INCIDENCE AND MORTALITY REPORT

Brain Tumour Registry of Canada (BTRC): Incidence (2013-2017) and Mortality (2014-2018) Report

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Executive Summary

Primary central nervous system (CNS) tumours refer to tumours originating in tissues encased by the skull and spinal column including the brain, cranial nerves, spinal cord, cauda equina, meninges, pineal and pituitary glands, and craniopharyngeal duct. Due to their anatomical location, all primary CNS tumours, malignant and non-malignant, have the potential to inflict debilitating symptoms.

Using data from Statistics Canada's Canadian Cancer Registry and Canadian Vital Statistics Death Database, this report includes comprehensive information needed to support the neuro-oncology community; by capturing the heterogeneous nature of these tumours and addressing the sparsity of adequate surveillance data in Canada to date.

Between 2013 and 2017, the average annual age-standardized incidence rate (ASIR) per 100,000 for all primary CNS tumours in Canada (excluding Quebec) was 21.05 (95%CI: 20.81-21.29). The ASIR for all non-malignant CNS tumours (13.12, 95%CI: 12.93-13.31) was 1.65 times greater than that for all malignant CNS tumours (7.93, 95%CI: 7.78-8.08). Tumours of neuroepithelial tissue were the most common, accounting for 33.6% of all CNS tumours and 83.2% of malignant CNS tumours. Tumours of the meninges were the second most common CNS tumour and most common non-malignant CNS tumour accounting for 25.4% and 39.6% of these tumours, respectively.

Although the ASIR for all CNS tumours combined was similar for males (20.73 per 100,000, 95%CI: 20.38-21.07) and females (21.40, 95%CI: 21.07-21.74), differences existed by histology. Men had higher rates for tumours of neuroepithelial tissue while females had higher rates for tumours of the meninges.

The ASIR for all CNS tumours combined significantly increases with life course stage from 4.99 per 100,000 (95%CI: 4.70-5.29) in children (age 0 to 14 years), to 8.71 (95%CI: 8.44-8.98) in adolescents and young adults (age 15-39 years), to 34.63 (95%CI: 34.20-35.07) in adults (age 40+ years).

Geographic variation in rates was greater for non-malignant CNS tumours than malignant CNS tumours. The ASIR for non-malignant tumours varied from a low of 5.26 per 100,000 (95%CI: 4.46-6.18) for Newfoundland and Labrador to a high of 16.56 per 100,000 (95%CI: 16.27-16.87) for Ontario. The ASIR for malignant tumours ranged from a low of 5.43 per 100,000 (95%CI: 3.52-8.86) for the combined territories to a high of 8.16 per 100,000 (95%CI: 7.95-8.37) for Ontario. Comparisons of rates between Canada and the United States and across

the provinces/territories suggest that registration of non-malignant CNS tumours remains incomplete, to various degrees, across Canada.

An examination of ASIRs for primary CNS tumours between 2010 and 2017 generally indicate downward trends in Canada (excluding Quebec) except for glioblastoma for which the average annual percent increase in the ASIR was 0.7% per year (95%CI: 0.1%-1.3%). Although downward trends are difficult to interpret because of reporting delays experienced by cancer registries, the upward trend in glioblastoma, despite changes in data collection practices and reporting delay, is worthy of continued investigation.

Between 2014 and 2018, an average of 2,599 Canadians died each year from primary CNS tumours. These deaths were predominantly among those with malignant primary CNS tumours. A decline in recent death rates reflects reporting delays.

Assuming sex and age-specific incidence rates for 2013 to 2017 continue into the future and incidence rates in Quebec are similar to the rest of Canada, we expect that 8,741 primary CNS tumours will be diagnosed in Canada in 2021: about 3,322 malignant tumours and 5,419 non-malignant tumours.

Reporting delay, incomplete case capture, and non-specific tumour characteristics contribute to underestimates of the burden of primary CNS tumours in Canada and compromise the accurate interpretation of surveillance statistics, particularly for non-malignant primary CNS tumours. We encourage key stakeholders to use the information in this report to address these issues and elevate the completeness and accuracy of primary CNS tumour data over time.

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Introduction

The main objective of this report is to present estimates of the frequency of primary central nervous system (CNS) tumour diagnoses among Canadians between 2013 and 2017. Estimates are presented by various tumour- and person-based characteristics, and by province/territory. Additionally, this report presents estimates on the frequency of deaths from primary CNS tumours among Canadians between 2014 and 2018, the most recent five-year period available at the time of analysis, and trends in age-standardized rates for diagnoses and deaths using data extending back to 2010, when registration of non-malignant CNS tumours began to improve in Canada. At the time of analysis, Quebec data on tumour diagnoses were not available beyond 2010 so all incidence rate estimates for primary CNS tumour diagnoses completely exclude Quebec. Additionally, mortality estimates in this report include Quebec but exclude the Yukon Territory for 2017 and 2018 because data were not available for 2017 and 2018. Nonetheless, by using all available information on CNS tumour diagnoses and deaths in Canada since 2010, this report provides the most comprehensive information for CNS tumours to date.

Background

Primary CNS tumours account for approximately 2% of tumours diagnosed annually in Canada[1]. Due to significant morbidity and mortality, these tumours cause a strain on the healthcare system that is disproportionate to their annual incidence[2]. Primary CNS tumours are a heterogeneous group of neoplasms[3]. However, routine Canadian cancer surveillance reports are limited to malignant tumours grouped into one category— "brain/CNS"[4, 5]. Given the level of heterogeneity of these tumours, limiting reporting to malignant tumours grouped in a single category is of limited utility in supporting resource allocation and research planning. All primary CNS tumours, regardless of behaviour, have the potential to inflict debilitating symptoms because of their anatomical location[6-9]. Therefore, limiting reporting to malignant CNS tumours does not adequately satisfy the information needs of the neuro-oncology community.

The Brain Tumour Registry of Canada (BTRC) Project was established in 2016 with the aim of improving the infrastructure for identifying and reporting on all primary CNS tumours in Canada and periodically providing high-quality surveillance estimates. Of particular importance is improving the extent to which data on non-malignant CNS tumours is being captured by Canadian cancer registries in response to a private members' motion (M235) passed in 2007 which mandated the collection of these tumours[10]. This work began with a collaboration across four provinces: British Columbia, Alberta, Manitoba and Ontario. These provinces participated in additional case-ascertainment activities, meetings and workshops to identify strategies for improving the routine capture of non-malignant CNS tumours in cancer registries. These four provinces contributed data on all primary CNS tumour diagnoses from 2010-2015, which was compiled in two reports released by the BTRC (https://braintumourregistry.ca/incidence-report/, https://braintumourregistry.ca/survival-report/). Additionally, the more complete data obtained through this project is being submitted to the Canadian Cancer Registry (CCR) annually, and therefore available to the research community

through Statistics Canada, or through each individual province.

Methodological Notes

Data collection

Data on tumour diagnoses are collected by each provincial/territorial cancer registry, for people residing in their jurisdiction at the time of diagnosis, and submitted to Statistics Canada for compilation in the CCR[11]. Collection and use of data in these registries is governed by provincial/territorial health legislation at the provincial/territorial level and the Statistics Act at the national level. Provincial health legislation mandates the collection of data on all new cancer diagnoses through passive surveillance. Passive surveillance systems rely on healthcare providers and laboratories to report new cases to provincial/territorial health agencies for inclusion in disease registries. Therefore, all relevant cases should be picked up by this system through routine diagnosis procedures and medical care.

Data on tumour diagnoses most often reaches cancer registries through pathology reports, or when a patient is treated at an oncology clinic or prescribed chemotherapy[12]. The laboratories, clinics and pharmacies involved are responsible for reporting these events to cancer registries. Highly trained tumour registrars receive these notifications and review the patient's medical records to obtain complete data on their diagnosis, dates of diagnosis and death, if applicable, and demographic characteristics like age, sex, and geographic location[12]. This well-established system for collecting data in cancer registries was designed to pick up malignant tumours and does so very effectively. However, CNS tumours are a unique group of tumours, in that non-malignant types, including benign, are reportable to the cancer registry. Since non-malignant CNS tumours are often diagnosed and managed differently than malignant tumours, the mechanisms through which data on these tumours get to cancer registries also differs[12].

While some non-malignant CNS tumours are picked up by cancer registries through traditional case-ascertainment activities, evidence suggests these processes miss a large proportion of diagnoses[13]. Through collaboration on the BTRC project, cancer registries in British Columbia and Alberta set out to address this gap by adding review of additional patient databases to identify non-malignant cases missed through other routine case-ascertainment activities. Specifically, review of the Discharge Abstract Database was used to identify patients treated in hospitals with non-malignant CNS tumours[2]. Prior to the BTRC project, Ontario and Manitoba had the highest proportion of expected non-malignant tumours registered in their respective cancer registries[13]. While progress on registration of non-malignant CNS tumours in Canada has been made for diagnosis years 2010 onward, more work is needed to ensure complete capture of these tumours in all provinces and territories. Therefore, while the estimates presented in this report reflect the most complete data available for Canadians, the frequency and distribution of non-malignant CNS tumours should be interpreted with caution. For more information on proposed strategies to improve routine capture of these tumours in cancer registries, please see Yuan et al. [12].

Data on deaths from primary CNS tumours were obtained using Statistics Canada's Vital Statistics Death Database, an administrative survey collecting demographic and cause of death information on all deaths in Canada from all provincial and territorial vital statistics registries[14]. For the time period of interest (2014-2018), all deaths were classified according to the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10)[15].

Disease Surveillance Measures

The main measures presented in this report are incidence rates and mortality rates. Incidence rates provide a measure of the frequency at which new cases occur in a population during a defined time period[16], whereas, mortality rates provide a measure of the frequency at which deaths occur as a result of the disease of interest in a population during a defined time period[16]. Rates are expressed as the number of cases per 100,000 persons. Age-specific rates are measures of the frequency of new cases or deaths in a population within a specific time period and a specific age category. Age-standardized rates are rates that have been adjusted for the effects of age on the risk of either being diagnosed or dying of a specific disease through the use of a reference population. Age-standardized rates can be compared across different geographic regions and over time because they account for differences in the age-structure of the populations being compared.

Tumour Classification Methods

Tumours can be classified according to their site (topography), histology, behaviour, molecular features, or some combination of these characteristics. At present, data on the molecular features of these tumours are not routinely available through the CCR. Therefore, disease groups presented in this report reflect a combination of topography, histology, and behaviour. The classification system used by cancer registries in Canada is the International Classification of Diseases for Oncology, 3rd edition, or ICD-O-3[17]. This multiaxial classification system assigns alphanumeric codes for the anatomical site of the tumour (topography) and numeric codes for the histology and behaviour.

Primary CNS tumours were defined as those occurring at the following ICD-O-3 sites: C70.0-C70.9, C71.0-71.9, C72.0-C72.9, C75.1-C75.3, and C30.0 (limited to histology codes 9522-9523). Histology codes were grouped into categories based on classifications used by the Central Brain Tumour Registry of the U.S. (CBTRUS), (Appendix)[18]. Primary CNS tumours not classifiable according to the scheme developed by CBTRUS were grouped into a new category, "not classified by CBTRUS" (Appendix). Primary CNS tumours are categorized as having one of three behaviours: benign, uncertain whether benign or malignant, or malignant. We dichotomized tumours based on behaviour as either non-malignant or malignant with uncertain behaviours being categorized as per CBTRUS.

Data Analysis Methods

Estimates produced for this report include counts, averages, medians, proportions and age-standardized rates. To allow valid comparisons of rates over time, across Canadian jurisdictions, with the U.S., and with previously published reports, all rates were age-standardized. Population estimates for all rate calculations were obtained from Statistics Canada[19]. Data analysis was conducted using SAS (version 9.4).

Figures were generated using STATA (version 16), Excel and R (version 4.0.3).

***Multiple Primaries*.** Individuals may be diagnosed with more than one primary CNS tumour. That is, multiple tumours originating in the brain or another part of the CNS independently and not metastasizing from another tumour. All primary CNS tumours, defined according to the National Cancer Institute Surveillance, Epidemiology, and End Results Program multiple primary rules[20, 21], were included in incidence estimates. Conversely, mortality estimates were based on the underlying cause of death, defined as "the disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury[14].

***Age-Standardized Rates*.** Age-standardized incidence rates (ASIR), age-standardized mortality rates (ASMR), and corresponding 95% confidence intervals (CI) presented in this report were calculated using direct standardization. The 2011 Canadian standard population was used as the reference, unless otherwise specified. ASIRs and ASMRs were also estimated using the 2000 U.S. standard population to enable comparison with estimates presented by the CBTRUS, which also uses this standard. Incidence estimates in this report exclude Quebec for which data is unavailable after 2010. Mortality estimates presented in this report exclude Yukon Territory for 2017 and 2018 because data were not available at the time of analysis. Further, due to reporting delays, 2016 to 2018 mortality data should be considered preliminary.

Trend Analysis. To objectively quantify trends in age-standardized rates, piecewise exponential functions were fit using a statistical algorithm that identifies the optimal number and location of points where the trend changes (i.e. joinpoints)[22]. Annual percent change (APC) in rates for each segment of the joinpoint model is obtained from the estimated slopes. Average annual percent change (AAPC), a summary of the trend over the complete period of interest, is calculated as the weighted average of estimated APCs with weights equal to the proportion of time accounted for by each APC. Joinpoint analyses were performed using Joinpoint Regression Program software (version 4.7.0.0) with default settings[23]. When communicating trend results, we use the terms "increase" or "decrease" when APCs/AAPCs significantly differ from zero ($p<0.05$) and "stable" when APCs/AAPCs do not significantly differ from zero ($p\geq0.05$).

***Projected New Cases*.** Projected new cases for all of Canada for 2020 and 2021 were calculated using sex- and age-specific incidence rates generated for this report for 2013 to 2017 and population projections based on the M1 projection scenario[24]. These projections assume sex- and age-specific incidence rates of primary CNS tumours in Quebec are similar to the rest of Canada and observed CNS tumour incidence rates continue into the future.

***Disclosure Rules and Rounding*.** Several measures were taken to protect the confidentiality of individuals underlying the data. First, all presented total case or person counts are randomly rounded using an unbiased random rounding scheme with a base of five. Second, estimates of average case counts per year for the five-year periods are rounded to the nearest whole number. Last, all estimates based on fewer than five observed cases are suppressed.

Results

Incidence

The majority of the primary CNS tumour incidence estimates are based on approximately 29,705 CNS tumours diagnosed in 28,490 Canadians (excluding Quebec) between 2013 and 2017. Incidence data is presented in Tables 1-19. The ASIR for all primary CNS tumours was 21.05 per 100,000 (95%CI: 20.81-21.29). The ASIR for malignant CNS tumours was 7.93 per 100,000 (95%CI: 7.78-8.08) while the ASIR for non-malignant CNS tumours was 13.12 per 100,000 (95%CI: 12.93-13.31). Tumours of the neuroepithelial tissue were most common overall and among malignant CNS tumours (Figure 1, Figure 2, Table 4). Of neuroepithelial tumours, glioblastoma was the most common histology (ASIR: 4.05 per 100,000 (95%CI: 3.95-4.16); 19.5% of all CNS tumours and 51.6% of all malignant CNS tumours(Table 4). Tumours of the meninges were second most common overall and most common among non-malignant tumours (Figure 1, Figure 2, Table 4). Of tumours of the meninges, meningioma was the most common histology (ASIR: 4.99 per 100,000 (95%CI: 4.88-5.11); 23.8% of all CNS tumours and 37.5% of all non-malignant CNS tumours.

