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Estimates of total spending on research and development in the health field in Canada, 1988 to 2004

Expenditures on research and development (R&D) in the health field are growing as a percentage of Gross Domestic Expenditures on Research and Development (GERD). Between the years 1997 and 2001, research and development expenditures in the health field represented approximately 17% of Canadian GERD. In the last three years, this percentage has grown to 22% (2002), 23% (2003) and 24% (2004 preliminary estimates). This service bulletin presents details of expenditures on Health R&D performance and funding.

Highlights

- ▶ In 2004, the preliminary estimates of the gross expenditures on health research and development in Canada was \$5.7 billion, an increase of \$467 million (9.0%) over 2003. Research and development in the health field has gained importance in Canada in the past several years. In 1996, \$78 per person was spent on research in the health field. Preliminary estimates for 2004 indicate that \$180 per person will be spent (table 1).
- ▶ The largest performer of Health GERD is the higher education sector. Showing an increase of \$372 million, it is the sector mainly responsible for the increase in Health R&D. This sector includes Canadian universities and teaching hospitals. In 2004, it performed 60% (\$3.5 billion) of total Health GERD. The second largest performer is the business enterprise sector representing 35% (\$2.0 billion) of Health GERD in 2004.
- ▶ The largest funder of Health GERD is the business enterprise sector with a total of \$1.6 billion in 2004. The higher education sector funded \$1.5 billion in 2004 and the federal government funded \$1.1 billion.
- ▶ Total Canadian R&D expenditures (GERD) were estimated to be \$24.5 billion in 2004. Health GERD represents 24% of this total. Over the last ten years, the average increase per year of the Health GERD has been 11% which is higher than the average annual 6% growth rate of GERD for the same period.

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- ▶ Table 2 examines the data historically. Health GERD data by performing sector reflects an average annual increase of 14% in the business sector, 14% 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 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 in these two provinces.

Definitions:

R&D is defined as creative work undertaken on a systematic basis to increase the stock of scientific and technical knowledge and to use this knowledge in 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 pediatric and geriatric research.

Federal government R&D expenditures in the health field from 1988 until 2004^P are derived from the federal survey of government departments and agencies. Data were collected from responses to a question on health as a socio-economic objective for 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 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.

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. 28, No. 10) 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.

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. See Volume 28, No. 4 of this publication for further information.

Table 1. Gross domestic expenditures on R&D in the health field, compared to total GERD, 1988 to 2004

Year	Health R&D in millions of dollars	Population ¹ in thousands	Health R&D/Capita dollars	GERD ² in millions of dollars	Health R&D/GERD percent
1988	1,221	26,795	46	9,045	13.5
1989	1,365	27,282	50	9,516	14.3
1990	1,551	27,698	56	10,260	15.1
1991	1,665	28,031	59	10,767	15.5
1992	1,783	28,367	63	11,338	15.7
1993	2,006	28,682	70	12,184	16.5
1994	2,105	28,999	73	13,342	15.8
1995 ^f	2,196	29,302	75	13,754	16.0
1996 ^f	2,317	29,611	78	13,816	16.8
1997 ^f	2,447	29,907	82	14,636	16.7
1998 ^f	2,692	30,157	89	16,089	16.7
1999 ^f	2,967	30,404	98	17,638	16.8
2000 ^f	3,561	30,689	116	20,531	17.3
2001 ^f	4,134	31,021	133	22,733	18.2
2002 ^f	4,956	31,373	158	22,370	22.2
2003 ^f	5,281	31,660	167	23,293	22.7
2004 ^p	5,748	31,946	180	24,487	23.5

1. CANSIM, table 051-0001.

2. Estimates of Canadian Research and Development Expenditures (GERD), Canada 1993 to 2004 and by Province 1993 to 2002, no. 88F0006XIE No.020, December 2004. CANSIM, table 358-0001.

