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Estimates of total spending on research and development in the health field in Canada, 1988 to 2005

Research and development (R&D) is a measure of a country's economic prosperity. Recently, our readers have expressed interest in the health field. How much R&D is Canada performing in the health field and who is funding this research? A methodology has been devised in order to estimate how much of the Gross Domestic Expenditures on R&D (GERD) are relevant to Health R&D. This service bulletin presents details of expenditures on health R&D performance and funding.

Highlights

- ▶ R&D in the health field has gained importance in Canada in the past several years. Preliminary estimates of the gross expenditures on health R&D in Canada was \$6.0 billion for 2005. This reflects an increase of 7% (\$379 million) over 2004 (table 1).
- As a percentage of the 2005 GERD, health R&D represents 23% whereas ten years ago, it represented just 16%. When compared to expenditures per capita, in 2005 Canada will spend \$184 dollars per person on health R&D while only \$75 was spent per person in 1995 (table 1).
- The higher education sector is, by far, the largest performer of health R&D. In 2005, it showed an increase of \$336 million (10%). Compared to expenditures in this sector in 1995 (\$1,428 million), they have more than doubled (\$3,681 million) in 2005. This sector includes Canadian universities and teaching hospitals. In 2005, it performed 62% (\$3.7 billion) of total health GERD. The second largest performer is the business enterprise sector representing 33% (\$2.0 billion) of health GERD in 2005 (table 2, chart 2).
- The largest funders of health GERD were the business enterprise sector and the higher education sector with a contribution of about \$1.6 billion each in 2005. They were followed by the federal government sector, which contributed \$1.2 billion (table 2).

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- ▶ Table 2 examines the data historically. Health GERD data by performing sector reflects an average annual increase of 13% in the business sector, 11% in the federal government sector and 10% in the higher education sector over the past 10 years. The major funders of health GERD; business enterprises and higher education sectors respectively show an 11% and 8% average annual increase over the same period.
- When examining the regional distribution of health GERD, data are only available for the higher education sector (table 3). We see that Ontario and Quebec are the provinces where most activities are taking place. This is due primarily to the large number of universities and teaching hospitals located in these two provinces.

Definitions:

R&D is defined as creative work undertaken on a systematic basis in order to increase the stock of scientific and technical knowledge and the use of this knowledge to devise new applications. Expenditures on R&D are an important indicator of the effort devoted to creative activity in science and technology.

Gross Domestic Expenditures on Research and Development (GERD) represent all R&D performed in a country's national territory during a given year. The GERD includes R&D performed within a country and funded from abroad but excludes payments sent abroad for R&D performed in other countries.

Methodology:

Federal government sector: The Health GERD figures include scientific activities aimed at protecting, promoting and restoring human health, broadly interpreted to include health aspects of nutrition and food hygiene. They range from preventative medicine, including all aspects of medical and surgical treatment, both for individuals and groups, and the provision of hospital and home care, to social medicine and paediatric and geriatric research.

Federal government R&D expenditures in the health field from 1988 until 2005^p are derived from the survey of Federal Science Expenditures and Personnel. Data were collected from responses to a question on health as a socio-economic objective for Federal R&D spending. Federal government data are published in Catalogue No. 88-204-XIE.

Provincial government: R&D expenditures in the health field are based on values from provincial science surveys which identify their intramural R&D expenditures in the health socio-economic objective field.

Business enterprise sector: The Pharmaceutical and medicine manufacturing industry North American Industry Classification System (NAICS) 325410 is the most significant source of health R&D in the Business enterprise sector. Other NAICS industries which are prevalent in Health R&D include: Pharmaceuticals and Pharmacy supplies wholesale- Distributors (414510), Testing Laboratories (541380), Research and Development in the Physical, Engineering and Life Sciences (541710) and Health Care and Social Assistance (NAICS 62) industries. Data originate from the R&D in Canadian Industry Survey conducted by Statistics Canada.

The higher education sector: Health R&D statistics are derived from Statistics Canada's revised higher education R&D estimates (STC Catalogue 88-001 Vol. 29, No. 6) which identify R&D performed in the health field. The revised estimates are based on the assumption that the total R&D expenditures are equal to the sum of: a) sponsored research expenditures (including all teaching hospitals); b) indirect expenditures on sponsored research; c) a value for the fraction of faculty members' time assumed to be devoted to sponsored and non-sponsored research; and d) indirect expenditures related to faculty members' time on research. Statistics Canada uses Canadian Association of University Business Officers (CAUBO) and Centre for Education Statistics data in order to compile the estimates.