Figure 1: Distribution of major histology groups for all primary central nervous system tumours by behaviour, Canada (excluding Quebec), 2013-2017

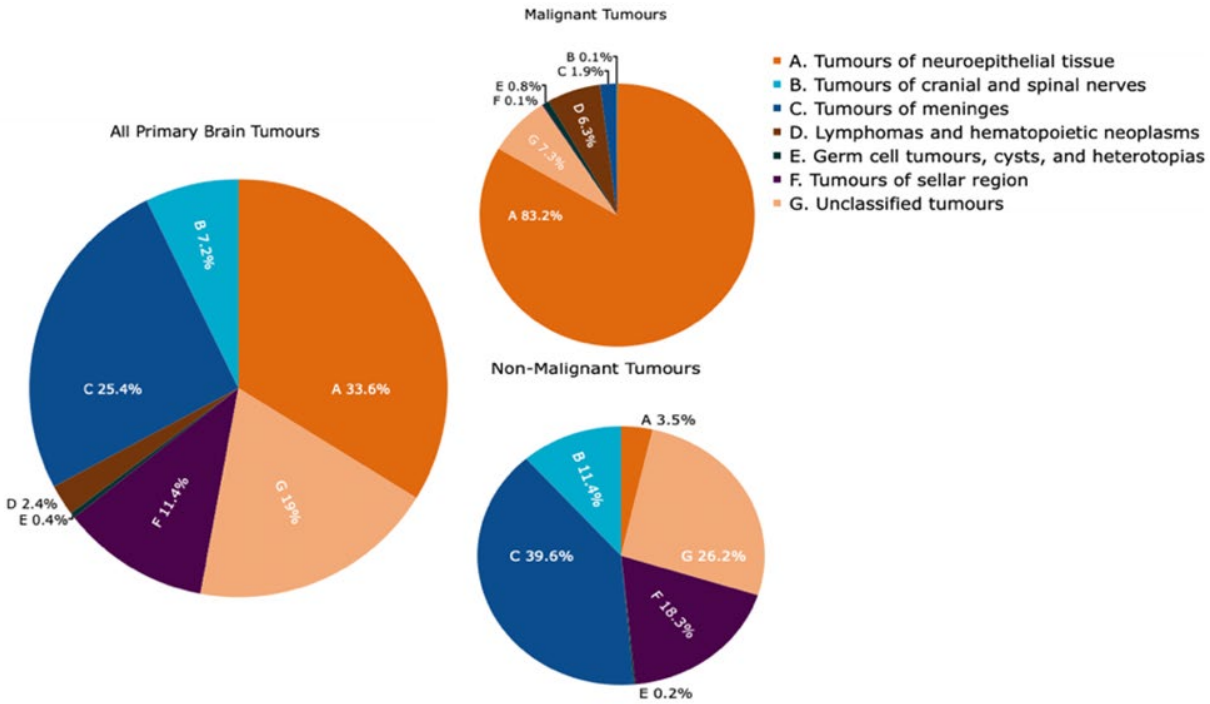
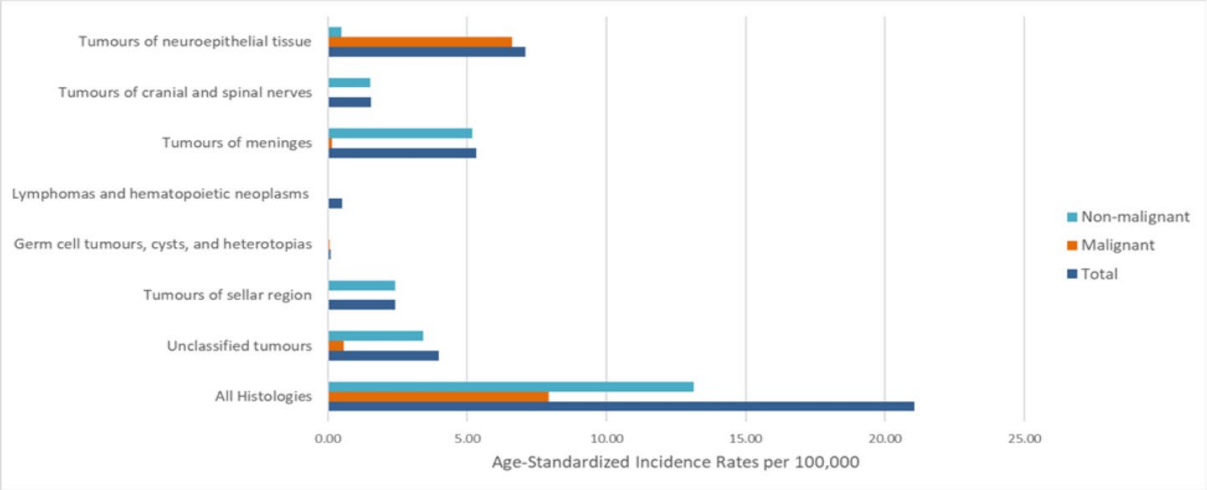


Figure 2: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by behaviour and major histology group, Canada (excluding Quebec), 2013-2017



Notes: *Estimates for non-malignant lymphomas and hematopoietic neoplasms were suppressed to maintain the confidentiality of the data.*

Age and Sex. Incidence of primary CNS tumours stratified by age are shown in Tables 5--9, and by sex in Tables1-3 and 8. The overall ASIR (per 100,000) for all primary CNS tumours was similar in males (20.73, 95% CI: 20.38-21.07) and females (21.40, 95% CI: 21.07-21.74), however differences existed by histology (Table 3, Figure 3). Neuroepithelial tumours were most common among males; tumours of the meninges were most common among females. Incidence rates increase with age for most major histological subtypes, with the steepest increases for tumours of the neuroepithelial tissue and meninges, and unclassified tumours (Figures 4 and 5, Tables 5 and 6).

Figure 3: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by sex and major histology group, Canada (excluding Quebec), 2013-2017

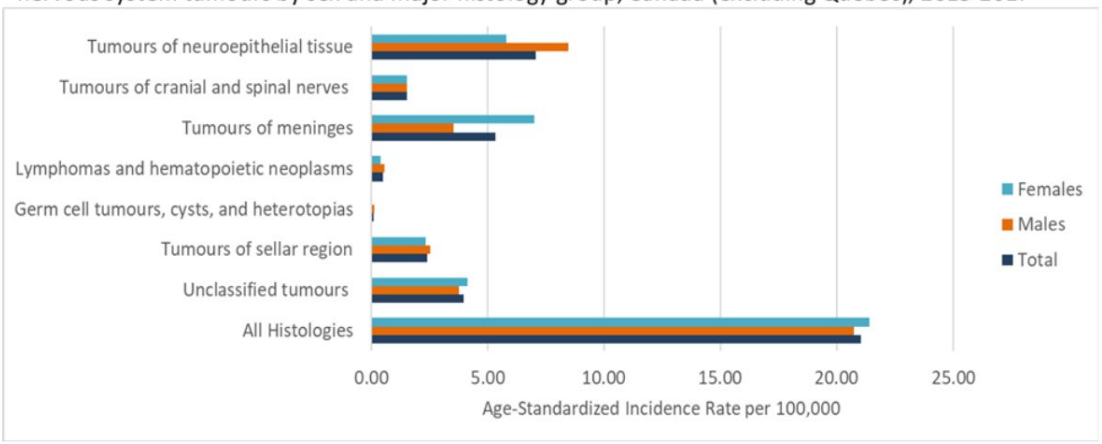
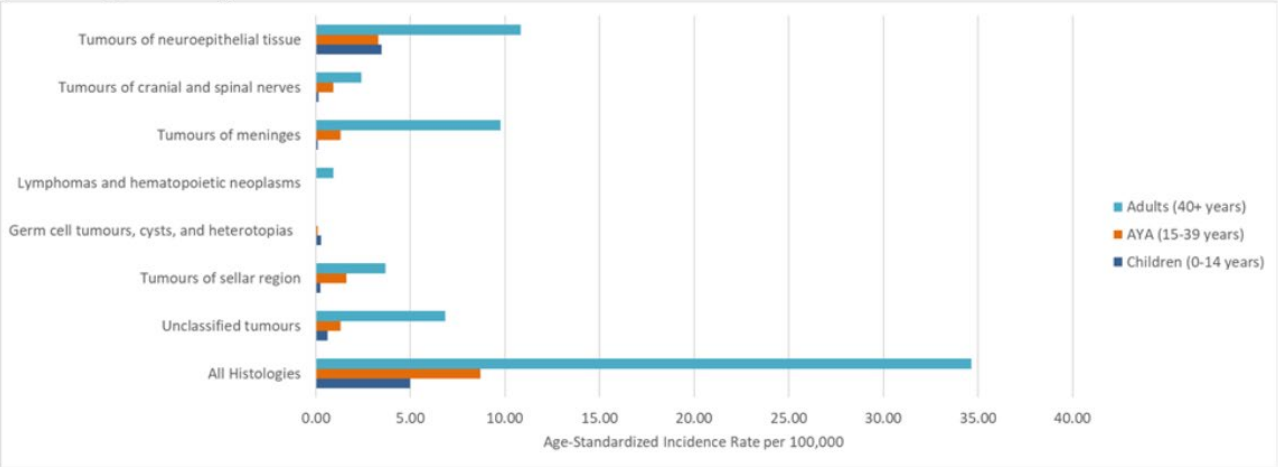
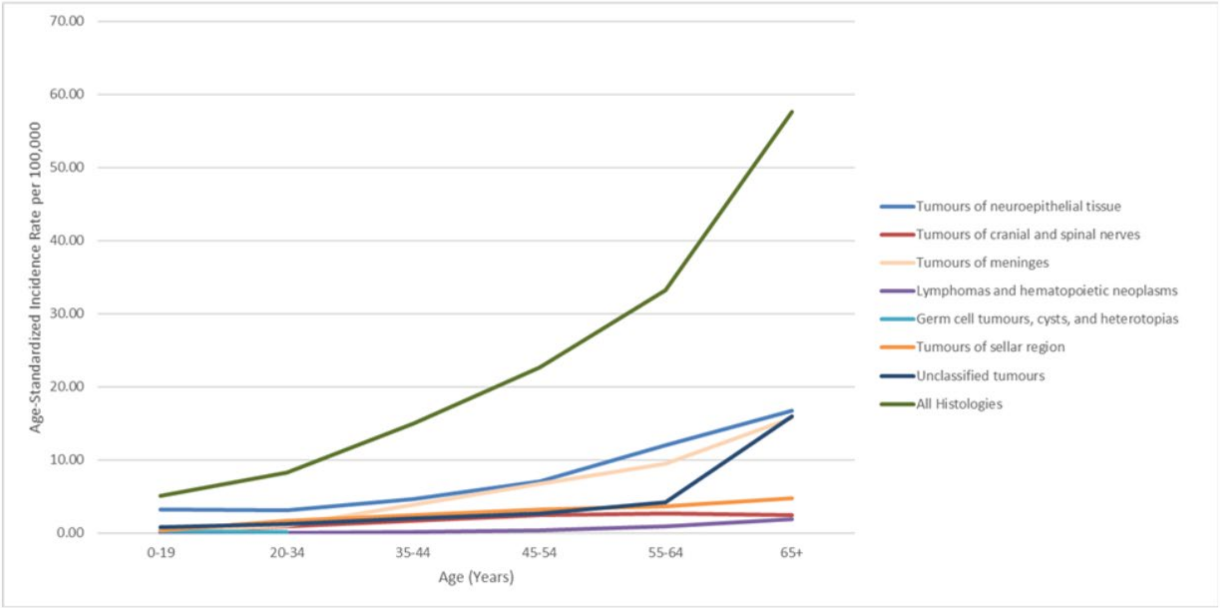


Figure 4: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by life course stage at diagnosis and major histology group, Canada (excluding Quebec), 2013-2017



Notes: *Estimates for lymphomas and hematopoietic neoplasms among children were suppressed to maintain the confidentiality of the data.*

Figure 5: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by age category at diagnosis and major histology group, Canada (excluding Quebec), 2013-2017

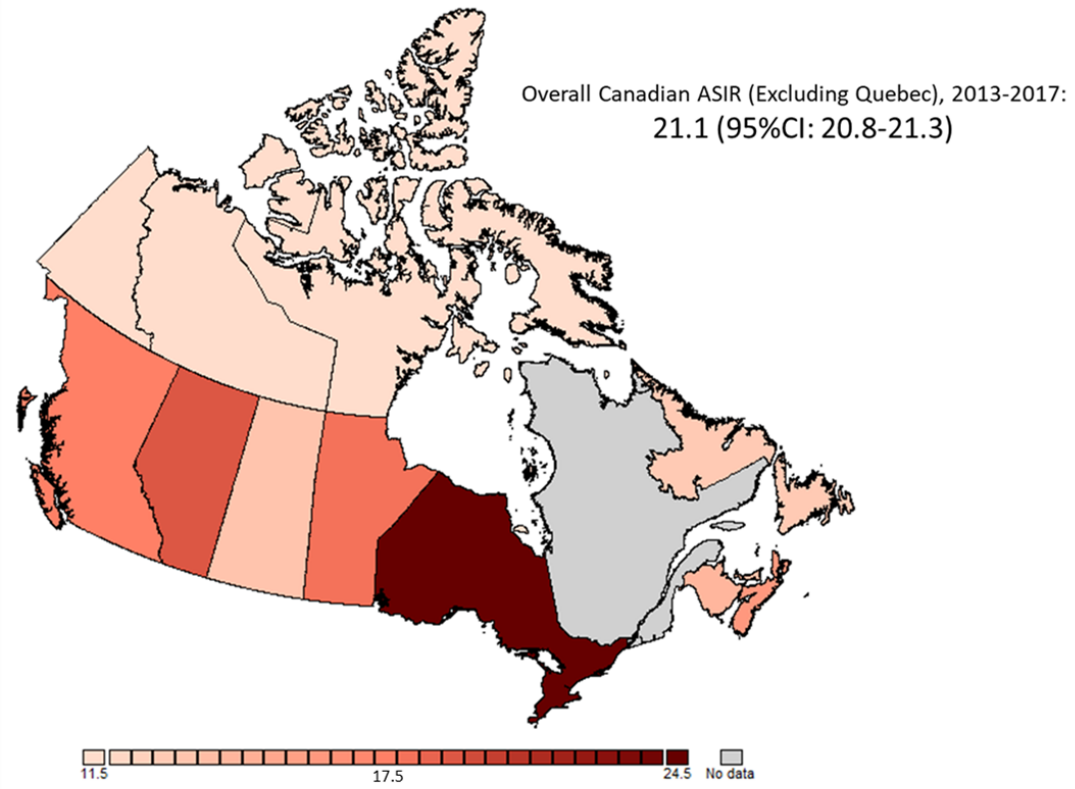


Notes: *Estimates for germ cell tumours, cysts, and heterotopias among those aged 65 years and older were suppressed to maintain the confidentiality of the data.*

Geographic distribution. Data on the geographic distribution of primary CNS tumours is shown in Tables 10-15. Ontario had the highest ASIR for all primary CNS tumours (24.72 per 100,000, 95%CI: 24.36-25.09) (Table 10, Figure 6). The lowest ASIR for all primary CNS tumours was in the territories (11.33 per 100,000, 95% CI: 8.30-15.78) (Figure 6).

The ASIR for malignant tumours ranged from a low of 5.43 per 100,000 (95% CI: 3.52-8.86) for the territories to a high of 8.16 per 100,000 (95% CI: 7.95-8.37) for Ontario (Table 12, Figure 7). The ASIR for non-malignant tumours ranged from a low of 5.26 per 100,000 (95% CI: 4.46-6.18) for Newfoundland and Labrador to a high of 16.56 per 100,000 (95% CI: 16.27-16.87) for Ontario (Table 14, Figure 8).

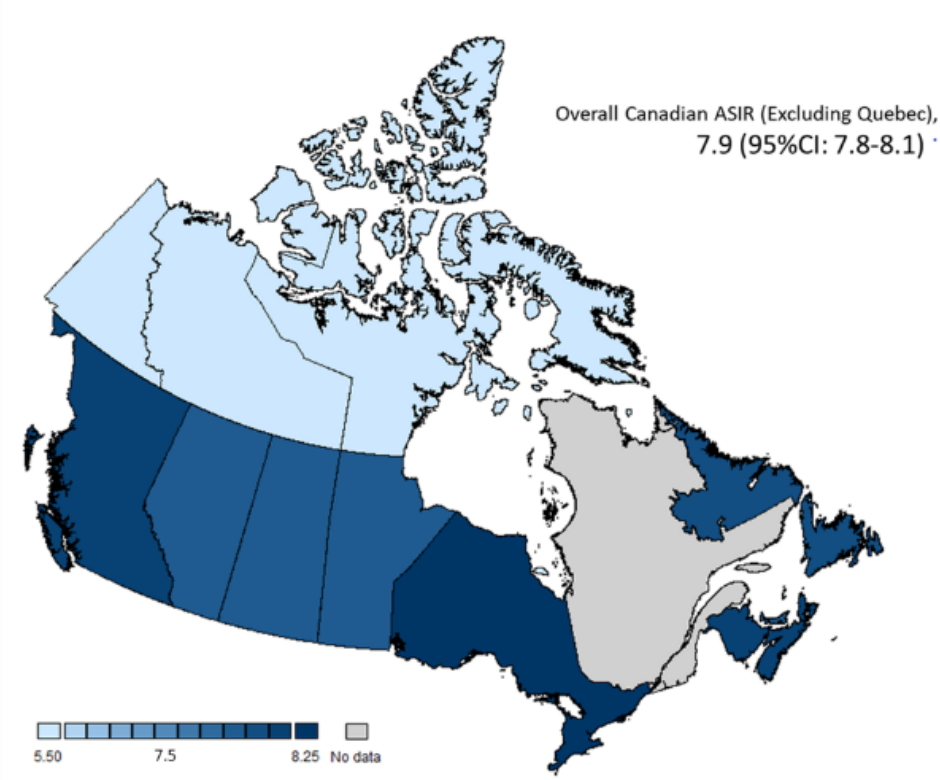
Figure 6: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by province/territory (excluding Quebec), 2013-2017



Notes:

- Figure uses data from Table 10, ASIR rounded to the nearest 0.5
- Due to small case counts, the rate for the territories (ASIR: 11.33 per 100,000, 95% CI: 8.30-15.78) is based on data from all three territories combined.

