

Canada's Investment in Cancer Risk and Prevention Research, 2005–2016

CANADIAN CANCER RESEARCH SURVEY

Since 2005, CCRA members have prioritized the quantification of Canada's cancer research funding. To that end, the CCRA's Canadian Cancer Research Survey (CCRS) was created, a database that has evolved over time to track the research investments made by over 40 organizations.

The CCRS is estimated to cover about 60–80% of the research investments made in Canada through peer-reviewed processes. Data are updated and corrected annually and will vary from previously published reports. Investment numbers may differ from those reported by contributing organizations because of methodological conventions like budget proration.

THIS REPORT

This brief report provides an overview of the level and nature of the investment in cancer risk and prevention research made by Canadian research funding organizations. Page 3 of this report presents annual investment data, while page 4 shows the proportion of the investment by key attributes for 2016 (graphs) and for the three four-year periods (tables). Data were coded to the Cancer Risk and Prevention Cube below.

RESEARCH FOCUS

- Causes
- Determinants that influence causes
- Determinants that influence interventions
- Interventions

RESEARCH TYPE

- Research involving model systems
- Human research
- Methodological/measurements research
- Knowledge synthesis
- Infrastructure and other support

RISK FACTOR

- Activity level, body composition and metabolism
- Alcohol
- Contaminants in the air, water and soil
- Diet and nutrition
- Ethnicity, sex and social environment
- Gene-environment interactions
- Genetic susceptibilities
- Hormones
- Infectious agents
- Occupational exposures
- Physiological susceptibilities
- Precursor lesions
- Tobacco
- Treatments/diagnostics
- Multiple/general

Recently, several Canadian population health researchers published a methodological framework to estimate the population attributable risk of cancer in the Canadian population.¹ Some authors contend that more than half of all cancers could be prevented by applying knowledge that we already have.²

Access interactive visualizations and a related slide deck at www.ccra-acrc.ca.



1 Brenner DR et al. (2018). Estimating the current and future cancer burden in Canada: methodological framework of the Canadian population attributable risk of cancer (ComPARE) study. *BMJ Open*, 8:e022378. doi:10.1136/bmjopen-2018-022378.
 2 Emmons KM & Colditz GA. (2017). Realizing the potential of cancer prevention —the role of implementation science. *New England Journal of Medicine*, 376(10): 986–90. doi:10.1056/NEJMsbl609101.



Overall Investment

A total of \$683.1M was invested in cancer risk and prevention research from 2005 to 2016. On a per capita basis, this translates into \$1.24 per Canadian, equivalent to the cost of two apples. The investment in cancer risk and prevention research represents 12% of the overall cancer research investment.



Major Funders

The Canadian Institutes of Health Research (CIHR) was the single largest funder of prevention research, accounting of 28% of the 12-year investment, and thus also a lead funder for investments in research on most risk factors. Other key funders were: Canadian Cancer Society (CCS); Canadian Partnership Against Cancer; Ontario Institute for Cancer Research (OICR); and Alberta Innovates.



Genes

Over the 12 years, \$192M was invested in research on genetic susceptibilities (\$123M) and gene-environment interactions (\$70M). Combined, these risk factors accounted for 28% of the total cancer risk and prevention research investment.



Tobacco

Investment in tobacco research reached a peak in 2016 at \$7M, with a 12-year investment of nearly \$64M. Interventional research reflected a growing proportion of this investment. Much of the research investment was in Ontario, with a large percentage at University of Waterloo.



Canadian Partnership for Tomorrow Project

Investment in the Canadian Partnership for Tomorrow Project by the Canadian Partnership Against Cancer and provincial partners formed 22% of overall 12-year investment and was the single largest targeted investment. This will be an important platform for future decades of cancer risk and prevention research.



Alcohol

Among the risk factors for which the data were coded, the lowest investment was for alcohol. It accounted for less than 1% of the cancer risk and prevention research investment in each year examined.