Due to the nature of the estimation system for Higher Education R&D (HERD) statistics, higher education is the only sector of performance where a regional breakdown of health R&D is available (see Table 4).

Private non-profit sector: Values used for estimating health R&D expenditures in the private non-profit (PNP) sector are those identified as health-related in survey responses. Please contact SIEID for further information on the PNP sector (see last page for coordinates).

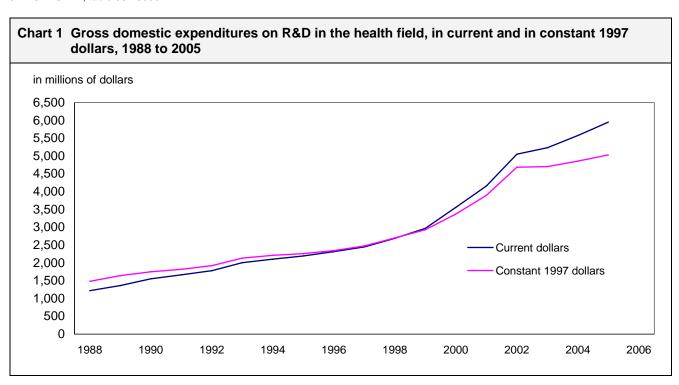
Statistics Canada 2 Catalogue no. 88-001-XIE

Table 1 Gross domestic expenditures on R&D in the health field, compared to total GERD, 1988 to 2005

				Health			Health
<u>Year</u>	Healt	h R&D	Population ¹	R&D/Capita	G	R&D/GERD	
	in millions of dollars	in millions of 1997 dollars ³	in thousands	dollars	in millions of dollars	in millions of 1997 dollars ³	percent
1988	1,221	1,482	26,795	46	9,045	10,977	13.5
1989	1,365	1,585	27,282	50	9,516	11,052	14.3
1990	1,551	1,747	27,698	56	10,260	11,554	15.1
1991	1,665	1,820	28,031	59	10,767	11,767	15.5
1992	1,783	1,923	28,367	63	11,338	12,231	15.7
1993	2,006	2,134	28,682	70	12,184	12,962	16.5
1994	2,105	2,213	28,999	73	13,342	14,029	15.8
1995	2,196	2,259	29,302	75	13,754	14,150	16.0
1996	2,317	2,345	29,611	78	13,816	13,984	16.8
1997 ^r	2,447	2,447	29,907	82	14,634	14,634	16.7
1998 ^r	2,692	2,703	30,157	89	16,088	16,153	16.7
1999 ^r	2,967	2,929	30,404	98	17,637	17,411	16.8
2000 ^r	3,560	3,374	30,689	116	20,635	19,559	17.3
2001 ^r	4,159	3,898	31,021	134	23,206	21,749	17.9
2002 ^r	5,050	4,685	31,373	161	23,382	21,690	21.6
2003 ^r	5,234	4,703	31,669	165	23,992	21,556	21.8
2004 ^r	5,574	4,860	31,974	174	25,259	22,022	22.1
2005 ^p	5,953 // II. table 051-00	5,032	32,271	184	26,268	22,205	22.7

^{1.} CANSIM II, table 051-0001.

^{3.} CANSIM II, table 384-0036.



^{2.} Estimates of Canadian Research and Development Expenditures (GERD), Canada 1994 to 2005 and by Province 1994 to 2003, no. 88F0006XIE No. 020, December 2005. CANSIM II, table 358-0001.