Figure 7: Average annual age-standardized incidence rates (per 100,000) for malignant primary central nervous system tumours by province/territory (excluding Quebec), 2013-2017

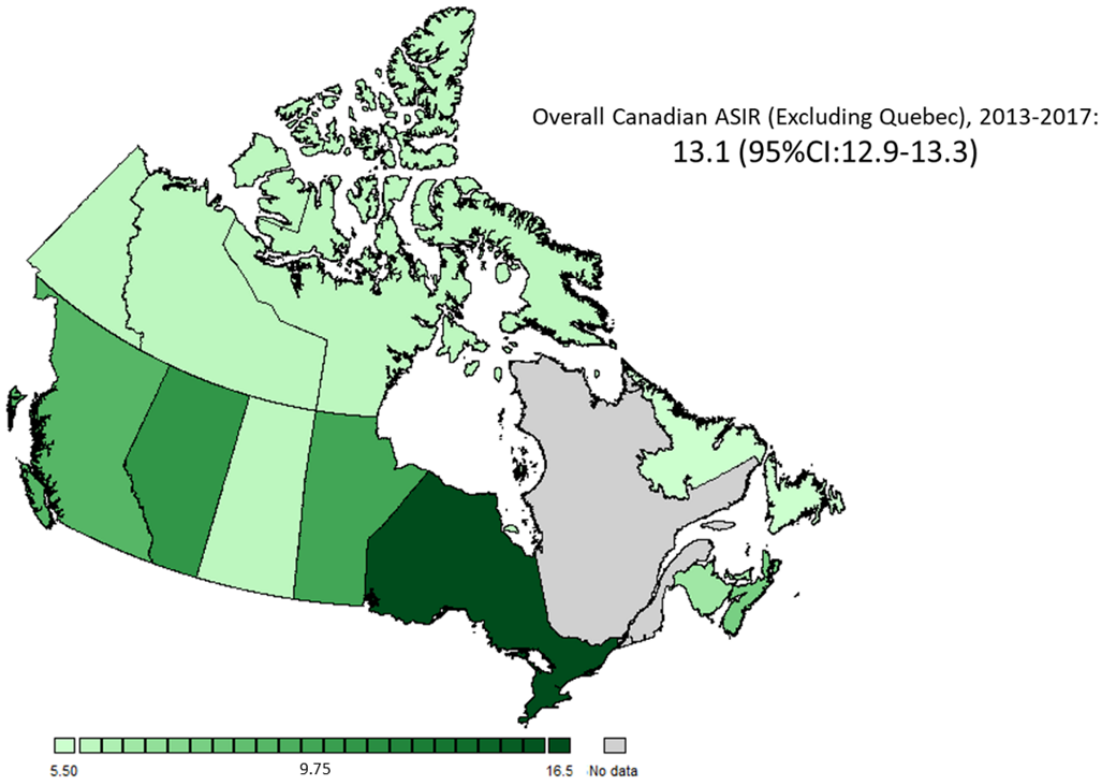


Notes:

- Figure uses data from Table 12, ASIR rounded to the nearest 0.25
- Due to small case counts, the rate for the territories (ASIR: 5.43 per 100,000, 95%CI: 3.52-8.86) is based on data from all three territories combined.

Trend Analysis. Results of the incidence trend analysis are shown in Figure 9 and Tables 16 to 18. There was evidence of a downward trend in the ASIR for all primary CNS tumours in Canada (excluding Quebec) between 2010-2017 (AAPC= -1.4%, 95% CI: -1.8% to -1.1%). Downward trends were also noted for all malignant (AAPC= -1.2%, 95% CI: -2.2% to -0.1%) and non-malignant CNS tumours (AAPC= -1.6%, 95% CI: -2.2% to -0.9%). The direction and magnitude of change, however, varied by histology. A slight upward trend was noted for glioblastoma (AAPC= 0.7%, 95% CI: 0.1% to 1.3%), while downward trends were noted for meningioma (AAPC= -2.3%, 95% CI: -3.4% to -1.3%) and tumours of the sellar region (AAPC= -3.0%, 95% CI: -4.5% to -1.5%). There was a dramatic decrease in oligoastrocytic tumours, particularly after 2014 (AAPC= -30.9%, 95% CI: -42.5% to -17.1%). These downward trends should be interpreted cautiously as it is unclear whether these trends reflect actual changes in incidence in the population or reporting delays to provincial/territorial cancer registries.

Figure 8: Average annual age-standardized incidence rates (per 100,000) for non-malignant primary central nervous system tumours by province/territory (excluding Quebec), 2013-2017

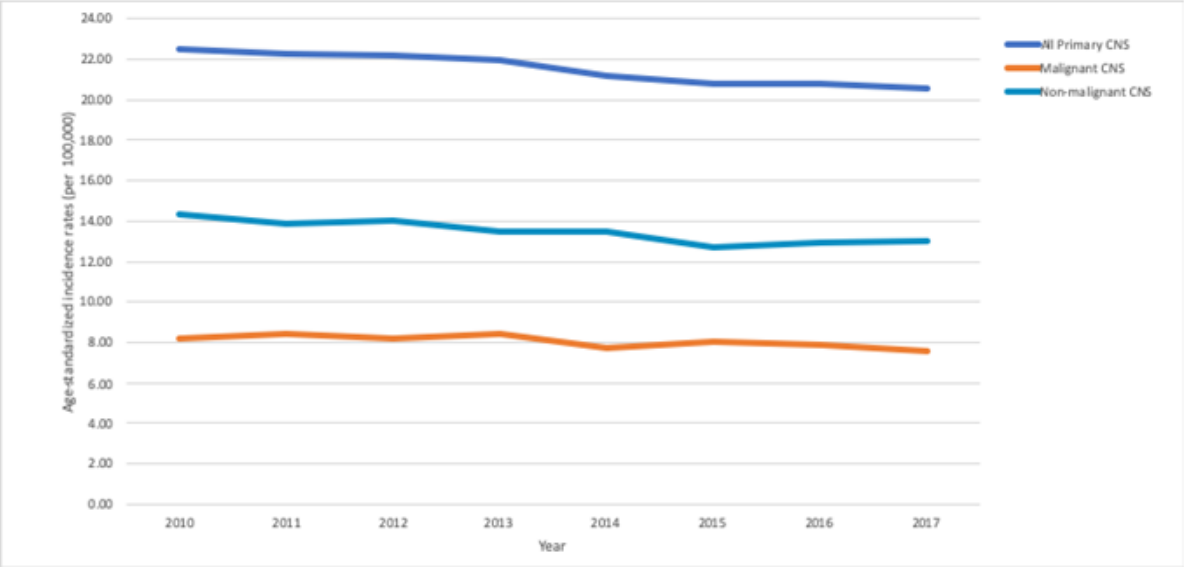


Notes:

- Figure uses data from Table 14, ASIR rounded to the nearest 0.25
- Due to small case counts, the rate for the territories (ASIR: 5.90 per 100,000, 95%CI: 3.68-9.67) is based on data from all three territories combined.

Projected Case Numbers. Projected case numbers are shown in Tables 20-22. Assuming sex and age-specific incidence rates for 2013 to 2017 continue into the future and incidence rates in Quebec are similar to the rest of Canada, we expect that 8,741 primary central nervous system tumours will be diagnosed in Canada in 2021: about 3,322 malignant tumours and 5,419 non-malignant tumours. Our projected number of total primary malignant CNS tumours diagnosed in 2020 (~3,260) is consistent with that recently released by the Canadian Cancer Statistics Advisory Committee (~3,000) considering differences in the manner primary CNS tumours were defined and the multiple primary rules used[5]. Specifically, the CBTRUS definition employed in this report additionally includes tumours of the pituitary gland, craniopharyngeal duct, pineal gland, selected tumours of the nasal cavity, and lymphomas and hematopoietic neoplasms; and we used the more liberal multiple primary rules of the Surveillance, Epidemiology, and End Results Program [20, 21, 25].

Figure 9: Trends in age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by behaviour, Canada (excluding Quebec), 2010-2017

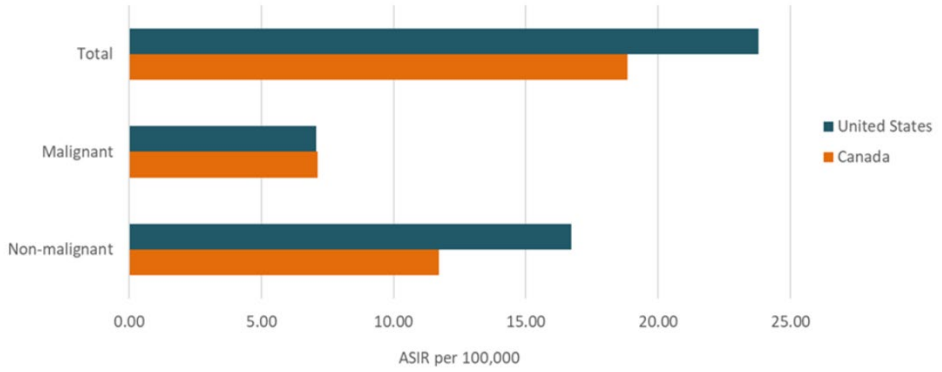


Comparison with the United States. Incidence rates standardized to the 2000 U.S. standard population are shown in Table 19. The ASIR for all primary CNS tumours was higher in the United States compared to Canada (U.S: 23.79 per 100,000 (95% CI: 23.71-23.86) ; Canada: 18.84 per 100,000 (95% CI: 18.62-19.06))[18].

By histology, the largest absolute difference between Canada and the United States was for tumours of the meninges (U.S: 9.09 per 100,000 (95% CI: 9.04-9.13); Canada: 4.63 per 100,000 (95% CI: 4.52-4.74))[18]. Conversely, the rate of unclassified tumours was higher in Canada than in the United States (U.S.: 1.16 per 100,000 (95% CI: 1.14-1.17); Canada: 3.55 per 100,000 (95% CI: 3.45-3.64))[18]. The difference between Canada and the U.S appears to be largely driven by Ontario's high rate of unclassified non-malignant CNS tumours (Table 14).

By behaviour, rates were similar for all primary malignant CNS tumours but the Canadian rate for all primary non-malignant CNS tumours is about 70% of the U.S. rate (Figure 10)[18] .

Figure 10: Age-Standardized Incidence Rates (per 100,000) for all primary central nervous system tumours in Canada and the United States by behaviour, 2013-2017



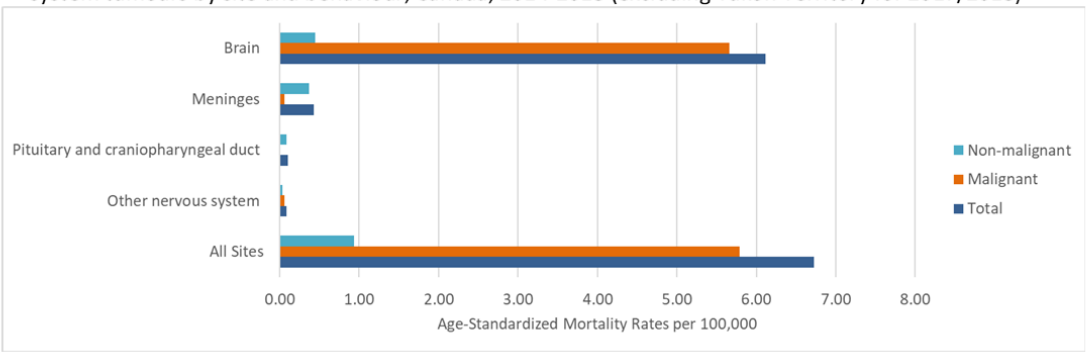
Notes:

- Incidence rates standardized using the US 2000 standard population
- ASIR=Age-Standardized Incidence Rate
- U.S rates obtained from CBTRUS [18]

Mortality

Between 2014 and 2018, an average of 2,599 Canadians died each year from primary CNS tumours, the majority being malignant. Data on ASMRs are shown in Tables 23 to 25. The ASMR for malignant CNS tumours was more than six times that of non-malignant CNS tumours (malignant ASMR: 5.79 per 100,000 (95% CI: 5.69-5.90); non-malignant ASMR: 0.94 per 100,000 (95% CI: 0.89-0.98). However, the magnitude of the difference varied by tumour site (Figure 11, Table 23). The largest absolute difference between malignant and non-malignant tumours was among those originating

Figure 11: Average annual age-standardized mortality rates (per 100,000) for all primary central nervous system tumours by site and behaviour, Canada, 2014-2018 (excluding Yukon Territory for 2017/2018)



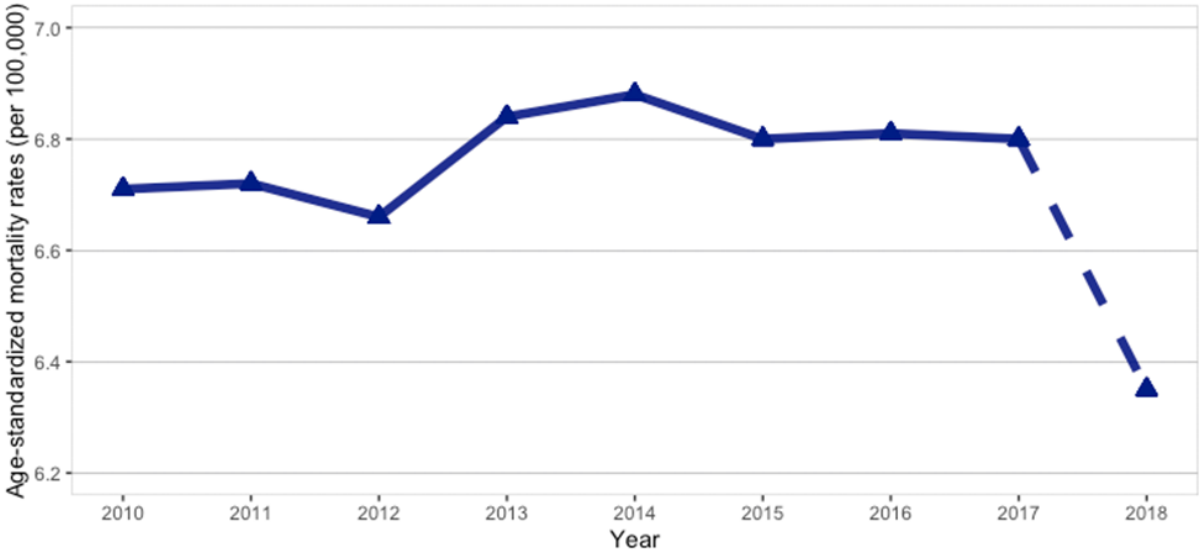
Notes:

- Site definitions are based on the International Statistical Classification of Diseases and Related Health Problems, 10th revision.
  Brain (C71, D33.0, D33.1, D33.2, D43.0, D43.1, D43.2); Meninges (C70, D32, D42);
  Pituitary and craniopharyngeal duct (C75.1, C75.2, D35.2, D35.3, D44.3, D44.4);
  Other nervous system (C72, C75.3, D33.3, D33.4, D33.7, D33.9, D35.4, D43.3, D43.4, D43.7, D43.9, D44.5)
- Yukon death data were not available for 2017 and 2018.

in the brain (malignant ASMR: 5.66 per 100,000 (95% CI: 5.55-5.77); non-malignant ASMR: 0.45 per 100,000 (95% CI: 0.42-0.48)). The smallest absolute difference was among tumours originating in the other nervous system (malignant ASMR: 0.06 per 100,000 (95% CI: 0.05-0.07); non-malignant ASMR: 0.03 per 100,000 (95% CI:0.02-0.04)).