Chart 1. Gross domestic expenditures on R&D in the health field, compared to total GERD, 1988 to 2004

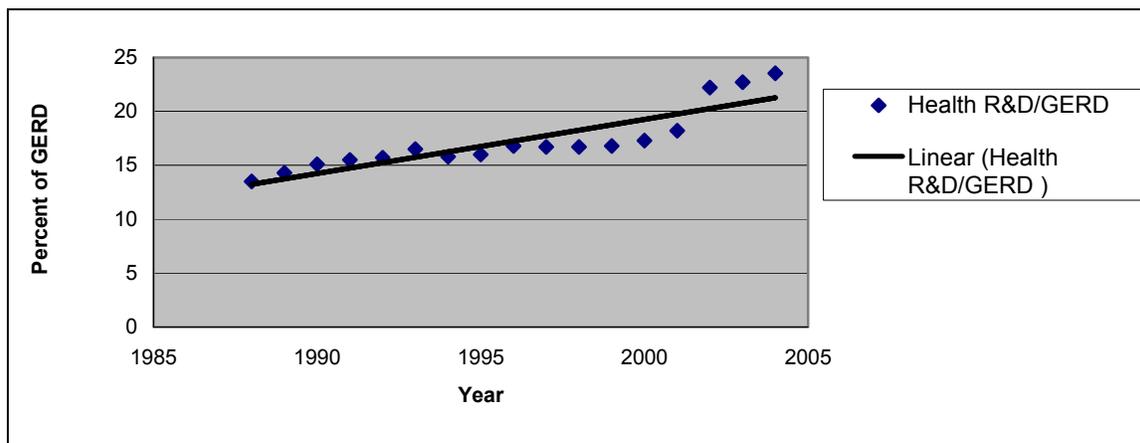


Chart 2. Gross domestic expenditures on R&D in the health field, by performer, 2004

