

Canada's Research Investment in Childhood and Adolescent Cancers, 2005-2021

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.

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THIS REPORT

Cancers affecting children and adolescents (0-19 years) are diverse and there is wide variation in etiology, incidence, age of onset, aggressiveness, treatments, and survival. Although cancer deaths are slowly decreasing and great progress has been made in terms of survival, cancer remains the most common disease-related cause of death among children¹ and there has been little improvement in survival for some cancer types with poor prognosis.² The rates of new cancer cases among children and adolescents in 2017 were lower than they have been in recent years, but are still higher than what they were in 2005.³

There is a growing number of childhood and adolescent cancer survivors and many experience significant long-term health and psychosocial challenges due to their cancer or treatments. Research that helps to reveal the complex biology of cancer and successful ways to prevent, detect, treat, and mitigate the long-term effects of cancer are all important to improving outcomes for childhood and adolescent cancer patients.

This brief report provides an overview of the level and nature of research investment in childhood and adolescent cancers 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 2021 (graphs) and for the three five-year periods (tables).

Not captured in this report is the investment in an important research platform—the Cancer in Young People in Canada (CYP-C) Program.⁴ CYP-C is a population-based surveillance system of all cases of pediatric cancer diagnosed and treated at the 17 tertiary pediatric oncology centres in Canada. Another significant omission is the support that the Canadian pediatric centres receive for enrolments in clinical trials conducted by cooperative groups in the U.S., Europe, and Australia.

While the investment figures shown in this report trend upwards in recent years, the rate of children on therapeutic clinical trials has shown a declining trend.⁵ The opportunity to participate in a clinical trial is considered a core component of the care of children and adolescents with cancer⁶ and more information is needed to understand how trial availability affects these trends.

1 Statistics Canada. Table 13-10-0394-01. Leading causes of death, total population, by age group. <https://doi.org/10.25318/1310039401-eng> (accessed 2023-07-28).

2 Ellison LF, Xie L, Sung L. (2021). Trends in paediatric cancer survival in Canada, 1992 to 2017. *Health Reports*, Statistics Canada, 32(2), Catalogue no. 82-003-X. <https://www150.statcan.gc.ca/n1/pub/82-003-x/2021002/article/00001-eng.htm> (accessed 2023-06-07).

3 Statistics Canada. Table 13-10-0111-01 Number and rates of new cases of primary cancer, by cancer type, age group and sex. <https://doi.org/10.25318/1310011101-eng> (accessed 2023-07-28). More recent data are available for the under 15- year age group at <https://health-infobase.canada.ca/data-tools/cypc/>.

4 CYP-C operates through a collaboration between the Public Health Agency of Canada, the Canadian Partnership Against Cancer, and the C⁷ Council.

5 Pole JD et al. (2017). Most children with cancer are not enrolled on a clinical trial in Canada: a population-based study. *BMC Cancer*, 17:402. <https://doi.org/10.1186/s12885-017-3390-6>. Updated analyses are underway by the Public Health Agency of Canada.

6 Alexander S et al. (2018). Pediatric oncology clinical trial participation where the geography is vast: Development of a clinical research system for tertiary and satellite centers in Ontario, Canada. *Pediatr Blood Cancer*. 65(4). <https://doi.org/10.1002/pbc.26901>.



Overall Investment

Although slightly lower than in 2019 and 2020, the research investment in childhood and adolescent cancers was \$35M in 2021, representing 7% of the overall cancer research investment in 2021. Over the 17 years tracked, a total of \$391M was invested in research on childhood and adolescent cancers. This is expected to rise in coming years with the major investment in 2023 by the Canadian Institutes of Health (CIHR) to establish the Canadian Pediatric Cancer Consortium (CPCC).



Major Funders

Nearly half (47%) of the 2021 research invested in childhood and adolescent cancers came from CIHR. Other key funders included: Genome Canada, the Canadian Cancer Society (CCS), the Canada Research Chairs Program (CRCP), Ontario Institute for Cancer Research (OICR), Fonds de recherche du Québec – Santé (FRQS), Ontario Ministry of Colleges and Universities (OMCU), The Terry Fox Research Institute (TFRI) and The Cole Foundation.