Comparison with the United States. The ASMR for all primary malignant CNS tumours among Canadians between 2014 and 2018, adjusted to the 2000 U.S standard population, was higher than that of the United States between 2013 and 2017 (Canada: 4.99 per 100,000 (95% CI: 4.90-5.09); U.S: 4.42 per 100,000 (95% CI: 4.39-4.45))[18] (Table 24).

Figure 12: Trends in age-standardized mortality rates (per 100,000) for all primary central nervous system tumours, Canada, 2010-2018 (excluding Yukon Territory for 2017/2018)



Notes:

- Data for 2018 is incomplete due to reporting delays, the preliminary nature of these data is demarcated by a dashed line between 2017 and 2018.
- Yukon death data were not available for 2017 and 2018.

Trend Analysis. Results of the mortality trend analysis are shown in Figure 12 and Table 25. For all primary CNS tumours, there was no statistically significant trend detected between 2010 and 2018. The only site-specific mortality rates demonstrating a statistically significant trend was brain, but this was primarily driven by a drop in rates between 2017 and 2018, which was likely the consequence of reporting delay.

Discussion

This report represents the most up-to-date, comprehensive, population-based data on all primary CNS tumour diagnoses and deaths among Canadians.

Comparison with the Previous BTRC Report. The previous report by the BTRC included data from 2010 to 2015 from four provinces (British Columbia, Alberta, Manitoba, and Ontario)[26]. Overall, findings from this report are consistent

with the previous estimates. The ASIR for all primary CNS tumours in Canada (excluding Quebec) from 2013-2017 was slightly lower than the estimate from the report based on four provinces (current estimate: 21.05 per 100,000 (95% CI: 20.81-21.29); estimate from the previous report: 23.49 per 100,000 (95% CI: 22.86-24.11)). Similarly, the estimated ASIR for malignant and non-malignant CNS tumours were lower in the current report relative to the previous report. For malignant tumours, the ASIR in the current report was 7.93 per 100,000 (95% CI: 7.78-8.08), and in the previous report the ASIR was 8.43 per 100,000 (95% CI: 8.05-8.80). For non-malignant tumours, the ASIR in the current report was 13.12 per 100,000 (95% CI: 12.93-13.31) and the ASIR in the previous report was 15.06 per 100,000 (95% CI: 14.56-15.56).

Differences in the non-malignant rate are expected, given the previous report included only those provinces that elected to engage in research aiming to improve the extent to which non-malignant CNS tumours are captured in their respective registries. This interpretation is further supported by the province-specific rates shown in Table 14, with higher non-malignant rates in the four provinces included in the previous reports, relative to the remaining geographic regions. These differences translated into higher rates for all primary CNS tumours in these provinces (Table 10) which is consistent with the higher overall rate in the previous report, relative to the current report. Additional factors contributing to these differences may include: reporting delay; possible downward trend in the incidence rate of primary central nervous system tumours; additional processing performed by Statistics Canada to ensure the quality of data in the CCR, such as removing duplicates; and missing cases in the CCR that are registered solely by death certificate. Missing cases registered by death certificate only are relevant for Ontario (diagnosis year 2017) and Manitoba (diagnosis years 2013 to 2017).

In both analyses, meningioma comprised approximately 24% of all primary CNS tumours. Glioblastoma made up a slightly higher proportion of tumours in the current report (19.5%, relative to 17.5%). In both reports, the most common histology by age-group was consistent; the rate of primary CNS tumours overall was slightly higher in females than males; histology-specific rates were generally higher in males than females except meningioma; and, the rate of unclassified tumours was higher in females than males.

***Geographic Distribution*.** Ontario had the highest ASIR for non-malignant CNS tumours. Given that malignant primary CNS tumour rates are relatively consistent across provinces/territories (Figure 7, Table 12) while rates of non-malignant primary CNS tumours vary by a factor of three (Figure 8, Table 14) suggests that primary non-malignant CNS tumour registration completeness varies across Canada. These findings are consistent with previous Canadian research that demonstrated observed provincial rates of non-malignant primary CNS tumours that varied from 22.5% to 85.3% of expected rates based on U.S. data[13], with Ontario having the closest to expected rates.

Work aiming to improve the extent to which non-malignant primary CNS tumours are captured in cancer registries in Alberta and British Columbia was completed as part of data quality improvement efforts led by the BTRC. Through these collaborations, the proportion of expected non-malignant tumours included in the Alberta and British Columbia cancer registries

increased by 26% and 32%, respectively. However, there are still an estimated 26-31% of cases that are missing from these registries[27, 28]. This work is ongoing, with diverse strategies being pursued in different geographic regions.

The territories had the lowest rate for all CNS tumours and malignant CNS tumours, and the second lowest rate for non-malignant CNS tumours. However, it should be noted that there is substantial uncertainty around these rates due to the small population of the territories. This uncertainty is reflected in confidence intervals that are wider than those for the provinces. Additionally, comparisons of ASIRs between the territories and provinces may be influenced by residual confounding caused by sparse data across age strata. Therefore, territorial rates and comparisons with provincial rates should be interpreted with caution. Additional analyses that compare the diagnosed cases in the territories with expected cases based on Canadian rates used in this report indicate that the territories are registering about 57.8% (95% CI: 43.6%-75.0%) of expected CNS tumours, 79.6% (95% CI: 53.7%-113.7%) of expected malignant CNS tumours, and 43.9% (95% CI: 28.7%-64.3%) of expected non-malignant CNS tumours. These analyses suggest that the rate of non-malignant CNS tumours are lower in the territories and/or case registration is incomplete.

Incidence Trends. Evidence from this analysis should be interpreted with caution, given the potential for incomplete data in more recent diagnosis years. Provincial/Territorial cancer registries are dynamic databases, with ongoing updates to data from previous diagnosis years. The length of time it takes for a given diagnosis year to be considered complete also varies by Province/Territory.

Differences in some histology-specific trends are likely due to changes in histological classifications during this period. Specifically, the dramatic drop in oligoastrocytoma diagnoses is expected, as it reflects the decision to eliminate this histological category in 2016 [15]. Additionally, integrating molecular markers with pathology results and changes to classification of high-grade astrocytoma may explain the slight increase in the incidence of glioblastoma over this period. Comparing glioblastoma rates in 3 countries (1990-2015) we previously concluded that divergent rates are likely due to variation in data collection practices in surveillance systems[29]. Data from Finland (2007-2016) indicates that trade-offs between specific and nonspecific categories of malignant brain tumours continue. As such, specific tumour rates increase as nonspecific tumour rates decrease over time[30].

Information on patterns over time involving non-malignant CNS tumours is limited as they have been included more recently in surveillance systems in North America. Meningioma incidence rates show an increasing pattern in the US from 2004-2009 which levelled off in 2009-2015 and varied by tumour grade[31]. WHO II grade increased from 2011-2015 and WHO grade III decreased from 2004-2015. The authors attributed these opposing changes to improved diagnostic practices, tumour classification and population risk factors[31]. Several lines of evidence suggest that, with the possible exception of Ontario, non-malignant tumours continue to be underreported in Canada[13]. This may contribute to the unexpected overall decrease in rates for meningioma and sellar region tumours reported here and warrants further investigation.

Projected Case Numbers. Since projections assume rates of diagnoses presented in this report continue into the future, the case counts actually diagnosed in 2020 and 2021 may differ. The impact on numbers due to the coronavirus disease pandemic (COVID-19) remains uncertain.

Comparison with the United States. As noted previously, the rate of non-malignant diagnoses in Canada was lower than that of the United States. Given similarities in the rates of malignant tumours, this difference most likely reflects incomplete capture of non-malignant tumours in Canada over the duration of the report period. The lower-than-expected rate of non-malignant tumours also explains the lower overall rate of primary CNS tumours in Canada relative to the United States.

By histology, the largest difference between Canada and the United States was among tumours of the meninges. This further supports the interpretation of differences being largely driven by under-reporting of non-malignant tumours in Canada, as these tumours are predominantly non-malignant (97%, using Canadian data from 2013-2017, excluding Quebec). The second largest difference was for unclassified tumours, with a higher rate of these tumours in Canada. This comparison flags an additional issue in the Canadian data that should be addressed going forward.

Comparison of ASMRs between Canada and the United States indicated a higher rate of death from primary malignant CNS tumours in Canada.

Unclassified Tumours. Within Canada, the highest ASIR for all primary unclassified tumours was in Ontario (7.20 per 100,000 (95% CI: 7.01-7.40). The rate of these tumours ranged from 0.35 per 100,000 (95% CI: 0.22-0.54) to 1.06 per 100,000 (95% CI: 0.71-1.54) in the remaining provinces (Table 10). When stratified by behaviour, it is clear that the overall rate of unclassified tumours in Ontario is largely driven by non-malignant types (ASIR=6.43 per 100,000 (95% CI: 6.24-6.61)) with the next highest rate in Newfoundland and Labrador (ASIR=0.70 per 100,000 (95% CI: 0.41-1.12)) (Table 14). Conversely, the ASIR of malignant unclassified tumours is consistent across provinces (Table 12).

This indicates that while Ontario appears to capture the greatest proportion of expected non-malignant tumours, relative to other provinces, a large proportion of those tumours are not classified by histology. Therefore, in addition to improving the overall capture of non-malignant tumours in provincial/territorial cancer registries, additional work is needed to ensure consistent and complete classification of these tumours across Canada.

Mortality Trends. Evidence from this analysis should be interpreted with caution, as mortality data from 2018 is likely incomplete at this time.

Strengths and Limitations

This report represents the most recent, comprehensive surveillance for all primary CNS tumours in Canada. Its broad scope will be of value for informing future research, policy, and cancer registry practices (e.g. data collection strategies). Notwithstanding these strengths, several limitations associated with the analysis of administrative data and case ascertainment of primary non-malignant CNS tumours should be acknowledged. Both cancer registry data and vital statistics death data are impacted by reporting delay. Delays in the reporting of new cases to the CCR results in undercounts of cases which are more pronounced in the most recently

reported diagnosis year — estimated at 2% to 3% for all cancers combined at the national level. In addition, registry cases solely identified through death certificates have not been submitted to the CCR by Ontario for 2017 (about 1,420 cases reported in 2016 for all cancers combined) or by Manitoba since 2013 (about 45 cases reported in 2012 for all cancers combined)[11]. Specific estimates of reporting delay for primary CNS tumours are not available, but it is not unreasonable to consider that reporting delay may impact non-malignant CNS tumours to a greater degree than malignant CNS tumours. Estimates of the impact of reporting delay on death data are not available but Statistics Canada advises that the 2017 and 2018 death data used in this report should be considered preliminary. Further, based on comparisons between Canada and the U.S. and between the provinces, it is apparent that registration of non-malignant CNS tumours is complete to various degrees across the country and that for Ontario, lack of detailed information on tumour characteristics is resulting in a large proportion of non-malignant CNS tumours being categorized as “unclassified tumours”.

Conclusions

This report contains the most comprehensive data on primary CNS tumour diagnoses and deaths among Canadians. The detailed data provided on the frequency and distribution of CNS tumours among Canadians will support the work of the neuro-oncology community and provide a baseline for ongoing surveillance.

Reporting delay, incomplete case capture, and non-specific tumour characteristics contribute to underestimates of the burden of primary CNS tumours in Canada and compromise the accurate interpretation of surveillance statistics, particularly for non-malignant primary CNS tumours. It is our hope that by making these estimates available that provincial stakeholders and the Canadian Council of Cancer Registries will collaborate to address these issues and elevate the accuracy of these data over time.

The BTRC is committed to ongoing data improvement initiatives throughout the country. We continue to pursue approaches for increasing the extent to which non-malignant tumours are routinely captured by provincial/territorial cancer registries. Additionally, we are working to develop methods for capturing data on molecular markers, with the hope of incorporating updated molecular classifications in future reports.

Table 1: Average annual cases, percent distributions, and median age for all primary central nervous system tumours by histology group and sex, Canada (excluding Quebec), 2013-2017

	Total					Males					Females				
Histology group[a] (**major**/specific)	Cases per year	Percent of all CNS tumours	Median age	Malignant cases per year	Percent malignant	Cases per year	Percent of all CNS tumours	Median age	Malignant cases per year	Percent malignant	Cases per year	Percent of all CNS tumours	Median age	Malignant cases per year	Percent malignant
Tumours of neuroepithelial tissue	1997	33.61	58	1867	93.49	1158	41.40	58	1082	93.44	839	26.69	58	786	93.68
Pilocytic astrocytoma	65	1.09	13	65	100.00	32	1.14	15	32	100.00	33	1.05	12	33	100.00
Diffuse astrocytoma	94	1.58	46	94	100.00	54	1.93	46	54	100.00	40	1.27	45	40	100.00
Anaplastic astrocytoma	88	1.48	51	88	100.00	49	1.75	50	49	100.00	39	1.24	52	39	100.00
Unique astrocytoma variants	20	0.34	33	14	70.00	12	0.43	41	9	75.00	8	0.25	30	5	62.50
Glioblastoma	1159	19.51	64	1159	100.00	680	24.31	64	680	100.00	478	15.20	65	478	100.00
Oligodendroglioma	73	1.23	43	73	100.00	44	1.57	43	44	100.00	29	0.92	42	29	100.00
Anaplastic oligodendroglioma	65	1.09	51	65	100.00	39	1.39	50	39	100.00	26	0.83	53	26	100.00
Oligoastrocytic tumours	44	0.74	47	44	100.00	25	0.89	46	25	100.00	20	0.64	47	20	100.00
Ependymal tumours	102	1.72	45	60	58.82	59	2.11	45	33	55.93	42	1.34	44	27	64.29
Glioma malignant, NOS	125	2.10	53	125	100.00	67	2.40	55	67	100.00	58	1.84	52	58	100.00
Choroid plexus tumours	11	0.19	17	1	9.09	5	0.18	9	-[b]	-	5	0.16	30	-	-
Neuronal and mixed neuronal-glial tumours	84	1.41	29	17	20.24	48	1.72	28	10	20.83	35	1.11	32	7	20.00
Tumours of the pineal region	9	0.15	45	6	66.67	5	0.18	46	3	60.00	4	0.13	31	2	50.00
Embryonal tumours	56	0.94	9	55	98.21	35	1.25	10	35	100.00	21	0.67	8	20	95.24
Other neuroepithelial tumours	2	0.03	19	-	-	-	-	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	426	7.17	54	3	0.70	210	7.51	54	2	0.95	216	6.87	53	1	0.46
Tumours of meninges	1507	25.37	62	42	2.79	477	17.05	63	20	4.19	1030	32.76	62	22	2.14
Meningioma	1413	23.78	63	29	2.05	429	15.34	64	14	3.26	985	31.33	62	15	1.52
Mesenchymal tumours	26	0.44	52	9	34.62	11	0.39	54	3	27.27	15	0.48	52	6	40.00
Primary melanocytic lesions	2	0.03	46	1	50.00	1	0.04	35	-	-	1	0.03	52	-	-
Other neoplasms related to the meninges	66	1.11	50	2	3.03	36	1.29	52	2	5.56	30	0.95	48	-	-
Lymphomas and hematopoietic neoplasms	143	2.41	66	142	99.30	79	2.82	65	79	100.00	63	2.00	68	63	100.00
Lymphoma	139	2.34	67	139	100.00	77	2.75	65	77	100.00	62	1.97	68	62	100.00
Other hematopoietic neoplasms	3	0.05	46	3	100.00	2	0.07	46	2	100.00	1	0.03	38	1	100.00
Germ cell tumours, cysts, and heterotopias	26	0.44	15	17	65.38	19	0.68	15	15	78.95	7	0.22	23	3	42.86
Tumours of sellar region	677	11.40	55	2	0.30	347	12.41	58	-	-	330	10.50	51	2	0.61
Unclassified tumours	1131	19.04	70	163	14.41	491	17.55	68	81	16.50	640	20.36	71	81	12.66
Not classified by CBTRUS	33	0.56	48	8	24.24	17	0.61	46	4	23.53	16	0.51	48	4	25.00
Total	5941	100.00	60	2245	37.79	2797	100.00	60	1284	45.91	3144	100.00	61	962	30.60