Infectious Agents

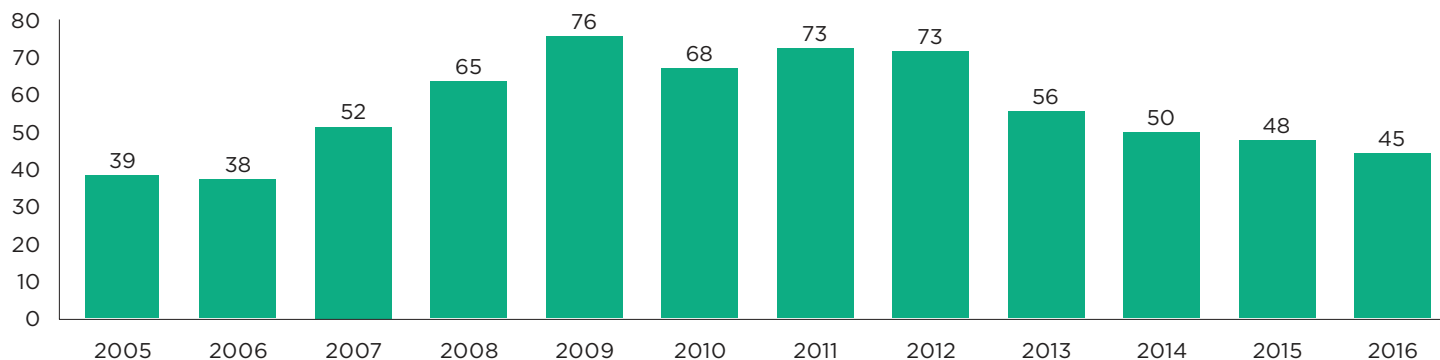
The research investment on infectious agents rose steadily over the 12 years—from \$6M in 2005 to \$10M in 2016. About 43% of the overall research investment related to the human papilloma virus (HPV), and another 19% on hepatitis viruses (B and C). Two of every \$5 invested in 2013–16 was on intervention research, a sizeable upward shift from the earliest four-year period.



Researchers

There were 338 nominated principal investigators (PI) who had funding at some point in the last four years. When stratified by risk factors, most worked in the areas of genetic susceptibilities or infectious agents. Over half of the PIs funded for work focused on cancer causation.

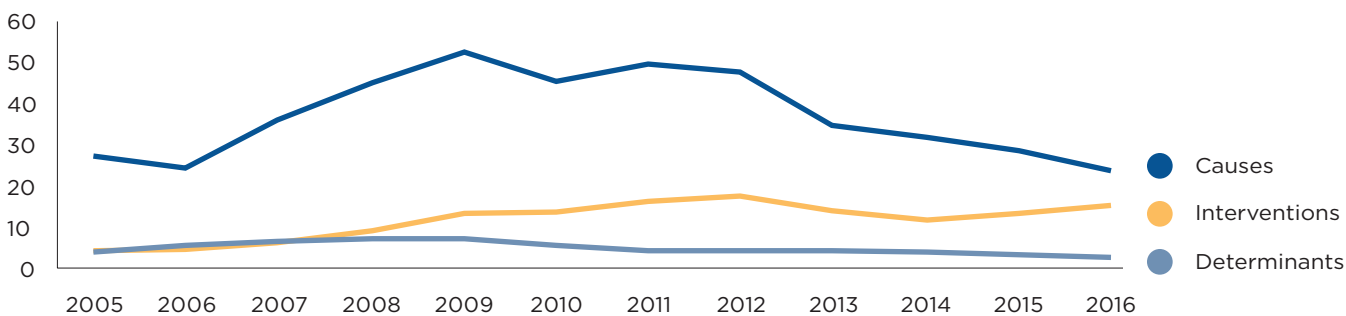
Annual Investment (\$M)