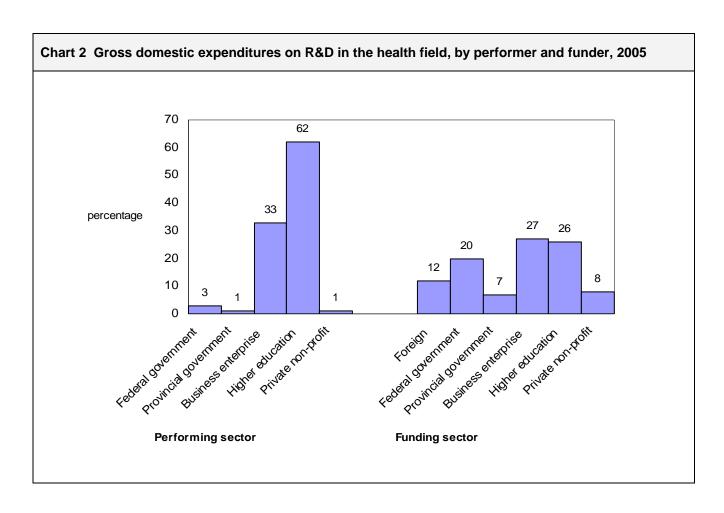
Table 2 Gross domestic expenditures on R&D in the health field, by performing sector and funding sector, 1988 to 2005 Year Federal Provincial **Business** Higher Private Foreign **Total** government government enterprise education1 non-profit in millions of dollars Performing sector 1,221 . . . 1,365 1,551 1,049 . . . 1,665 1,156 . . . 1.229 1.783 . . . 1.367 2.006 1,382 2,105 . . . 1,428 2,196 . . . 1,430 2,317 1,516 2,447 . . . 1,628 2,692 . . . 1,823 2,967 2000^r 1,254 3,560 2,104 . . . 2001^r 1,542 2,383 4,159 ... 2002^r 1,826 2,956 5,050 2003^r 1,856 3,086 5,234 2004^r 5,574 1,949 3,345 . . . 2005^p 1,999 3,681 5,953 . . . Funding sector 1.221 1,365 1,551 1,665 1,783 2,006 2,105 2,196 2,317 2,447 2,692 2,967 2000^r 1,000 3,560 1,054 2001^r 1,233 1,023 4,159 2002^r 1,427 1,283 5,050 2003^r 1,029 5,234 1,466 1,300 2004^r 1,084 1,547 1,409 5,574 2005^p 1,162 1,609 1,551 5,953

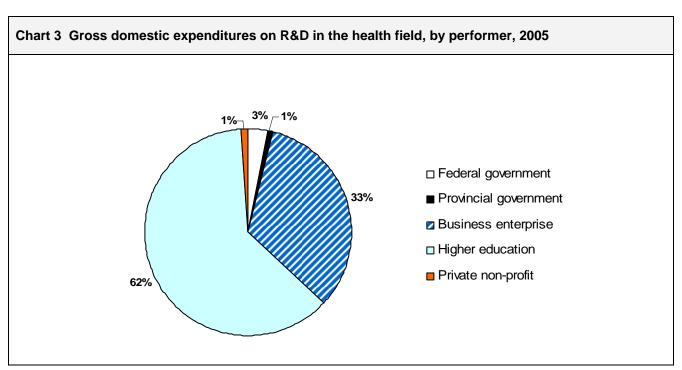
As mentioned in the methodology section, higher education R&D expenditures are estimated by Statistics Canada using financial data collected through the CAUBO survey and the survey of University and College Academic Staff System conducted by the Centre for Education Statistics of Statistics Canada.

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^{1.} Includes teaching hospitals.

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The estimates are made at the university level. This allows us to make available provincial statistics for the higher education sector. Because estimates are made by field of science, health sciences being one of the fields, we are able to identify Health R&D performed by the higher education sector by province.

This provides interesting detail as the higher education sector is the largest performer of health R&D (42% in 2003). As with all provincial R&D data published by Science, Innovation and Electronic Information Division (SIEID), 2003 data are the most recent data available.

The following 2 tables show regional distribution of R&D in the health field performed by the higher education sector.

	Funding sector								
Province	Federal government	Provincial government	Business enterprise	Higher education ¹	Private non-profit	Foreign	Tota		
			in mi	illions of dollars					
Newfoundland and Labrador	8.5	0.3	6.1	19.8	1.3	0.0	36.0		
Prince Edward Island	1.5	0.2	0.0	1.7	0.0	0.0	3.4		
Nova Scotia	18.6	2.1	15.3	50.9	20.0	0.4	107.3		
New Brunswick	3.0	1.1	0.0	6.0	0.0	0.0	10.1		
Quebec	282.2	100.1	60.5	332.6	94.6	6.1	876.1		
Ontario	293.7	107.1	135.2	597.4	163.8	17.4	1,314.6		
Manitoba	22.4	4.7	4.3	35.4	15.6	0.7	83.1		
Saskatchewan	15.8	8.9	0.0	33.3	7.0	0.3	65.3		
Alberta	85.8	54.7	27.3	132.1	27.7	2.4	330.0		
British Columbia	82.2	26.2	18.6	90.6	39.1	3.0	259.7		
Canada ²	813.7	305.4	267.3	1,299.8	369.1	30.3	3,085.6		

^{1.} Includes teaching hospitals.