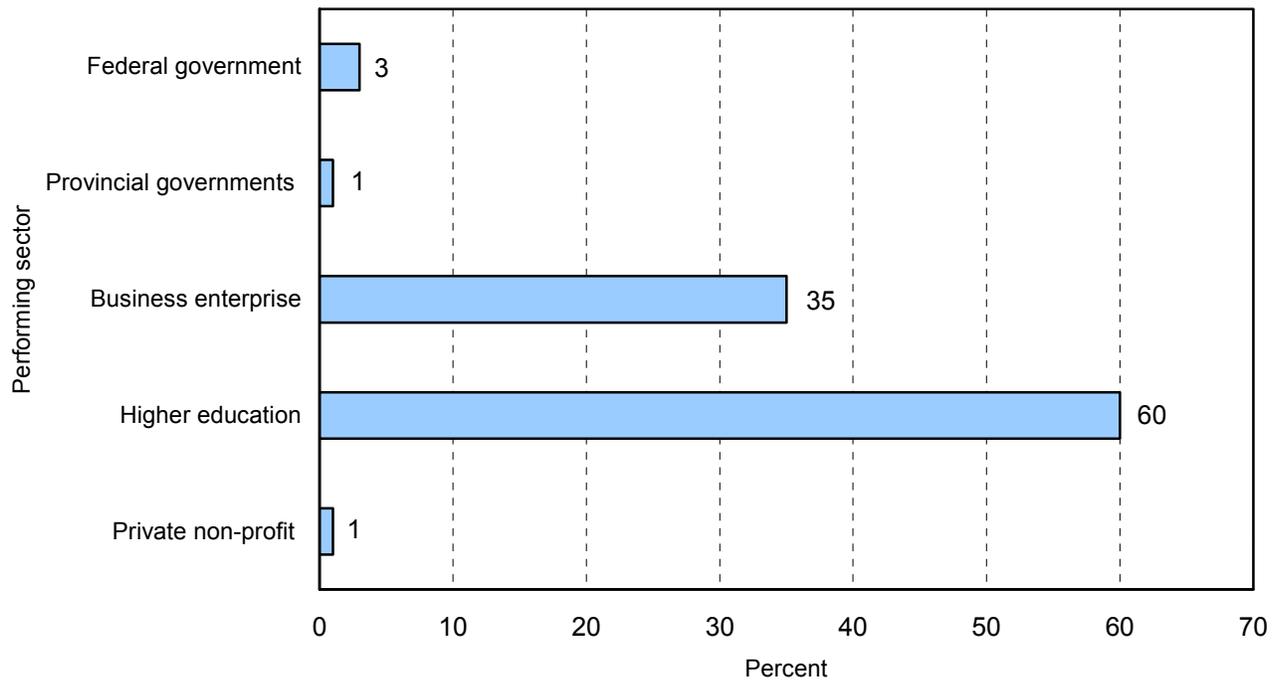


Chart 3. Gross domestic expenditures on R&D in the health field, by funder, 2004

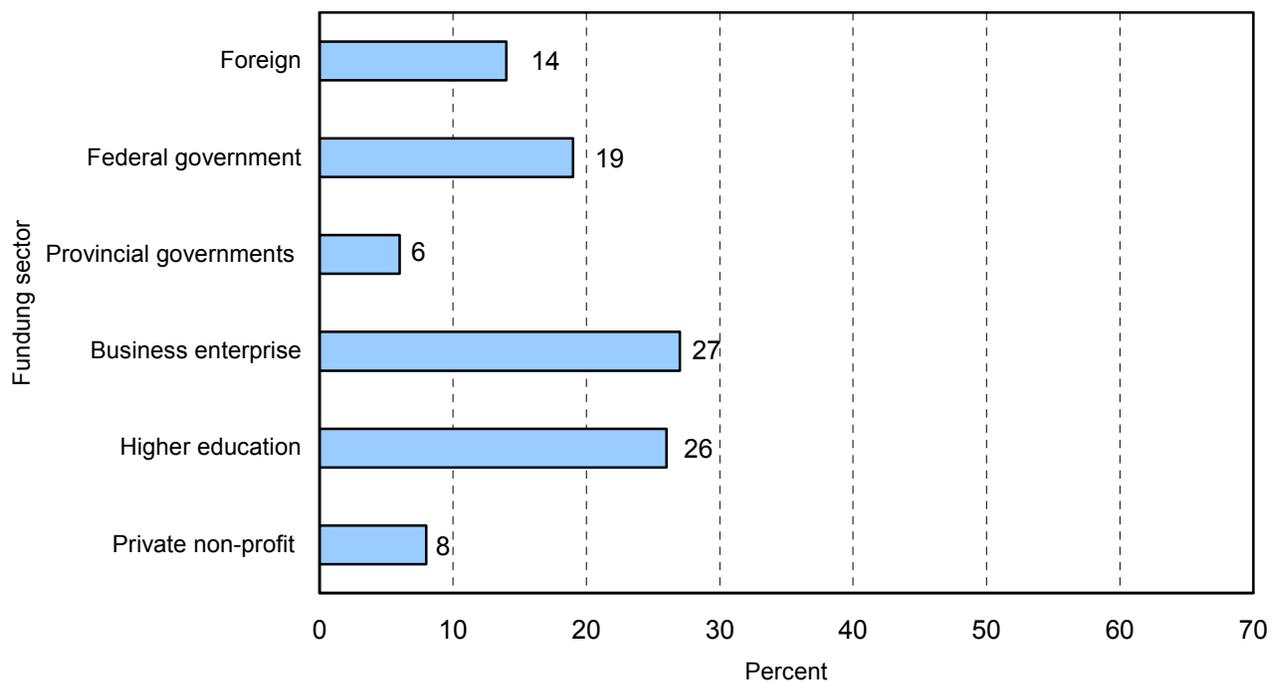


Table 2. Gross domestic expenditures on R&D in the health field, by performing sector and funding sector, 1988 to 2004