Notes: Columns and rows may not sum to totals due to rounding. CNS = central nervous system; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 2: Average annual cases and age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by tumour site and sex, Canada (excluding Quebec), 2013-2017

	Total			Males			Females		
Topography code[a] (**major**/specific)	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI
Brain (C71)	2839	10.04	9.88-10.21	1560	11.52	11.27-11.78	1279	8.68	8.47-8.90
Cerebrum (C71.0)	148	0.53	0.49-0.57	85	0.63	0.57-0.69	63	0.43	0.39-0.48
Frontal lobe (C71.1)	662	2.35	2.27-2.43	359	2.65	2.53-2.78	303	2.07	1.96-2.18
Temporal lobe (C71.2)	495	1.74	1.68-1.81	301	2.21	2.10-2.33	194	1.32	1.24-1.41
Parietal lobe (C71.3)	288	1.01	0.96-1.07	163	1.19	1.11-1.28	126	0.84	0.78-0.91
Occipital lobe (C71.4)	72	0.25	0.23-0.28	43	0.31	0.27-0.36	29	0.19	0.16-0.23
Ventricle, NOS (C71.5)	62	0.22	0.20-0.25	33	0.24	0.21-0.28	29	0.21	0.18-0.25
Cerebellum, NOS (C71.6)	167	0.60	0.56-0.65	91	0.66	0.60-0.73	77	0.55	0.50-0.61
Brain stem (C71.7)	84	0.30	0.27-0.33	49	0.36	0.31-0.41	35	0.25	0.21-0.29
Overlapping lesion of brain (C71.8)	184	0.65	0.61-0.69	106	0.78	0.72-0.85	79	0.52	0.47-0.57
Brain, NOS (C71.9)	675	2.38	2.30-2.46	330	2.48	2.36-2.60	345	2.29	2.18-2.40
Spinal cord and cauda equina (C72.0-C72.1)	217	0.78	0.74-0.83	117	0.86	0.79-0.93	100	0.71	0.65-0.77
Spinal cord (C72.0)	212	0.76	0.72-0.81	114	0.84	0.77-0.91	98	0.69	0.63-0.76
Cauda equina (C72.1)	5	0.02	0.01-0.03	3	0.02	0.01-0.04	2	0.01	0.01-0.03
Cranial nerves (C72.2-C72.5)	318	1.14	1.08-1.19	153	1.12	1.05-1.21	165	1.15	1.08-1.24
Olfactory nerve (C72.2)	-[b]	-	-	-	-	-	-	-	-
Optic nerve (C72.3)	15	0.05	0.04-0.07	6	0.04	0.03-0.06	9	0.06	0.05-0.09
Acoustic nerve (C72.4)	196	0.70	0.65-0.74	94	0.68	0.62-0.75	102	0.72	0.66-0.78
Cranial nerve, NOS (C72.5)	108	0.39	0.35-0.42	54	0.40	0.35-0.45	54	0.37	0.33-0.42
Other nervous system (C72.8-C72.9)	32	0.11	0.10-0.13	16	0.12	0.09-0.15	16	0.11	0.08-0.13
Overlapping lesion of brain and CNS (C72.8)	5	0.02	0.01-0.03	3	0.02	0.01-0.03	3	0.02	0.01-0.03
Nervous system, NOS (C72.9)	26	0.09	0.08-0.11	13	0.10	0.08-0.13	13	0.09	0.07-0.11
Meninges (C70)	1663	5.86	5.73-5.99	514	3.88	3.73-4.03	1149	7.68	7.48-7.88
Cerebral meninges (C70.0)	1366	4.82	4.70-4.93	425	3.19	3.06-3.33	941	6.33	6.15-6.52
Spinal meninges (C70.1)	127	0.45	0.41-0.48	36	0.27	0.23-0.31	91	0.62	0.56-0.68
Meninges, NOS (C70.9)	170	0.59	0.55-0.63	53	0.42	0.37-0.47	117	0.73	0.67-0.80
Pituitary and craniopharyngeal duct (C75.1-C75.2)	831	2.97	2.88-3.06	412	3.04	2.91-3.18	419	2.95	2.82-3.08
Pituitary gland (C75.1)	786	2.80	2.72-2.89	388	2.87	2.74-3.00	398	2.79	2.67-2.92
Craniopharyngeal duct (C75.2)	45	0.16	0.14-0.19	24	0.17	0.14-0.21	21	0.15	0.13-0.19
Pineal gland (C75.3)	31	0.11	0.10-0.13	19	0.14	0.11-0.17	12	0.09	0.07-0.12
Nasal cavity (C30.0)	10	0.04	0.03-0.05	6	0.04	0.03-0.06	4	0.03	0.02-0.05
Total	5941	21.05	20.81-21.29	2797	20.73	20.38-21.07	3144	21.40	21.07-21.74

Notes: Rates are age-standardized to the 2011 Canadian standard population. Columns and rows may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Topography codes are based on the International Classification of Diseases for Oncology, 3rd edition.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 3: Average annual cases and age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by histology group and sex, Canada (excluding Quebec), 2013-2017

	Total			Males			Females		
Histology group[a] (**major**/specific)	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI
Tumours of neuroepithelial tissue	1997	7.08	6.94-7.22	1158	8.47	8.25-8.69	839	5.80	5.62-5.97
Pilocytic astrocytoma	65	0.24	0.21-0.27	32	0.23	0.20-0.27	33	0.25	0.21-0.29
Diffuse astrocytoma	94	0.34	0.31-0.37	54	0.39	0.35-0.44	40	0.29	0.25-0.33
Anaplastic astrocytoma	88	0.31	0.29-0.35	49	0.36	0.31-0.41	39	0.27	0.24-0.31
Unique astrocytoma variants	20	0.07	0.06-0.09	12	0.09	0.07-0.12	8	0.06	0.04-0.08
Glioblastoma	1159	4.05	3.95-4.16	680	4.98	4.82-5.15	478	3.21	3.08-3.34
Oligodendroglioma	73	0.27	0.24-0.30	44	0.33	0.29-0.37	29	0.21	0.18-0.25
Anaplastic oligodendroglioma	65	0.24	0.21-0.26	39	0.29	0.25-0.33	26	0.19	0.16-0.22
Oligoastrocytic tumours	44	0.16	0.14-0.18	25	0.18	0.15-0.21	20	0.14	0.12-0.17
Ependymal tumours	102	0.37	0.34-0.40	59	0.43	0.38-0.48	42	0.31	0.27-0.35
Glioma malignant, NOS	125	0.44	0.41-0.48	67	0.50	0.45-0.56	58	0.40	0.35-0.45
Choroid plexus tumours	11	0.04	0.03-0.05	5	0.04	0.02-0.06	5	0.04	0.03-0.06
Neuronal and mixed neuronal-glial tumours	84	0.31	0.28-0.34	48	0.35	0.31-0.40	35	0.26	0.22-0.30
Tumours of the pineal region	9	0.03	0.02-0.04	5	0.04	0.03-0.06	4	0.03	0.02-0.04
Embryonal tumours	56	0.20	0.18-0.23	35	0.25	0.22-0.30	21	0.15	0.13-0.19
Other neuroepithelial tumours	2	0.01	0.00-0.01	-[b]	-	-	-	-	-
Tumours of cranial and spinal nerves	426	1.53	1.47-1.60	210	1.54	1.45-1.64	216	1.53	1.44-1.62
Tumours of meninges	1507	5.33	5.21-5.45	477	3.56	3.41-3.70	1030	7.01	6.82-7.20
Meningioma	1413	4.99	4.88-5.11	429	3.20	3.07-3.34	985	6.68	6.49-6.87
Mesenchymal tumours	26	0.09	0.08-0.11	11	0.08	0.06-0.10	15	0.10	0.08-0.13
Primary melanocytic lesions	2	0.01	0.00-0.01	1	0.01	0.00-0.02	1	0.01	0.00-0.02
Other neoplasms related to the meninges	66	0.24	0.21-0.27	36	0.27	0.23-0.31	30	0.21	0.18-0.25
Lymphomas and hematopoietic neoplasms	143	0.50	0.46-0.53	79	0.58	0.52-0.64	63	0.42	0.37-0.47
Lymphoma	139	0.48	0.45-0.52	77	0.57	0.51-0.63	62	0.41	0.36-0.46
Other hematopoietic neoplasms	3	0.01	0.01-0.02	2	0.01	0.01-0.03	1	0.01	0.00-0.02
Germ cell tumours, cysts, and heterotopias	26	0.10	0.08-0.11	19	0.14	0.11-0.17	7	0.05	0.04-0.07
Tumours of sellar region	677	2.42	2.34-2.50	347	2.55	2.43-2.67	330	2.34	2.23-2.45
Unclassified tumours	1131	3.97	3.87-4.08	491	3.77	3.63-3.93	640	4.15	4.00-4.29
Not classified by CBTRUS	33	0.12	0.10-0.14	17	0.12	0.10-0.15	16	0.11	0.09-0.14
Total	5941	21.05	20.81-21.29	2797	20.73	20.38-21.07	3144	21.40	21.07-21.74

Notes: Rates are age-standardized to the 2011 Canadian standard population. Columns and rows may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 4: Average annual cases and age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by histology group and behaviour, Canada (excluding Quebec), 2013-2017

	Total			Malignant			Non-malignant		
Histology group[a] (**major**/specific)	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI
Tumours of neuroepithelial tissue	1997	7.08	6.94-7.22	1867	6.61	6.47-6.74	130	0.47	0.44-0.51
Pilocytic astrocytoma	65	0.24	0.21-0.27	65	0.24	0.21-0.27	[b]		
Diffuse astrocytoma	94	0.34	0.31-0.37	94	0.34	0.31-0.37			
Anaplastic astrocytoma	88	0.31	0.29-0.35	88	0.31	0.29-0.35			
Unique astrocytoma variants	20	0.07	0.06-0.09	14	0.05	0.04-0.06	6	0.02	0.02-0.03
Glioblastoma	1159	4.05	3.95-4.16	1159	4.05	3.95-4.16			
Oligodendroglioma	73	0.27	0.24-0.30	73	0.27	0.24-0.30			
Anaplastic oligodendroglioma	65	0.24	0.21-0.26	65	0.24	0.21-0.26			
Oligoastrocytic tumours	44	0.16	0.14-0.18	44	0.16	0.14-0.18			
Ependymal tumours	102	0.37	0.34-0.40	60	0.22	0.19-0.24	42	0.15	0.13-0.17
Glioma malignant, NOS	125	0.44	0.41-0.48	125	0.44	0.41-0.48			
Choroid plexus tumours	11	0.04	0.03-0.05	1	0.00	0.00-0.01	10	0.04	0.03-0.05
Neuronal and mixed neuronal-glial tumours	84	0.31	0.28-0.34	17	0.06	0.05-0.08	66	0.24	0.22-0.27
Tumours of the pineal region	9	0.03	0.02-0.04	6	0.02	0.01-0.03	4	0.01	0.01-0.02
Embryonal tumours	56	0.20	0.18-0.23	55	0.20	0.18-0.23	1	0.00	0.00-0.01
Other neuroepithelial tumours	2	0.01	0.00-0.01	-[c]	-	-	-	-	-
Tumours of cranial and spinal nerves	426	1.53	1.47-1.60	3	0.01	0.01-0.02	423	1.52	1.46-1.59
Tumours of meninges	1507	5.33	5.21-5.45	42	0.15	0.13-0.17	1465	5.18	5.06-5.30
Meningioma	1413	4.99	4.88-5.11	29	0.10	0.09-0.12	1384	4.89	4.77-5.01
Mesenchymal tumours	26	0.09	0.08-0.11	9	0.03	0.02-0.04	17	0.06	0.05-0.08
Primary melanocytic lesions	2	0.01	0.00-0.01	1	0.01	0.00-0.01	-	-	-
Other neoplasms related to the meninges	66	0.24	0.21-0.27	2	0.01	0.00-0.02	64	0.23	0.21-0.26
Lymphomas and hematopoietic neoplasms	143	0.50	0.46-0.53	142	0.50	0.46-0.53	-	-	-
Lymphoma	139	0.48	0.45-0.52	139	0.48	0.45-0.52			
Other hematopoietic neoplasms	3	0.01	0.01-0.02	3	0.01	0.01-0.02	-	-	-
Germ cell tumours, cysts, and heterotopias	26	0.10	0.08-0.11	17	0.06	0.05-0.08	9	0.03	0.02-0.04
Tumours of sellar region	677	2.42	2.34-2.50	2	0.01	0.00-0.01	675	2.41	2.33-2.50
Unclassified tumours	1131	3.97	3.87-4.08	163	0.57	0.53-0.61	969	3.41	3.31-3.50
Not classified by CBTRUS	33	0.12	0.10-0.14	8	0.03	0.02-0.04	25	0.09	0.07-0.11
Total	5941	21.05	20.81-21.29	2245	7.93	7.78-8.08	3695	13.12	12.93-13.31

Notes: Rates are age-standardized to the 2011 Canadian standard population. Columns and rows may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Empty cells indicate the histology is not applicable for non-malignant tumours.

[c] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 5: Average annual cases and age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by life course stage at diagnosis, Canada (excluding Quebec), 2013-2017

	Children (0-14 years)			AYA (15-39 years)			Adults (40+ years)		
Histology group[a] (**major**/specific)	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI
Tumours of neuroepithelial tissue	157	3.47	3.24-3.73	304	3.29	3.13-3.46	1536	10.82	10.57-11.06
Pilocytic astrocytoma	35	0.78	0.67-0.90	20	0.22	0.18-0.27	10	0.08	0.06-0.10
Diffuse astrocytoma	8	0.18	0.13-0.24	31	0.34	0.29-0.39	55	0.39	0.35-0.44
Anaplastic astrocytoma	3	0.07	0.04-0.12	26	0.28	0.24-0.34	58	0.42	0.37-0.47
Unique astrocytoma variants	4	0.08	0.05-0.13	7	0.08	0.06-0.11	9	0.06	0.05-0.09
Glioblastoma	8	0.18	0.13-0.25	55	0.59	0.52-0.67	1096	7.65	7.45-7.86
Oligodendroglioma	-[b]	-	-	31	0.33	0.28-0.38	43	0.31	0.27-0.36
Anaplastic oligodendroglioma	-	-	-	14	0.15	0.12-0.19	51	0.37	0.32-0.42
Oligoastrocytic tumours	-	-	-	15	0.16	0.12-0.20	29	0.21	0.18-0.25
Ependymal tumours	16	0.36	0.29-0.45	26	0.28	0.23-0.33	60	0.43	0.38-0.48
Glioma malignant, NOS	25	0.54	0.45-0.65	23	0.25	0.21-0.30	77	0.54	0.49-0.60
Choroid plexus tumours	5	0.11	0.07-0.16	2	0.02	0.01-0.03	4	0.03	0.02-0.05
Neuronal and mixed neuronal-glial tumours	15	0.33	0.26-0.42	38	0.42	0.36-0.48	31	0.22	0.19-0.26
Tumours of the pineal region	2	0.03	0.02-0.07	3	0.03	0.02-0.05	5	0.03	0.02-0.05
Embryonal tumours	35	0.77	0.66-0.89	13	0.14	0.11-0.18	9	0.06	0.05-0.08
Other neuroepithelial tumours	-	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	6	0.12	0.08-0.18	86	0.92	0.83-1.01	335	2.41	2.29-2.53
Tumours of meninges	5	0.11	0.07-0.16	120	1.29	1.19-1.40	1382	9.77	9.54-10.00
Meningioma	3	0.06	0.03-0.10	99	1.06	0.97-1.16	1312	9.26	9.04-9.49
Mesenchymal tumours	1	0.02	0.01-0.05	4	0.04	0.02-0.06	21	0.15	0.12-0.18
Primary melanocytic lesions	-	-	-	-	-	-	1	0.01	0.00-0.02
Other neoplasms related to the meninges	1	0.02	0.01-0.05	17	0.18	0.15-0.23	48	0.35	0.30-0.39
Lymphomas and hematopoietic neoplasms	-	-	-	8	0.08	0.06-0.12	134	0.93	0.86-1.01
Lymphoma	-	-	-	7	0.08	0.05-0.11	132	0.92	0.85-0.99
Other hematopoietic neoplasms	-	-	-	-	-	-	2	0.02	0.01-0.03
Germ cell tumours, cysts, and heterotopias	12	0.27	0.21-0.35	10	0.11	0.08-0.15	4	0.03	0.02-0.05
Tumours of sellar region	11	0.24	0.18-0.32	150	1.61	1.49-1.73	517	3.68	3.54-3.83
Unclassified tumours	28	0.63	0.53-0.74	122	1.32	1.22-1.43	981	6.86	6.67-7.05
Not classified by CBTRUS	6	0.12	0.08-0.18	8	0.09	0.06-0.12	19	0.14	0.11-0.17
Total	225	4.99	4.70-5.29	808	8.71	8.44-8.98	4908	34.63	34.20-35.07