Investment by Funding Mechanism

In terms of funding mechanisms, operating grants (direct support) formed the largest share of the investment (80% in 2017-2021 up from 69% in 2007-2011). Over 70% of the operating grant investment was for biomedical research projects.



Investment by Area of Science

Biology represented a shrinking proportion of the annual investment over the 17 years, consistent with the overall cancer research investment trend. Investment in the Early detection, diagnosis & prognosis category had the greatest increase from the first to the third five-year period (six-fold) and reflected increased focus on biomarker discovery to aid in precision medicine.



Investment Trend

The investment in research on childhood and adolescent cancers increased from 2005 to 2012, followed by a period of levelling and then substantially increasing in 2018 and remaining fairly stable to 2021. The increase in 2018 was due to the initiation of several large-scale pediatric-related genomics research projects.



Targeted Investment

Much of the impetus in funding in the latest five-year period (2017-2021) was the result of non-targeted funding programs – that is, from funding programs that were not specific to childhood and adolescent cancers. This suggests a lack of targeted funding programs, but also that researchers in this space compete well in open competitions.



Investment by Cancer Site

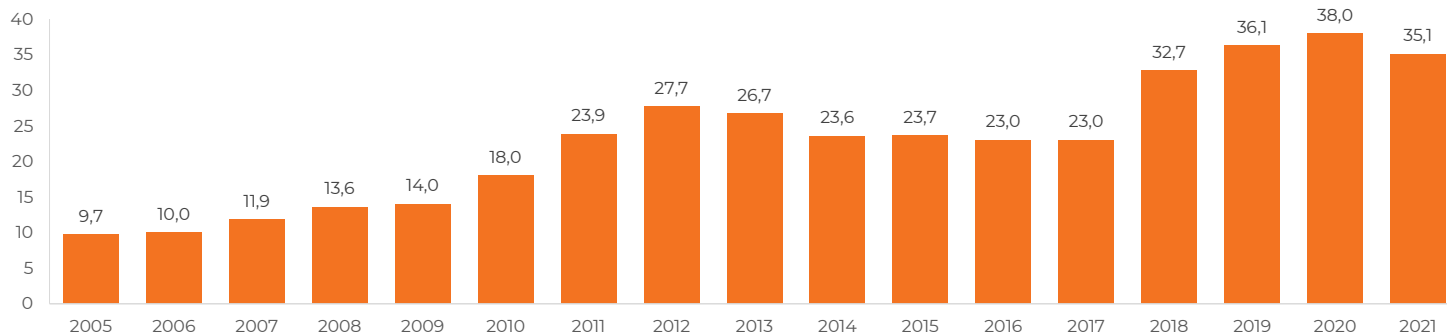
Over the 17 years, nearly 80% of the childhood and adolescent cancer research investment was focused on specific cancers. Much of the overall increased investment in childhood and adolescent cancer research was the result of increased investments in research on central nervous system neoplasms (which includes cancers of the brain and spinal cord).



Researchers

Over the 17 years, there were 466 nominated principal investigators (PIs) funded for research projects on childhood and adolescent cancers. This number represents nominated PIs who were funded for at least one operating grant, equipment grant, and/or career award relevant to childhood and adolescent cancers. Many were based in Ontario and Quebec, but it is noteworthy that many research projects involved multiple institutions. Multi-centred and multi-disciplinary research is necessary to advance the evidence base.

Annual Investment (\$M)



Investment by Funder (\$M)

