of Education*, OECD, 2004. Singapore data not available.

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The logo for Canada, featuring the word "Canada" in a stylized serif font with a small crown above the letter 'a'.

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