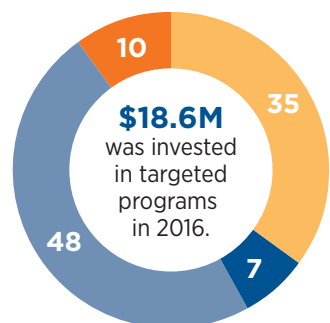
Investment by Funder (\$M)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CIHR	11.1	12.8	15.8	18.4	19.5	17.8	18.6	18.6	16.7	15.0	14.3	15.4
CCS	6.6	6.3	6.3	6.6	8.0	7.1	7.2	7.1	6.2	5.8	7.3	7.3
Canadian Partnership Against Cancer	0.0	0.0	0.0	9.2	9.0	5.6	7.6	11.9	3.9	5.0	3.3	3.6
OICR	0.4	0.3	2.5	0.7	3.6	4.4	5.6	6.0	4.2	4.0	3.8	3.4
Alberta Innovates	0.8	0.9	2.0	2.6	2.8	2.8	4.9	3.4	5.5	4.3	3.5	1.1
Canada Foundation for Innovation	0.8	0.7	2.5	3.4	5.5	5.6	5.4	3.8	1.3	0.2	0.3	0.5
Canada Research Chairs Program	2.2	2.6	2.3	2.2	2.2	2.3	2.2	2.1	2.1	2.2	2.2	2.2
Genome Canada	2.9	1.0	4.2	5.0	5.0	1.3	0.3	0.4	0.1	0.0	0.0	0.0
Canadian Breast Cancer Foundation	2.4	1.5	1.1	1.4	1.7	1.9	1.9	1.5	1.1	1.0	1.0	0.8
Other funders	11.8	11.7	15.3	15.2	19.0	19.1	19.6	17.9	15.0	12.8	12.8	10.6

Investment by Research Focus (\$M)



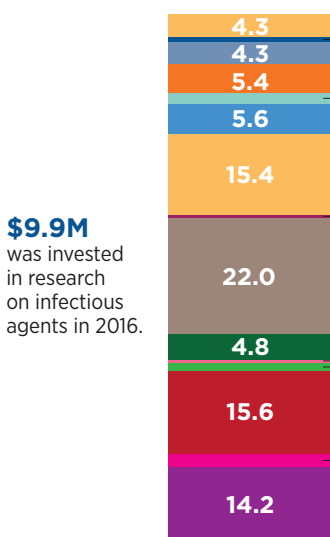
Program Type (%)



- National - Targeted
- Regional - Targeted
- National - Other
- Regional - Other

	2013-16	2009-12	2005-08
National - Targeted	35	50	28
Regional - Targeted	9	10	2
National - Other	44	69	54
Regional - Other	12	16	12

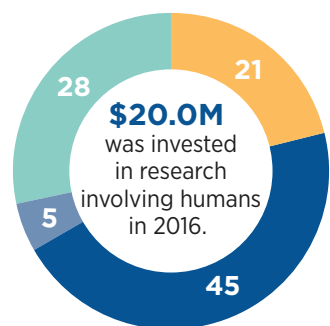
Risk Factor (%)



- Activity level, body composition & metabolism
- Alcohol
- Contaminants in the air, water & soil
- Diet & nutrition
- Ethnicity, sex & social environment
- Gene-environment interactions
- Genetic susceptibilities
- Hormones
- Infectious agents
- Occupational exposures
- Physiological susceptibilities
- Precursor lesions
- Tobacco
- Treatment/diagnostics
- Multiple/general

	2013-16	2009-12	2005-08
Activity level, body composition & metabolism	4.4	3.3	2.8
Alcohol	0.6	0.5	0.2
Contaminants in the air, water & soil	4.6	4.6	6.1
Diet & nutrition	4.6	4.5	4.2
Ethnicity, sex & social environment	3.3	2.4	3.5
Gene-environment interactions	9.2	11.0	10.0
Genetic susceptibilities	15.2	18.5	19.9
Hormones	0.6	1.3	2.4
Infectious agents	17.0	10.6	13.7
Occupational exposures	5.2	2.2	1.1
Physiological susceptibilities	1.3	1.5	2.2
Precursor lesions	1.2	1.7	3.6
Tobacco	11.7	6.4	11.2
Treatment/diagnostics	1.7	1.5	1.3
Multiple/general	19.5	30.0	18.1

Research Type (%)



- Research involving model systems
- Human research
- Methodological/measurements research
- Knowledge synthesis
- Infrastructure & other support

	2013-16	2009-12	2005-08
Research involving model systems	18	14	20
Human research	42	32	40
Methodological/measurements research	6	4	4
Knowledge synthesis	1	1	1
Infrastructure & other support	33	50	34