^{2.} Includes Nunavut, the Northwest Territories and Yukon.

Table 4 Higher education sector GERD in the health field by provincial population, 2003							
Province	Population ¹	Health R&D in the higher education sector	Health R&D in the higher education sector / capita				
	in thousands	in millions of dollars	in dollars				
Newfoundland and Labrador	519	36	69				
Prince Edward Island	137	4	29				
Nova Scotia	936	107	114				
New Brunswick	751	10	13				
Quebec	7,494	876	117				
Ontario	12,260	1,315	107				
Manitoba	1,162	83	71				
Saskatchewan	995	65	65				
Alberta	3,160	330	104				
British Columbia	4,155	260	63				
Canada ²	31,669	3,086	97				

^{1.} CANSIM, table 051-0001.

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^{2.} Includes Nunavut, the Northwest Territories and Yukon.

Historical tables

In this service bulletin, we publish the Health GERD matrix from 1994 to 2005, however the tables are available back to 1988. If you require 1988 to 1993 matrix's, please contact us and the information will be given, free of charge.

As with the Canadian GERD, we display the Health GERD as a matrix of performing and funding sectors. Based on what is reported by the performer, the matrix illustrates how much R&D in the Health field each sector performed over a 12 month period, and also which sector financed the R&D that was performed.

	Performing sector								
Funding sector	Federal government	Provincial governments	Business enterprise	Higher education ²	Private non-profit	Total ¹			
1994			in millions of do	ollars					
Federal government	57	0	6	283	8	354			
Provincial governments	0	31	8	94	15	148			
Business enterprise	0	0	460	109	12	58			
Higher education ²	0	0	0	721	0	72			
Private non-profit	0	0	0	166	34	200			
Foreign	0	0	87	9	5	101			
Total ¹	57	31	561	1,382	74	2,105			
1995									
Federal government	63	0	9	294	7	373			
Provincial governments	0	33	8	97	15	153			
Business enterprise	0	0	458	105	15	578			
Higher education ²	0	0	0	753	0	753			
Private non-profit	0	0	0	169	37	206			
Foreign	0	0	118	10	5	133			
Total ¹	63	33	593	1,428	79	2,196			
1996									
Federal government	76	0	10	255	6	347			
Provincial governments	0	32	6	89	16	143			
Business enterprise	0	0	505	118	9	632			
Higher education ²	0	0	0	754	0	754			
Private non-profit	0	0	0	200	39	239			
Foreign	0	0	181	14	7	202			
Total ¹	76	32	702	1,430	77	2,317			
1997									
Federal government	78	0	8	261	6	353			
Provincial governments	0	32	7	111	18	168			
Business enterprise	0	0	559	134	10	703			
Higher education ²	0	0	0	786	0	780			
Private non-profit	0	0	0	208	37	24			
Foreign	0	0	175	16	1	192			
Total ¹	78	32	749	1,516	72	2,447			

^{7.} As data are not provided specifically by "Health Field", this is STC's best estimate.

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^{2.} Includes teaching hospitals.