Notes: Rates are age-standardized to the 2011 Canadian standard population. Columns may not sum to totals due to rounding. AYA = adolescents and young adults; CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 6: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by histology group and age at diagnosis, Canada (excluding Quebec), 2013-2017

	0 to 19 years		20 to 34 years		35 to 44 years		45 to 54 years		55 to 64 years		65+ years	
Histology group[a] (**major**/specific)	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumours of neuroepithelial tissue	3.21	3.02-3.42	3.16	2.96-3.37	4.68	4.37-5.01	7.07	6.71-7.44	11.97	11.47-12.48	16.71	16.17-17.27
Pilocytic astrocytoma	0.68	0.59-0.78	0.18	0.13-0.23	0.13	0.08-0.19	0.11	0.07-0.17	0.05	0.03-0.10	0.03	0.01-0.07
Diffuse astrocytoma	0.16	0.12-0.21	0.38	0.32-0.46	0.38	0.30-0.48	0.34	0.26-0.43	0.45	0.36-0.55	0.42	0.34-0.51
Anaplastic astrocytoma	0.07	0.04-0.11	0.30	0.24-0.37	0.36	0.28-0.46	0.42	0.33-0.52	0.39	0.31-0.49	0.50	0.41-0.61
Unique astrocytoma variants	0.09	0.06-0.13	0.08	0.05-0.13	0.04	0.02-0.08	0.05	0.02-0.09	0.07	0.03-0.11	0.09	0.05-0.14
Glioblastoma	0.22	0.17-0.28	0.51	0.43-0.60	1.51	1.34-1.70	4.04	3.77-4.32	8.75	8.32-9.19	13.40	12.91-13.90
Oligodendroglioma	0.03	0.01-0.05	0.30	0.24-0.37	0.59	0.48-0.71	0.36	0.28-0.45	0.34	0.26-0.44	0.14	0.10-0.20
Anaplastic oligodendroglioma	-[b]	-	0.14	0.10-0.19	0.32	0.25-0.42	0.45	0.36-0.55	0.42	0.34-0.53	0.25	0.19-0.33
Oligoastrocytic tumours	-	-	0.19	0.14-0.24	0.24	0.17-0.32	0.24	0.18-0.32	0.23	0.17-0.32	0.13	0.09-0.19
Ependymal tumours	0.32	0.26-0.39	0.27	0.21-0.33	0.43	0.34-0.54	0.43	0.34-0.53	0.43	0.34-0.54	0.41	0.33-0.50
Glioma malignant, NOS	0.44	0.37-0.52	0.25	0.19-0.31	0.28	0.21-0.37	0.29	0.22-0.37	0.44	0.35-0.55	1.05	0.92-1.20
Choroid plexus tumours	0.09	0.06-0.13	-	-	0.04	0.02-0.08	0.03	0.01-0.07	0.04	0.02-0.08	-	-
Neuronal and mixed neuronal-glial tumours	0.42	0.35-0.50	0.39	0.32-0.47	0.26	0.19-0.34	0.22	0.16-0.30	0.23	0.17-0.32	0.19	0.14-0.26
Tumours of the pineal region	0.04	0.02-0.06	0.03	0.01-0.06	-	-	0.03	0.01-0.07	0.05	0.03-0.10	0.03	0.01-0.06
Embryonal tumours	0.62	0.54-0.71	0.13	0.09-0.18	0.09	0.05-0.14	0.05	0.03-0.10	0.06	0.03-0.11	0.05	0.02-0.09
Other neuroepithelial tumours	-	-	-	-	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	0.17	0.12-0.22	0.90	0.79-1.01	1.69	1.51-1.89	2.46	2.25-2.69	2.68	2.45-2.93	2.42	2.21-2.63
Tumours of meninges	0.20	0.15-0.25	1.04	0.92-1.16	3.90	3.62-4.20	6.71	6.36-7.08	9.51	9.07-9.97	15.73	15.20-16.27
Meningioma	0.12	0.09-0.17	0.82	0.72-0.93	3.46	3.20-3.75	6.19	5.85-6.54	9.04	8.61-9.48	15.20	14.68-15.74
Mesenchymal tumours	0.02	0.01-0.04	0.05	0.02-0.08	0.07	0.04-0.12	0.18	0.12-0.25	0.13	0.08-0.19	0.17	0.12-0.24
Primary melanocytic lesions	-	-	-	-	-	-	-	-	-	-	-	-
Other neoplasms related to the meninges	0.05	0.03-0.08	0.16	0.12-0.22	0.36	0.28-0.46	0.34	0.26-0.43	0.32	0.24-0.41	0.35	0.28-0.44
Lymphomas and hematopoietic neoplasms	0.02	0.01-0.04	0.08	0.05-0.12	0.14	0.09-0.20	0.41	0.33-0.51	0.95	0.81-1.10	1.88	1.70-2.08
Lymphoma	-	-	0.08	0.05-0.12	0.11	0.07-0.18	0.38	0.30-0.48	0.95	0.81-1.10	1.86	1.68-2.06
Other hematopoietic neoplasms	-	-	-	-	-	-	0.03	0.01-0.06	-	-	-	-
Germ cell tumours, cysts, and heterotopias	0.26	0.21-0.33	0.10	0.06-0.14	0.03	0.01-0.07	0.02	0.01-0.06	0.05	0.02-0.09	-	-
Tumours of sellar region	0.36	0.30-0.44	1.67	1.53-1.83	2.48	2.25-2.71	3.17	2.93-3.42	3.67	3.40-3.96	4.78	4.49-5.08
Unclassified tumours	0.79	0.70-0.90	1.22	1.10-1.36	1.99	1.79-2.20	2.70	2.48-2.93	4.26	3.96-4.57	15.95	15.42-16.50
Not classified by CBTRUS	0.11	0.08-0.16	0.07	0.04-0.11	0.12	0.07-0.18	0.13	0.08-0.19	0.14	0.09-0.20	0.17	0.12-0.24
Total	5.12	4.87-5.38	8.24	7.91-8.58	15.03	14.47-15.60	22.67	22.02-23.33	33.22	32.39-34.07	57.66	56.65-58.69

Notes: Rates are age-standardized to the 2011 Canadian standard population. Columns may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 7: Average annual age-standardized incidence rates (per 100,000) for the most common primary central nervous system tumour histologies by age at diagnosis, Canada (excluding Quebec), 2013-2017

	Most common histology			Second most common histology			Third most common histology		
Age group (years)	Histology	Rate	95% CI	Histology	Rate	95% CI	Histology	Rate	95% CI
0 to 4	embryonal tumours	1.18	0.95-1.46	pilocytic astrocytoma	0.86	0.66-1.10	unclassified tumours	0.78	0.59-1.01
5 to 9	pilocytic astrocytoma	0.79	0.60-1.01	glioma malignant, NOS	0.76	0.58-0.98	embryonal tumours	0.71	0.53-0.92
10 to 14	pilocytic astrocytoma	0.69	0.52-0.90	unclassified tumours	0.69	0.52-0.90	neuronal and mixed neuronal-glial tumours	0.53	0.38-0.72
15 to 19	unclassified tumours	1.21	0.99-1.47	tumours of sellar region	0.66	0.50-0.86	neuronal and mixed neuronal-glial tumours	0.65	0.49-0.85
20 to 34	tumours of sellar region	1.67	1.53-1.83	unclassified tumours	1.22	1.10-1.36	tumours of cranial and spinal nerves	0.90	0.79-1.01
35 to 44	meningioma	3.46	3.20-3.75	tumours of sellar region	2.48	2.25-2.71	unclassified tumours	1.99	1.79-2.20
45 to 54	meningioma	6.19	5.85-6.54	glioblastoma	4.04	3.77-4.32	tumours of sellar region	3.17	2.93-3.42
55 to 64	meningioma	9.04	8.61-9.48	glioblastoma	8.75	8.32-9.19	unclassified tumours	4.26	3.96-4.57
65+	unclassified tumours	15.95	15.42-16.50	meningioma	15.20	14.68-15.74	glioblastoma	13.40	12.91-13.90
All ages	meningioma	4.99	4.88-5.11	glioblastoma	4.05	3.95-4.16	unclassified tumours	3.97	3.87-4.08

Notes: Rates are age-standardized to the 2011 Canadian standard population. Age-specific rates are presented for 5-year age groups. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 8: Average annual cases and age-standardized incidence rates (per 100,000) for all primary central nervous system tumours in children and adolescents (aged 0-19 years) by histology group and sex, Canada (excluding Quebec), 2013-2017

	Total (0-19 years)			Males (0-19 years)			Females (0-19 years)		
Histology group[a] (**major**/specific)	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI
Tumours of neuroepithelial tissue	200	3.21	3.02-3.42	107	3.36	3.08-3.66	93	3.06	2.79-3.35
Pilocytic astrocytoma	43	0.68	0.59-0.78	19	0.58	0.47-0.71	24	0.79	0.65-0.94
Diffuse astrocytoma	10	0.16	0.12-0.21	5	0.17	0.11-0.25	5	0.15	0.10-0.23
Anaplastic astrocytoma	4	0.07	0.04-0.11	2	0.07	0.03-0.12	2	0.07	0.04-0.13
Unique astrocytoma variants	6	0.09	0.06-0.13	3	0.11	0.06-0.17	2	0.07	0.04-0.13
Glioblastoma	14	0.22	0.17-0.28	7	0.23	0.16-0.32	6	0.21	0.15-0.30
Oligodendroglioma	2	0.03	0.01-0.05	1	0.03	0.01-0.08	-[b]	-	-
Anaplastic oligodendroglioma	-	-	-	-	-	-	-	-	-
Oligoastrocytic tumours	-	-	-	-	-	-	-	-	-
Ependymal tumours	20	0.32	0.26-0.39	12	0.39	0.30-0.50	7	0.25	0.17-0.34
Glioma malignant, NOS	28	0.44	0.37-0.52	13	0.40	0.31-0.52	15	0.48	0.38-0.61
Choroid plexus tumours	5	0.09	0.06-0.13	3	0.09	0.05-0.15	2	0.08	0.04-0.14
Neuronal and mixed neuronal-glial tumours	26	0.42	0.35-0.50	15	0.48	0.38-0.60	11	0.37	0.27-0.48
Tumours of the pineal region	2	0.04	0.02-0.06	1	0.03	0.01-0.07	1	0.04	0.01-0.09
Embryonal tumours	39	0.62	0.54-0.71	24	0.74	0.61-0.88	15	0.50	0.39-0.62
Other neuroepithelial tumours	-	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	10	0.17	0.12-0.22	6	0.19	0.13-0.27	4	0.14	0.09-0.21
Tumours of meninges	12	0.20	0.15-0.25	6	0.19	0.12-0.27	6	0.21	0.14-0.30
Meningioma	7	0.12	0.09-0.17	4	0.13	0.08-0.20	3	0.12	0.07-0.19
Mesenchymal tumours	1	0.02	0.01-0.04	-	-	-	-	-	-
Primary melanocytic lesions	-	-	-	-	-	-	-	-	-
Other neoplasms related to the meninges	3	0.05	0.03-0.08	1	0.04	0.01-0.08	2	0.05	0.02-0.11
Lymphomas and hematopoietic neoplasms	1	0.02	0.01-0.04	-	-	-	-	-	-
Lymphoma	-	-	-	-	-	-	-	-	-
Other hematopoietic neoplasms	-	-	-	-	-	-	-	-	-
Germ cell tumours, cysts, and heterotopias	16	0.26	0.21-0.33	13	0.40	0.31-0.51	4	0.12	0.07-0.18
Tumours of sellar region	22	0.36	0.30-0.44	10	0.30	0.22-0.40	12	0.43	0.33-0.55
Unclassified tumours	48	0.79	0.70-0.90	22	0.71	0.58-0.85	26	0.89	0.74-1.06
Not classified by CBTRUS	7	0.11	0.08-0.16	4	0.11	0.07-0.18	3	0.11	0.06-0.18
Total	316	5.12	4.87-5.38	167	5.28	4.93-5.65	149	4.96	4.61-5.33

Notes: Rates are age-standardized to the 2011 Canadian standard population. Columns and rows may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 9: Average annual cases and age-specific incidence rates (per 100,000) for all primary central nervous system tumours in children and adolescents (aged 0-19 years) by histology group and age at diagnosis, Canada (excluding Quebec), 2013-2017

	0 to 4 years			5 to 9 years			10 to 14 years			15 to 19 years		
Histology group[a] (**major**/specific)	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI	Cases per year	Rate	95% CI
Tumours of neuroepithelial tissue	63	4.20	3.75-4.69	53	3.46	3.05-3.90	42	2.77	2.41-3.17	43	2.55	2.22-2.92
Pilocytic astrocytoma	13	0.86	0.66-1.10	12	0.79	0.60-1.01	10	0.69	0.52-0.90	7	0.44	0.31-0.61
Diffuse astrocytoma	3	0.20	0.11-0.33	2	0.12	0.05-0.22	3	0.21	0.12-0.34	2	0.12	0.06-0.22
Anaplastic astrocytoma	-[b]	-	-	2	0.13	0.06-0.24	-	-	-	1	0.06	0.02-0.14
Unique astrocytoma variants	1	0.07	0.02-0.16	1	0.07	0.02-0.15	2	0.12	0.05-0.23	2	0.11	0.05-0.20
Glioblastoma	2	0.15	0.07-0.26	3	0.20	0.11-0.32	3	0.20	0.11-0.33	5	0.32	0.21-0.47
Oligodendroglioma	-	-	-	-	-	-	-	-	-	1	0.08	0.03-0.17
Anaplastic oligodendroglioma	-	-	-	-	-	-	-	-	-	-	-	-
Oligoastrocytic tumours	-	-	-	-	-	-	-	-	-	-	-	-
Ependymal tumours	9	0.59	0.43-0.79	5	0.31	0.20-0.47	3	0.17	0.09-0.29	4	0.22	0.13-0.34
Glioma malignant, NOS	9	0.58	0.42-0.78	12	0.76	0.58-0.98	5	0.31	0.19-0.46	3	0.19	0.11-0.31
Choroid plexus tumours	4	0.24	0.14-0.38	1	0.07	0.02-0.15	-	-	-	-	-	-
Neuronal and mixed neuronal-glial tumours	4	0.27	0.16-0.41	3	0.20	0.11-0.32	8	0.53	0.38-0.72	11	0.65	0.49-0.85
Tumours of the pineal region	-	-	-	-	-	-	-	-	-	-	-	-
Embryonal tumours	18	1.18	0.95-1.46	11	0.71	0.53-0.92	6	0.42	0.29-0.60	4	0.24	0.15-0.37
Other neuroepithelial tumours	-	-	-	-	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	1	0.09	0.04-0.19	2	0.16	0.08-0.27	2	0.12	0.05-0.23	5	0.28	0.17-0.41
Tumours of meninges	2	0.13	0.06-0.25	1	0.09	0.04-0.19	2	0.11	0.05-0.21	7	0.41	0.28-0.57
Meningioma	-	-	-	-	-	-	1	0.07	0.02-0.15	5	0.29	0.18-0.43
Mesenchymal tumours	-	-	-	-	-	-	-	-	-	-	-	-
Primary melanocytic lesions	-	-	-	-	-	-	-	-	-	-	-	-
Other neoplasms related to the meninges	-	-	-	-	-	-	-	-	-	2	0.11	0.05-0.20
Lymphomas and hematopoietic neoplasms	-	-	-	-	-	-	-	-	-	-	-	-
Lymphoma	-	-	-	-	-	-	-	-	-	-	-	-
Other hematopoietic neoplasms	-	-	-	-	-	-	-	-	-	-	-	-
Germ cell tumours, cysts, and heterotopias	4	0.27	0.16-0.41	3	0.22	0.13-0.36	5	0.32	0.20-0.47	4	0.24	0.15-0.37
Tumours of sellar region	3	0.17	0.09-0.30	3	0.20	0.11-0.32	5	0.36	0.24-0.52	11	0.66	0.50-0.86
Unclassified tumours	12	0.78	0.59-1.01	6	0.41	0.28-0.58	10	0.69	0.52-0.90	20	1.21	0.99-1.47
Not classified by CBTRUS	2	0.15	0.07-0.26	2	0.10	0.05-0.21	2	0.12	0.05-0.23	1	0.08	0.03-0.17
Total	87	5.81	5.28-6.39	71	4.65	4.18-5.16	68	4.50	4.03-5.00	91	5.46	4.97-5.98