Year	Federal government	Provincial government	Business enterprise	Higher education ¹	Private non-profit	Foreign	Total
in millions of dollars							
Performing sector							
1988	41	17	196	895	72	...	1,221
1989	50	22	233	980	80	...	1,365
1990	64	26	321	1,049	91	...	1,551
1991	55	29	324	1,156	101	...	1,665
1992	56	33	405	1,229	60	...	1,783
1993	53	29	490	1,367	67	...	2,006
1994	57	31	561	1,382	74	...	2,105
1995 ^f	63	33	593	1,428	79	...	2,196
1996 ^f	76	32	702	1,430	77	...	2,317
1997 ^f	78	32	749	1,516	72	...	2,447
1998 ^f	87	36	874	1,628	67	...	2,692
1999 ^f	103	32	961	1,823	48	...	2,967
2000 ^f	116	42	1,255	2,104	44	...	3,561
2001 ^f	152	42	1,517	2,383	40	...	4,134
2002 ^f	186	42	1,758	2,930	40	...	4,956
2003 ^f	206	43	1,896	3,095	41	...	5,281
2004 ^p	195	42	2,002	3,467	42	...	5,748
Funding sector							
1988	255	95	198	500	138	35	1,221
1989	282	129	251	532	143	28	1,365
1990	334	145	333	558	152	29	1,551
1991	322	147	367	616	173	40	1,665
1992	317	149	442	670	138	67	1,783
1993	351	146	533	713	178	85	2,006
1994	354	148	581	721	200	101	2,105
1995 ^f	373	153	578	753	206	133	2,196
1996 ^f	347	143	632	754	239	202	2,317
1997 ^f	353	168	703	786	245	192	2,447
1998 ^f	381	171	794	864	244	238	2,692
1999 ^f	477	195	837	907	242	309	2,967
2000 ^f	559	233	1,056	1,000	285	428	3,561
2001 ^f	731	273	1,211	1,023	330	566	4,134
2002 ^f	952	311	1,360	1,257	386	690	4,956
2003 ^f	1,015	327	1,461	1,328	407	743	5,281
2004 ^p	1,101	358	1,560	1,487	455	787	5,748

1. Includes teaching hospitals.

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

The estimates are done 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 region.

This provides interesting detail as the higher education sector is the largest performer of health R&D (43% in 2002). As with all provincial R&D data published by Science, Innovation and Electronic Information Division (SIED), 2002 data is 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.

Table 3. Higher education sector GERD in the health field by funder and province, 2002							
Province	Funding sector						Total
	Federal government	Provincial government	Business enterprise	Higher education ¹	Private non-profit	Foreign	
in millions of dollars							
Newfoundland and Labrador	6.6	0.4	6.3	15.8	0.5	0.0	29.6
Prince Edward Island	0.9	0.2	0.0	1.1	0.0	0.0	2.2
Nova Scotia	15.3	2.1	15.4	40.0	13.8	0.6	87.2
New Brunswick	1.9	0.7	0.1	6.3	0.0	0.2	9.2
Quebec	258.2	78.5	57.0	405.8	96.1	10.5	906.1
Ontario	277.9	92.3	139.1	485.5	163.1	20.9	1,178.8
Manitoba	21.2	4.7	4.0	35.0	15.4	1.0	81.3
Saskatchewan	16.0	10.7	0.0	37.3	12.6	0.0	76.6
Alberta	76.7	36.5	21.3	136.0	32.1	2.7	305.3
British Columbia	77.5	22.5	17.3	93.7	37.5	4.3	252.8
Canada	752.2	248.6	260.5	1,256.5	371.1	40.2	2,929.1

1. Includes teaching hospitals.

Table 4. Higher education sector GERD in the health field by provincial population, 2002			
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	30	58
Prince Edward Island	137	2	15
Nova Scotia	935	87	93
New Brunswick	750	9	12
Quebec	7,446	906	122
Ontario	12,102	1,179	97
Manitoba	1,156	82	70
Saskatchewan	996	77	77
Alberta	3,116	305	98
British Columbia	4,115	253	62
Canada²	31,373	2,930	93

1. CANSIM, table 051-0001.

2. Includes Nunavut, the Northwest Territories and Yukon.

Historical tables

Although we publish the Health GERD matrix from 1993 to 2004, the tables are available back to 1988. If you require 1988 to 1992 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.