	Performing sector								
Funding sector	Federal government	Provincial governments	Business enterprise	Higher education ²	Private non-profit	Total			
	in millions of dollars								
1998									
Federal government	87	0	9	275	10	38			
Provincial governments	0	36	8	111	16	17			
Business enterprise	0	0	641	145	8	79			
Higher education ²	0	0	0	864	0	86			
Private non-profit	0	0	0	213	31	24			
Foreign	0	0	216	20	2	23			
Total ¹	87	36	874	1,628	67	2,69			
1999									
Federal government	103	0	6	362	6	47			
Provincial governments	0	32	6	145	12	19			
Business enterprise	0	0	665	167	5	83			
Higher education ²	0	0	0	907	0	90			
Private non-profit	0	0	0	219	23	24			
Foreign	0	0	284	23	2	30			
Total ¹	103	32	961	1,823	48	2,96			
2000									
Federal government	116	0	8	433	3	56			
Provincial governments	0	42	4	176	11	23			
Business enterprise	0	0	835	211	8	1,05			
Higher education ²	0	0	0	1,000	0	1,00			
Private non-profit	0	0	0	264	21	28			
Foreign	0	0	407	20	1	42			
Total ¹	116	42	1,254	2,104	44	3,56			
2001									
Federal government	152	0	12	564	3	73			
Provincial governments	0	42	5	214	12	27			
Business enterprise	0	0	991	236	6	1,23			
Higher education ²	0	0	0	1,023	0	1,02			
Private non-profit	0	0	0	312	18	33			
Foreign	0	0	534	34	1	56			
Total ¹	152	42	1,542	2,383	40	4,15			

As data are not provided specifically by "Health Field", this is STC's best estimate.
Includes teaching hospitals.

Gross domestic expenditures on R&D (GERD) in the health field, 1994 to 2005 (concluded)

	Performing sector							
Funding sector	Federal government	Provincial governments	Business enterprise	Higher education ²	Private non-profit	Total ¹		
			in millions of do	ollars				
2002								
Federal government	186	0	11	752	3	952		
Provincial governments	0	42	2	249	14	307		
Business enterprise	0	0	1,159	261	7	1,427		
Higher education ²	0	0	0	1,283	0	1,283		
Private non-profit	0	0	0	371	15	386		
Foreign	0	0	654	40	1	695		
Total ¹	186	42	1,826	2,956	40	5,050		
2003								
Federal government	196	0	11	814	8	1,029		
Provincial governments	0	44	2	306	12	364		
Business enterprise	0	0	1,190	267	9	1,466		
Higher education ²	0	0	0	1,300	0	1,300		
Private non-profit	0	0	0	369	22	391		
Foreign	0	0	653	30	1	684		
Total ¹	196	44	1,856	3,086	52	5,234		
2004								
Federal government	182	0	12	882	8	1,084		
Provincial government	0	45	2	332	12	391		
Business enterprise	0	0	1,249	289	9	1,547		
Higher education ²	0	0	0	1,409	0	1,409		
Private non-profit	0	0	0	400	23	423		
Foreign	0	0	686	33	1	720		
Total ¹	182	45	1,949	3,345	53	5,574		
2005						<u> </u>		
Federal government	171	0	12	971	8	1,162		
Provincial government	0	48	2	365	12	427		
Business enterprise	0	0	1,282	318	9	1,609		
Higher education ²	0	0	0	1,551	0	1,551		
Private non-profit	0	0	0	440	24	464		
Foreign	0	0	703	36	1	740		
Total ¹	171	48	1,999	3,681	54	5,953		

As data are not provided specifically by "Health Field", this is STC's best estimate.
Includes teaching hospitals.

Symbols

The following standard symbols are used in Statistics Canada publications:

- . not available for any reference period
- .. not available for a specific reference period
- ... not applicable
- 0 true zero or a value rounded to zero
- 0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- p preliminary
- revised
- x suppressed to meet the confidentiality requirements of the Statistics Act
- E use with caution
- F too unreliable to be published

This publication was prepared by **Gisèle Bellefeuille** under the direction of **Janet Thompson**, Unit Head, Science and innovation surveys section, Science, Innovation and Electronic Information Division.

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Current publications of the Science and Innovation Surveys section include:

Industrial Research and Development, 2005 Intentions (with 2004 preliminary estimates and 2003 actual expenditures) Catalogue No. 88-202-XIE, annual. It presents statistics on research and development (R&D) activities performed and funded by Canadian business enterprises. The report covers current and capital expenditures on R&D, R&D as a percent of performing company revenues, R&D expenditures by province, the company's country of control, personnel engaged in R&D and payments for technological services.

http://www.statcan.ca:8096/bsolc/english/bsolc?catno=88-202-X

Federal Science Activities, 2004-2005, Catalogue No. 88-204-XIE, annual. It presents statistics on the federal government's activities in science and technology (S&T). It covers expenditures and person-years by type of science, performing sectors, provinces, federal departments and agencies.

http://www.statcan.ca:8096/bsolc/english/bsolc?catno=88-204-X

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