Notes: Columns may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 10: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by histology group and province, 2013-2017

Histology group[a] (**major**/specific)	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario		New Brunswick		Nova Scotia		Prince Edward Island		Newfoundland and Labrador	
	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI
Tumours of neuroepithelial tissue	6.90	6.58-7.24	7.16	6.79-7.56	6.87	6.19-7.60	6.54	5.93-7.21	7.15	6.96-7.35	7.44	6.63-8.32	7.26	6.54-8.05	7.19	5.42-9.41	7.05	6.12-8.10
Pilocytic astrocytoma	0.17	0.12-0.24	0.24	0.18-0.32	0.20	0.10-0.36	0.27	0.16-0.42	0.25	0.21-0.29	0.28	0.13-0.52	0.29	0.15-0.51	-[b]	-	0.28	0.11-0.59
Diffuse astrocytoma	0.16	0.12-0.22	0.36	0.28-0.45	0.34	0.21-0.55	0.19	0.10-0.34	0.39	0.34-0.44	0.48	0.28-0.76	0.47	0.30-0.72	-	-	0.44	0.22-0.80
Anaplastic astrocytoma	0.15	0.11-0.21	0.44	0.35-0.54	0.27	0.15-0.46	0.81	0.61-1.08	0.31	0.27-0.35	0.17	0.07-0.36	0.34	0.19-0.56	-	-	0.18	0.06-0.43
Unique astrocytoma variants	0.07	0.04-0.12	0.07	0.04-0.12	-	-	0.09	0.03-0.20	0.08	0.06-0.10	-	-	-	-	-	-	-	-
Glioblastoma	4.35	4.10-4.62	4.03	3.74-4.33	4.30	3.77-4.90	3.23	2.80-3.71	3.91	3.76-4.05	4.60	3.99-5.28	4.50	3.96-5.10	3.89	2.68-5.52	4.60	3.87-5.43
Oligodendroglioma	0.38	0.31-0.47	0.23	0.17-0.31	0.26	0.14-0.44	0.29	0.17-0.46	0.24	0.20-0.28	0.26	0.12-0.49	0.23	0.11-0.42	-	-	0.28	0.11-0.59
Anaplastic oligodendroglioma	0.16	0.11-0.22	0.14	0.09-0.20	0.14	0.06-0.30	0.11	0.04-0.23	0.32	0.28-0.37	0.19	0.07-0.39	0.23	0.11-0.43	-	-	-	-
Oligoastrocytic tumours	0.24	0.18-0.31	0.18	0.13-0.25	0.20	0.10-0.37	0.09	0.03-0.21	0.13	0.11-0.16	0.16	0.06-0.36	0.15	0.06-0.32	-	-	-	-
Ependymal tumours	0.28	0.22-0.36	0.39	0.31-0.49	0.26	0.15-0.45	0.47	0.32-0.68	0.40	0.36-0.45	0.33	0.17-0.58	0.30	0.16-0.50	-	-	0.35	0.17-0.68
Glioma malignant, NOS	0.41	0.33-0.50	0.54	0.44-0.66	0.30	0.17-0.48	0.67	0.49-0.91	0.45	0.40-0.50	0.34	0.18-0.58	0.25	0.13-0.45	-	-	0.38	0.18-0.72
Choroid plexus tumours	0.04	0.02-0.07	0.04	0.02-0.08	-	-	-	-	0.04	0.03-0.06	-	-	-	-	-	-	-	-
Neuronal and mixed neuronal-glial tumours	0.22	0.16-0.28	0.30	0.23-0.38	0.27	0.14-0.45	0.14	0.06-0.27	0.37	0.33-0.42	0.17	0.06-0.38	0.31	0.17-0.53	-	-	-	-
Tumours of the pineal region	0.05	0.03-0.09	0.04	0.02-0.08	-	-	-	-	0.03	0.02-0.05	-	-	-	-	-	-	-	-
Embryonal tumours	0.22	0.16-0.29	0.17	0.12-0.23	0.23	0.13-0.40	0.14	0.07-0.27	0.23	0.19-0.26	0.33	0.17-0.60	-	-	-	-	-	-
Other neuroepithelial tumours	-	-	-	-	-	-	-	-	0.01	0.00-0.02	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	1.57	1.41-1.73	1.40	1.23-1.58	0.31	0.18-0.50	1.51	1.22-1.86	1.82	1.72-1.92	0.56	0.35-0.86	0.96	0.71-1.29	1.15	0.55-2.21	0.22	0.09-0.48
Tumours of meninges	4.73	4.47-5.00	7.26	6.87-7.67	4.55	4.00-5.16	6.57	5.95-7.24	5.28	5.12-5.46	4.24	3.64-4.92	4.63	4.07-5.26	3.71	2.53-5.34	3.50	2.86-4.25
Meningioma	4.49	4.23-4.76	6.99	6.60-7.39	4.41	3.86-5.01	6.28	5.68-6.93	4.86	4.70-5.02	4.09	3.50-4.77	4.24	3.70-4.83	3.60	2.43-5.21	3.17	2.57-3.89
Mesenchymal tumours	0.08	0.05-0.12	0.05	0.02-0.09	-	-	0.13	0.06-0.27	0.12	0.10-0.15	-	-	-	-	-	-	-	-
Primary melanocytic lesions	-	-	-	-	-	-	-	-	0.01	0.00-0.02	-	-	-	-	-	-	-	-
Other neoplasms related to the meninges	0.15	0.11-0.21	0.22	0.16-0.30	0.09	0.03-0.23	0.16	0.08-0.30	0.29	0.26-0.34	0.15	0.05-0.34	0.32	0.18-0.54	-	-	0.30	0.13-0.61
Lymphomas and hematopoietic neoplasms	0.52	0.43-0.61	0.41	0.32-0.52	0.55	0.37-0.80	0.64	0.46-0.88	0.48	0.43-0.54	0.46	0.29-0.72	0.57	0.40-0.82	0.71	0.25-1.65	0.60	0.36-0.95
Lymphoma	0.51	0.43-0.60	0.40	0.31-0.50	0.52	0.34-0.76	0.64	0.46-0.88	0.47	0.42-0.52	0.46	0.29-0.72	0.55	0.38-0.79	0.71	0.25-1.65	0.60	0.36-0.95
Other hematopoietic neoplasms	-	-	-	-	-	-	-	-	0.01	0.01-0.02	-	-	-	-	-	-	-	-
Germ cell tumours, cysts, and heterotopias	0.15	0.10-0.21	0.06	0.03-0.10	-	-	0.10	0.04-0.21	0.10	0.08-0.13	-	-	-	-	-	-	-	-
Tumours of sellar region	2.91	2.70-3.13	2.47	2.24-2.70	0.74	0.53-1.02	2.44	2.07-2.87	2.54	2.43-2.66	1.35	1.01-1.77	2.54	2.13-3.02	0.75	0.27-1.72	0.67	0.41-1.06
Unclassified tumours	0.77	0.67-0.88	0.64	0.52-0.77	0.35	0.22-0.54	0.61	0.44-0.84	7.20	7.01-7.40	0.54	0.35-0.82	0.52	0.34-0.76	-	-	1.06	0.71-1.54
Not classified by CBTRUS	0.22	0.16-0.29	0.04	0.02-0.08	-	-	-	-	0.14	0.11-0.17	-	-	-	-	-	-	-	-
Total	17.76	17.24-18.29	19.43	18.80-20.08	13.49	12.53-14.50	18.47	17.43-19.57	24.72	24.36-25.09	14.68	13.54-15.91	16.67	15.58-17.83	13.90	11.43-16.79	13.14	11.86-14.53

Notes: Rates are age-standardized to the 2011 Canadian standard population. The territories are not displayed due to small case counts. Columns may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 11: Average annual age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by histology group and region, 2013-2017

	British Columbia		Prairie Region		Ontario		Atlantic Region	
Histology group[a] (**major**/specific)	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumours of neuroepithelial tissue	6.90	6.58-7.24	6.97	6.68-7.27	7.15	6.96-7.35	7.28	6.82-7.76
Pilocytic astrocytoma	0.17	0.12-0.24	0.24	0.19-0.30	0.25	0.21-0.29	0.29	0.20-0.42
Diffuse astrocytoma	0.16	0.12-0.22	0.32	0.26-0.39	0.39	0.34-0.44	0.45	0.33-0.59
Anaplastic astrocytoma	0.15	0.11-0.21	0.48	0.41-0.57	0.31	0.27-0.35	0.26	0.17-0.37
Unique astrocytoma variants	0.07	0.04-0.12	0.07	0.05-0.11	0.08	0.06-0.10	0.05	0.02-0.11
Glioblastoma	4.35	4.10-4.62	3.90	3.68-4.13	3.91	3.76-4.05	4.53	4.18-4.90
Oligodendroglioma	0.38	0.31-0.47	0.25	0.19-0.31	0.24	0.20-0.28	0.27	0.18-0.39
Anaplastic oligodendroglioma	0.16	0.11-0.22	0.13	0.09-0.18	0.32	0.28-0.37	0.19	0.12-0.29
Oligoastrocytic tumours	0.24	0.18-0.31	0.17	0.12-0.22	0.13	0.11-0.16	0.12	0.06-0.20
Ependymal tumours	0.28	0.22-0.36	0.38	0.32-0.46	0.40	0.36-0.45	0.31	0.22-0.43
Glioma malignant, NOS	0.41	0.33-0.50	0.53	0.45-0.62	0.45	0.40-0.50	0.31	0.22-0.43
Choroid plexus tumours	0.04	0.02-0.07	0.03	0.02-0.06	0.04	0.03-0.06	0.05	0.02-0.11
Neuronal and mixed neuronal-glial tumours	0.22	0.16-0.28	0.26	0.20-0.32	0.37	0.33-0.42	0.24	0.16-0.35
Tumours of the pineal region	0.05	0.03-0.09	0.03	0.01-0.05	0.03	0.02-0.05	0.04	0.01-0.11
Embryonal tumours	0.22	0.16-0.29	0.17	0.13-0.22	0.23	0.19-0.26	0.16	0.09-0.26
Other neuroepithelial tumours	-[b]	-	-	-	0.01	0.00-0.02	-	-
Tumours of cranial and spinal nerves	1.57	1.41-1.73	1.23	1.11-1.36	1.82	1.72-1.92	0.68	0.54-0.84
Tumours of meninges	4.73	4.47-5.00	6.60	6.31-6.90	5.28	5.12-5.46	4.20	3.86-4.57
Meningioma	4.49	4.23-4.76	6.35	6.06-6.64	4.86	4.70-5.02	3.92	3.59-4.27
Mesenchymal tumours	0.08	0.05-0.12	0.06	0.04-0.10	0.12	0.10-0.15	0.04	0.01-0.10
Primary melanocytic lesions	-	-	-	-	0.01	0.00-0.02	-	-
Other neoplasms related to the meninges	0.15	0.11-0.21	0.18	0.14-0.24	0.29	0.26-0.34	0.25	0.17-0.36
Lymphomas and hematopoietic neoplasms	0.52	0.43-0.61	0.49	0.41-0.57	0.48	0.43-0.54	0.55	0.44-0.69
Lymphoma	0.51	0.43-0.60	0.47	0.40-0.56	0.47	0.42-0.52	0.54	0.43-0.68
Other hematopoietic neoplasms	-	-	0.02	0.01-0.04	0.01	0.01-0.02	-	-
Germ cell tumours, cysts, and heterotopias	0.15	0.10-0.21	0.06	0.04-0.10	0.10	0.08-0.13	0.08	0.03-0.15
Tumours of sellar region	2.91	2.70-3.13	2.14	1.98-2.32	2.54	2.43-2.66	1.63	1.42-1.87
Unclassified tumours	0.77	0.67-0.88	0.58	0.49-0.67	7.20	7.01-7.40	0.62	0.49-0.77
Not classified by CBTRUS	0.22	0.16-0.29	0.04	0.02-0.08	0.14	0.11-0.17	0.04	0.01-0.10
Total	17.76	17.24-18.29	18.11	17.64-18.60	24.72	24.36-25.09	15.08	14.43-15.77

Notes: Rates are age-standardized to the 2011 Canadian standard population. Prairie region includes Alberta, Saskatchewan, and Manitoba. Atlantic region includes New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. The territories are not displayed due to small case counts. Columns may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 12: Average annual age-standardized incidence rates (per 100,000) for primary malignant central nervous system tumours by histology group and province, 2013-2017