Gross domestic expenditures on R&D (GERD) in the health field, 1993 to 2004						
Funding sector	Performing sector					Total ¹
	Federal government	Provincial governments	Business enterprise	Higher education ²	Private non-profit	
in millions of dollars						
1993						
Federal government	53	0	7	282	9	351
Provincial governments	0	29	9	94	14	146
Business enterprise	0	0	403	117	13	533
Higher education ²	0	0	0	713	0	713
Private non-profit	0	0	0	153	25	178
Foreign	0	0	71	8	6	85
Total¹	53	29	490	1,367	67	2,006
1994						
Federal government	57	0	6	283	8	354
Provincial governments	0	31	8	94	15	148
Business enterprise	0	0	460	109	12	581
Higher education ²	0	0	0	721	0	721
Private non-profit	0	0	0	166	34	200
Foreign	0	0	87	9	5	101
Total¹	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
Total¹	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
Total¹	76	32	702	1,430	77	2,317

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

2. Includes teaching hospitals.

Gross domestic expenditures on R&D (GERD) in the health field, 1993 to 2004 (Continued)						
Funding sector	Performing sector					Total ¹
	Federal government	Provincial governments	Business enterprise	Higher education ²	Private non-profit	
in millions of dollars						
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	786
Private non-profit	0	0	0	208	37	245
Foreign	0	0	175	16	1	192
Total¹	78	32	749	1,516	72	2,447
1998						
Federal government	87	0	9	275	10	381
Provincial governments	0	36	8	111	16	171
Business enterprise	0	0	641	145	8	794
Higher education ²	0	0	0	864	0	864
Private non-profit	0	0	0	213	31	244
Foreign	0	0	216	20	2	238
Total¹	87	36	874	1,628	67	2,692
1999						
Federal government	103	0	6	362	6	477
Provincial governments	0	32	6	145	12	195
Business enterprise	0	0	665	167	5	837
Higher education ²	0	0	0	907	0	907
Private non-profit	0	0	0	219	23	242
Foreign	0	0	284	23	2	309
Total¹	103	32	961	1,823	48	2,967
2000						
Federal government	116	0	7	433	3	559
Provincial governments	0	42	4	176	11	233
Business enterprise	0	0	837	211	8	1,056
Higher education ²	0	0	0	1,000	0	1,000
Private non-profit	0	0	0	264	21	285
Foreign	0	0	407	20	1	428
Total¹	116	42	1,255	2,104	44	3,561

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

2. Includes teaching hospitals.

Gross domestic expenditures on R&D (GERD) in the health field, 1993 to 2004 (End)						
Funding sector	Performing sector					Total ¹
	Federal government	Provincial governments	Business enterprise	Higher education ²	Private non-profit	
in millions of dollars						
2001						
Federal government	152	0	12	564	3	731
Provincial governments	0	42	5	214	12	273
Business enterprise	0	0	969	236	6	1,211
Higher education ²	0	0	0	1,023	0	1,023
Private non-profit	0	0	0	312	18	330
Foreign	0	0	531	34	1	566
Total¹	152	42	1,517	2,383	40	4,134
2002						
Federal government	186	0	11	752	3	952
Provincial governments	0	42	6	249	14	311
Business enterprise	0	0	1,092	261	7	1,360
Higher education ²	0	0	0	1,257	0	1,257
Private non-profit	0	0	0	371	15	386
Foreign	0	0	649	40	1	690
Total¹	186	42	1,758	2,930	40	4,956
2003						
Federal government	206	0	12	794	3	1,015
Provincial governments	0	43	7	263	14	327
Business enterprise	0	0	1,177	276	8	1,461
Higher education ²	0	0	0	1,328	0	1,328
Private non-profit	0	0	0	392	15	407
Foreign	0	0	700	42	1	743
Total¹	206	43	1,896	3,095	41	5,281
2004						
Federal government	195	0	13	890	3	1,101
Provincial government	0	42	7	295	14	358
Business enterprise	0	0	1,243	309	8	1,560
Higher education ²	0	0	0	1,487	0	1,487
Private non-profit	0	0	0	439	16	455
Foreign	0	0	739	47	1	787
Total¹	195	42	2,002	3,467	42	5,748

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

2. 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
- ^r revised
- x suppressed to meet the confidentiality requirements of the *Statistics Act*
- ^E use with caution
- F too unreliable to be published

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<http://www.statcan.ca:8096/bsolc/english/bsolc?catno=88-001-X>

Current publications of the Science and Innovation Surveys section include:

Industrial Research and Development, 2004 Intentions (with 2003 preliminary estimates and 2002 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, 2003-2004, 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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