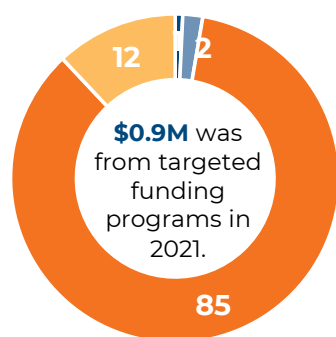
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
CIHR	3.5	3.6	3.9	4.3	4.7	6.1	7.9	9.6	9.8	10.8	11.0	10.0	8.9	14.2	15.6	17.1	16.6
Genome Canada	0.1	0.2	0.2	0.2	0.2	0.5	1.6	2.4	1.9	1.1	0.6	1.5	1.5	2.4	3.0	2.8	1.9
CCS	2.0	2.2	2.7	3.0	2.7	2.6	2.6	3.1	2.4	1.9	2.5	2.4	2.2	2.1	1.8	2.0	1.7
CRCP	0.4	0.4	0.6	0.6	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.7	1.2	1.5	1.5
OICR	1.0	0.3	0.5	0.9	1.1	1.3	1.4	1.1	0.7	0.7	1.1	1.3	2.4	3.9	3.6	2.7	1.4
FRQS	0.3	0.3	0.3	0.4	0.3	0.4	0.5	0.6	0.7	0.5	0.8	0.8	0.9	1.1	1.0	1.2	1.3
TFRI	0.5	0.6	0.7	0.8	0.8	1.2	1.8	2.1	1.4	0.6	0.8	1.3	1.5	1.3	1.3	1.1	0.7
Cole Foundation	0.0	0.1	0.2	0.5	0.5	0.8	1.0	1.2	1.1	0.8	0.8	0.8	0.7	0.5	0.4	0.6	0.6
Other funders	1.9	2.3	2.8	3.1	3.2	4.6	6.6	7.3	8.2	6.7	5.6	4.5	4.5	6.7	8.4	9.1	9.4

[1] Organizations/programs with a cumulative 17-year investment of \$10M or more are listed by name.

Investment by Cancer Site (\$M)

	2007-2011	2012-2016	2017-2021
Central nervous system neoplasms	20.1	48.6	68.0
Gonadal germ cell tumours cell	1.3	1.1	1.1
Hepatic tumours	0.1	0.0	0.2
Hodgkin lymphomas	0.8	1.0	0.1
Leukemias	25.5	34.9	34.0
Malignant bone tumours	3.8	3.5	3.9
Neuroblastoma	5.2	5.2	4.4
Non-Hodgkin lymphomas	2.4	2.8	1.8
Renal tumours	1.3	0.9	0.2
Retinoblastoma	3.5	2.2	1.6
Soft tissue sarcomas	1.5	2.4	6.4
Thyroid carcinomas	0.1	0.1	0.0
Other cancers	1.2	1.3	2.0

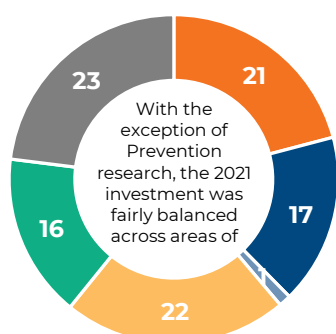
Program Type (%)



- National – targeted program
- Regional – targeted program
- National – other program
- Regional – other program

	2017–21	2012–16	2007–11
National – targeted program	1	12	4
Regional – targeted program	3	4	5
National – other program	81	72	71
Regional – other program	15	12	20

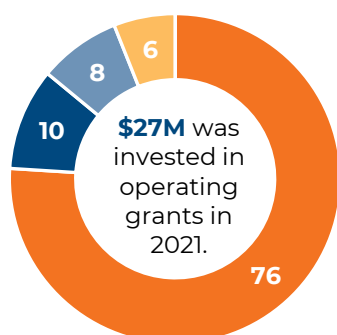
Areas of Science (%)



- Biology
- Etiology
- Prevention
- Early detection, diagnosis & prognosis
- Treatment
- Cancer control, survivorship & outcomes

	2017–21	2012–16	2007–11
Biology	23	29	40
Etiology	20	20	22
Prevention	1	1	0
Early detection, diagnosis & prognosis	19	17	7
Treatment	19	14	13
Cancer control, survivorship & outcomes	18	19	18

Funding Mechanism (%)



- Operating grants
- Equipment/infrastructure grants
- Career awards
- Trainee awards
- Related support grants

	2017–21	2012–16	2007–11
Operating grants	79.5	77.4	69.2
Equipment/infrastructure grants	6.3	8.8	11.0
Career awards	7.3	6.4	10.2
Trainee awards	6.7	7.3	9.3
Related support grants	0.2	0.1	0.3