	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario		New Brunswick		Nova Scotia		Prince Edward Island		Newfoundland and Labrador	
Histology group[a] (**major**/specific)	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI	Rate	95%CI
Tumours of neuroepithelial tissue	6.58	6.27-6.91	6.69	6.32-7.07	6.56	5.89-7.28	6.21	5.62-6.86	6.60	6.41-6.79	6.95	6.18-7.81	6.79	6.10-7.55	6.48	4.81-8.58	6.74	5.83-7.76
Pilocytic astrocytoma	0.17	0.12-0.24	0.24	0.18-0.32	0.20	0.10-0.36	0.27	0.16-0.42	0.25	0.21-0.29	0.28	0.13-0.52	0.29	0.15-0.51	-[b]	-	0.28	0.11-0.59
Diffuse astrocytoma	0.16	0.12-0.22	0.36	0.28-0.45	0.34	0.21-0.55	0.19	0.10-0.34	0.39	0.34-0.44	0.48	0.28-0.76	0.47	0.30-0.72	-	-	0.44	0.22-0.80
Anaplastic astrocytoma	0.15	0.11-0.21	0.44	0.35-0.54	0.27	0.15-0.46	0.81	0.61-1.08	0.31	0.27-0.35	0.17	0.07-0.36	0.34	0.19-0.56	-	-	0.18	0.06-0.43
Unique astrocytoma variants	0.05	0.03-0.09	0.06	0.03-0.11	-	-	-	-	0.05	0.03-0.07	-	-	-	-	-	-	-	-
Glioblastoma	4.35	4.10-4.62	4.03	3.74-4.33	4.30	3.77-4.90	3.23	2.80-3.71	3.91	3.76-4.05	4.60	3.99-5.28	4.50	3.96-5.10	3.89	2.68-5.52	4.60	3.87-5.43
Oligodendroglioma	0.38	0.31-0.47	0.23	0.17-0.31	0.26	0.14-0.44	0.29	0.17-0.46	0.24	0.20-0.28	0.26	0.12-0.49	0.23	0.11-0.42	-	-	0.28	0.11-0.59
Anaplastic oligodendroglioma	0.16	0.11-0.22	0.14	0.09-0.20	0.14	0.06-0.30	0.11	0.04-0.23	0.32	0.28-0.37	0.19	0.07-0.39	0.23	0.11-0.43	-	-	-	-
Oligoastrocytic tumours	0.24	0.18-0.31	0.18	0.13-0.25	0.20	0.10-0.37	0.09	0.03-0.21	0.13	0.11-0.16	0.16	0.06-0.36	0.15	0.06-0.32	-	-	-	-
Ependymal tumours	0.18	0.13-0.24	0.22	0.16-0.30	0.18	0.08-0.33	0.33	0.20-0.51	0.23	0.20-0.27	0.13	0.04-0.32	0.17	0.07-0.35	-	-	0.21	0.08-0.49
Glioma malignant, NOS	0.41	0.33-0.50	0.54	0.44-0.66	0.30	0.17-0.48	0.67	0.49-0.91	0.45	0.40-0.50	0.34	0.18-0.58	0.25	0.13-0.45	-	-	0.38	0.18-0.72
Choroid plexus tumours	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neuronal and mixed neuronal-glial tumours	0.05	0.02-0.08	0.06	0.03-0.11	-	-	-	-	0.08	0.06-0.10	-	-	-	-	-	-	-	-
Tumours of the pineal region	0.05	0.02-0.08	-	-	-	-	-	-	0.02	0.01-0.03	-	-	-	-	-	-	-	-
Embryonal tumours	0.21	0.16-0.28	0.17	0.12-0.23	0.23	0.13-0.40	0.14	0.07-0.27	0.22	0.19-0.26	0.33	0.17-0.60	-	-	-	-	-	-
Other neuroepithelial tumours	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	-	-	-	-	-	-	-	-	0.01	0.01-0.03	-	-	-	-	-	-	-	-
Tumours of meninges	0.13	0.09-0.18	0.09	0.06-0.15	0.13	0.05-0.27	0.11	0.04-0.24	0.19	0.16-0.22	0.13	0.04-0.31	-	-	-	-	-	-
Meningioma	0.08	0.05-0.13	0.06	0.03-0.12	0.11	0.04-0.24	-	-	0.13	0.11-0.16	0.13	0.04-0.31	-	-	-	-	-	-
Mesenchymal tumours	0.04	0.02-0.07	-	-	-	-	-	-	0.04	0.02-0.05	-	-	-	-	-	-	-	-
Primary melanocytic lesions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other neoplasms related to the meninges	-	-	-	-	-	-	-	-	0.01	0.01-0.02	-	-	-	-	-	-	-	-
Lymphomas and hematopoietic neoplasms	0.51	0.43-0.61	0.41	0.32-0.52	0.55	0.37-0.80	0.64	0.46-0.88	0.48	0.43-0.54	0.46	0.29-0.72	0.57	0.40-0.82	0.71	0.25-1.65	0.60	0.36-0.95
Lymphoma	0.51	0.43-0.60	0.40	0.31-0.50	0.52	0.34-0.76	0.64	0.46-0.88	0.47	0.42-0.52	0.46	0.29-0.72	0.55	0.38-0.79	0.71	0.25-1.65	0.60	0.36-0.95
Other hematopoietic neoplasms	-	-	-	-	-	-	-	-	0.01	0.01-0.02	-	-	-	-	-	-	-	-
Germ cell tumours, cysts, and heterotopias	0.10	0.06-0.15	0.04	0.02-0.08	-	-	0.10	0.04-0.21	0.06	0.04-0.08	-	-	-	-	-	-	-	-
Tumours of sellar region	-	-	-	-	-	-	-	-	0.01	0.00-0.02	-	-	-	-	-	-	-	-
Unclassified tumours	0.43	0.36-0.52	0.29	0.21-0.38	0.17	0.08-0.32	0.33	0.21-0.51	0.78	0.71-0.84	0.32	0.18-0.55	0.38	0.24-0.60	-	-	0.36	0.18-0.67
Not classified by CBTRUS	0.02	0.01-0.05	0.04	0.01-0.08	-	-	-	-	0.03	0.02-0.05	-	-	-	-	-	-	-	-
Total	7.80	7.46-8.16	7.57	7.17-7.97	7.50	6.79-8.26	7.43	6.77-8.13	8.16	7.95-8.37	7.93	7.10-8.83	7.95	7.20-8.76	7.46	5.66-9.69	7.87	6.89-8.97

Notes: Rates are age-standardized to the 2011 Canadian standard population. The territories are not displayed due to small case counts. Columns may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 13: Average annual age-standardized incidence rates (per 100,000) for primary malignant central nervous system tumours by histology group and region, 2013-2017

	British Columbia		Prairie Region		Ontario		Atlantic Region	
Histology group[a] (**major**/specific)	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumours of neuroepithelial tissue	6.58	6.27-6.91	6.55	6.27-6.84	6.60	6.41-6.79	6.82	6.38-7.29
Pilocytic astrocytoma	0.17	0.12-0.24	0.24	0.19-0.30	0.25	0.21-0.29	0.29	0.20-0.42
Diffuse astrocytoma	0.16	0.12-0.22	0.32	0.26-0.39	0.39	0.34-0.44	0.45	0.33-0.59
Anaplastic astrocytoma	0.15	0.11-0.21	0.48	0.41-0.57	0.31	0.27-0.35	0.26	0.17-0.37
Unique astrocytoma variants	0.05	0.03-0.09	0.06	0.03-0.09	0.05	0.03-0.07	0.04	0.01-0.10
Glioblastoma	4.35	4.10-4.62	3.90	3.68-4.13	3.91	3.76-4.05	4.53	4.18-4.90
Oligodendroglioma	0.38	0.31-0.47	0.25	0.19-0.31	0.24	0.20-0.28	0.27	0.18-0.39
Anaplastic oligodendroglioma	0.16	0.11-0.22	0.13	0.09-0.18	0.32	0.28-0.37	0.19	0.12-0.29
Oligoastrocytic tumours	0.24	0.18-0.31	0.17	0.12-0.22	0.13	0.11-0.16	0.12	0.06-0.20
Ependymal tumours	0.18	0.13-0.24	0.23	0.18-0.29	0.23	0.20-0.27	0.16	0.10-0.26
Glioma malignant, NOS	0.41	0.33-0.50	0.53	0.45-0.62	0.45	0.40-0.50	0.31	0.22-0.43
Choroid plexus tumours	-[b]	-	-	-	-	-	-	-
Neuronal and mixed neuronal-glial tumours	0.05	0.02-0.08	0.05	0.03-0.09	0.08	0.06-0.10	-	-
Tumours of the pineal region	0.05	0.02-0.08	-	-	0.02	0.01-0.03	-	-
Embryonal tumours	0.21	0.16-0.28	0.17	0.13-0.22	0.22	0.19-0.26	0.16	0.09-0.26
Other neuroepithelial tumours	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	-	-	-	-	0.01	0.01-0.03	-	-
Tumours of meninges	0.13	0.09-0.18	0.11	0.07-0.15	0.19	0.16-0.22	0.10	0.05-0.17
Meningioma	0.08	0.05-0.13	0.07	0.05-0.11	0.13	0.11-0.16	0.06	0.03-0.13
Mesenchymal tumours	0.04	0.02-0.07	0.02	0.01-0.05	0.04	0.02-0.05	-	-
Primary melanocytic lesions	-	-	-	-	-	-	-	-
Other neoplasms related to the meninges	-	-	-	-	0.01	0.01-0.02	-	-
Lymphomas and hematopoietic neoplasms	0.51	0.43-0.61	0.49	0.41-0.57	0.48	0.43-0.54	0.55	0.44-0.69
Lymphoma	0.51	0.43-0.60	0.47	0.40-0.56	0.47	0.42-0.52	0.54	0.43-0.68
Other hematopoietic neoplasms	-	-	0.02	0.01-0.04	0.01	0.01-0.02	-	-
Germ cell tumours, cysts, and heterotopias	0.10	0.06-0.15	0.05	0.03-0.08	0.06	0.04-0.08	0.08	0.03-0.15
Tumours of sellar region	-	-	-	-	0.01	0.00-0.02	-	-
Unclassified tumours	0.43	0.36-0.52	0.27	0.21-0.34	0.78	0.71-0.84	0.34	0.25-0.46
Not classified by CBTRUS	0.02	0.01-0.05	0.03	0.02-0.06	0.03	0.02-0.05	-	-
Total	7.80	7.46-8.16	7.51	7.20-7.82	8.16	7.95-8.37	7.91	7.44-8.41

Notes: Rates are age-standardized to the 2011 Canadian standard population. Prairie region includes Alberta, Saskatchewan, and Manitoba. Atlantic region includes New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. The territories are not displayed due to small case counts. Columns may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 14: Average annual age-standardized incidence rates (per 100,000) for primary non-malignant central nervous system tumours by histology group and province, 2013-2017

	British Columbia		Alberta		Saskatchewan		Manitoba		Ontario		New Brunswick		Nova Scotia		Prince Edward Island		Newfoundland and Labrador	
Histology group[a] (**major**/specific)	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumours of neuroepithelial tissue	0.32	0.25-0.41	0.48	0.39-0.58	0.31	0.18-0.51	0.33	0.20-0.51	0.56	0.50-0.62	0.48	0.29-0.78	0.47	0.29-0.72	0.72	0.23-1.73	0.31	0.13-0.64
Unique astrocytoma variants	-[b]	-	-	-	-	-	-	-	0.03	0.02-0.05	-	-	-	-	-	-	-	-
Ependymal tumours	0.10	0.07-0.15	0.17	0.12-0.24	0.09	0.03-0.22	0.15	0.07-0.29	0.17	0.14-0.21	0.20	0.08-0.41	0.13	0.05-0.28	-	-	-	-
Choroid plexus tumours	0.03	0.01-0.06	0.04	0.02-0.08	-	-	-	-	0.04	0.02-0.06	-	-	-	-	-	-	-	-
Neuronal and mixed neuronal-glial tumours	0.17	0.12-0.23	0.23	0.17-0.31	0.19	0.09-0.35	0.12	0.05-0.25	0.29	0.25-0.34	0.15	0.05-0.35	0.28	0.14-0.49	-	-	-	-
Tumours of the pineal region	-	-	-	-	-	-	-	-	0.01	0.01-0.02	-	-	-	-	-	-	-	-
Embryonal tumours	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other neuroepithelial tumours	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	1.55	1.40-1.71	1.39	1.22-1.56	0.31	0.18-0.50	1.51	1.22-1.86	1.81	1.71-1.91	0.56	0.35-0.86	0.96	0.71-1.29	1.15	0.55-2.21	0.18	0.07-0.44
Tumours of meninges	4.60	4.34-4.87	7.16	6.78-7.57	4.43	3.88-5.03	6.46	5.85-7.12	5.10	4.93-5.26	4.11	3.52-4.79	4.57	4.01-5.20	3.59	2.43-5.19	3.39	2.77-4.14
Meningioma	4.41	4.15-4.67	6.92	6.54-7.32	4.30	3.76-4.89	6.22	5.62-6.87	4.72	4.57-4.89	3.97	3.39-4.63	4.22	3.68-4.81	3.48	2.33-5.06	3.14	2.54-3.85
Mesenchymal tumours	0.04	0.02-0.08	0.03	0.01-0.07	-	-	0.08	0.03-0.20	0.09	0.07-0.11	-	-	-	-	-	-	-	-
Primary melanocytic lesions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other neoplasms related to the meninges	0.15	0.10-0.21	0.21	0.15-0.29	-	-	0.16	0.08-0.30	0.28	0.24-0.33	0.15	0.05-0.34	0.32	0.18-0.54	-	-	0.26	0.10-0.55
Lymphomas and hematopoietic neoplasms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other hematopoietic neoplasms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germ cell tumours, cysts, and heterotopias	0.05	0.02-0.09	-	-	-	-	-	-	0.04	0.03-0.06	-	-	-	-	-	-	-	-
Tumours of sellar region	2.89	2.69-3.12	2.47	2.24-2.70	0.74	0.53-1.02	2.43	2.06-2.85	2.53	2.42-2.65	1.35	1.01-1.77	2.54	2.13-3.02	0.75	0.27-1.72	0.67	0.41-1.06
Unclassified tumours	0.34	0.27-0.42	0.35	0.27-0.45	0.18	0.09-0.34	0.28	0.17-0.45	6.43	6.24-6.61	0.22	0.11-0.43	0.13	0.05-0.29	-	-	0.70	0.41-1.12
Not classified by CBTRUS	0.20	0.14-0.26	-	-	-	-	-	-	0.10	0.08-0.13	-	-	-	-	-	-	-	-
Total	9.95	9.56-10.35	11.87	11.37-12.38	5.99	5.36-6.68	11.04	10.24-11.90	16.56	16.27-16.87	6.76	5.98-7.61	8.72	7.93-9.57	6.44	4.82-8.50	5.26	4.46-6.18

Notes: Rates are age-standardized to the 2011 Canadian standard population. The territories are not displayed due to small case counts. Only applicable histologies are displayed. Columns may not sum to totals due to rounding. CI = confidence interval.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 15: Average annual age-standardized incidence rates (per 100,000) for primary non-malignant central nervous system tumours by histology group and region, 2013-2017

	British Columbia		Prairie Region		Ontario		Atlantic Region	
Histology group[a] (**major**/specific)	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumours of neuroepithelial tissue	0.32	0.25-0.41	0.42	0.35-0.50	0.56	0.50-0.62	0.46	0.34-0.60
Unique astrocytoma variants	-[b]	-	0.02	0.01-0.04	0.03	0.02-0.05	-	-
Ependymal tumours	0.10	0.07-0.15	0.15	0.11-0.20	0.17	0.14-0.21	0.15	0.09-0.23
Choroid plexus tumours	0.03	0.01-0.06	0.03	0.02-0.06	0.04	0.02-0.06	0.05	0.02-0.11
Neuronal and mixed neuronal-glial tumours	0.17	0.12-0.23	0.20	0.16-0.26	0.29	0.25-0.34	0.21	0.13-0.32
Tumours of the pineal region	-	-	-	-	0.01	0.01-0.02	-	-
Embryonal tumours	-	-	-	-	-	-	-	-
Other neuroepithelial tumours	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	1.55	1.40-1.71	1.22	1.10-1.35	1.81	1.71-1.91	0.67	0.54-0.83
Tumours of meninges	4.60	4.34-4.87	6.50	6.21-6.80	5.10	4.93-5.26	4.11	3.77-4.47
Meningioma	4.41	4.15-4.67	6.27	5.99-6.57	4.72	4.57-4.89	3.86	3.53-4.21
Mesenchymal tumours	0.04	0.02-0.08	0.04	0.02-0.07	0.09	0.07-0.11	-	-
Primary melanocytic lesions	-	-	-	-	-	-	-	-
Other neoplasms related to the meninges	0.15	0.10-0.21	0.18	0.13-0.23	0.28	0.24-0.33	0.24	0.16-0.35
Lymphomas and hematopoietic neoplasms	-	-	-	-	-	-	-	-
Other hematopoietic neoplasms	-	-	-	-	-	-	-	-
Germ cell tumours, cysts, and heterotopias	0.05	0.02-0.09	-	-	0.04	0.03-0.06	-	-
Tumours of sellar region	2.89	2.69-3.12	2.14	1.98-2.31	2.53	2.42-2.65	1.63	1.42-1.87
Unclassified tumours	0.34	0.27-0.42	0.31	0.25-0.37	6.43	6.24-6.61	0.28	0.20-0.39
Not classified by CBTRUS	0.20	0.14-0.26	-	-	0.10	0.08-0.13	-	-
Total	9.95	9.56-10.35	10.61	10.24-10.98	16.56	16.27-16.87	7.17	6.72-7.65

Notes: Rates are age-standardized to the 2011 Canadian standard population. Prairie region includes Alberta, Saskatchewan, and Manitoba. Atlantic region includes New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. The territories are not displayed due to small case counts. Only applicable histologies are displayed. Columns may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 16: Age-standardized incidence rates (per 100,000) for all primary central nervous system tumours by histology group and diagnosis year, Canada (excluding Quebec), 2010-2017

	2010		2011		2012		2013		2014		2015		2016		2017	
Histology group[a] (**major**/specific)	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumours of neuroepithelial tissue	7.31	6.99-7.65	7.42	7.09-7.76	7.30	6.98-7.63	7.53	7.20-7.86	6.87	6.57-7.19	7.18	6.87-7.50	6.98	6.67-7.29	6.85	6.56-7.16
Pilocytic astrocytoma	0.29	0.23-0.37	0.26	0.20-0.32	0.25	0.20-0.32	0.20	0.15-0.26	0.26	0.21-0.33	0.28	0.22-0.35	0.23	0.18-0.29	0.22	0.17-0.29
Diffuse astrocytoma	0.43	0.35-0.52	0.45	0.38-0.54	0.39	0.32-0.48	0.35	0.29-0.43	0.28	0.22-0.35	0.37	0.30-0.44	0.39	0.32-0.47	0.30	0.24-0.38
Anaplastic astrocytoma	0.29	0.23-0.36	0.28	0.22-0.35	0.26	0.20-0.33	0.38	0.31-0.46	0.30	0.24-0.38	0.29	0.23-0.36	0.32	0.26-0.40	0.28	0.23-0.35
Unique astrocytoma variants	0.08	0.05-0.12	0.04	0.02-0.07	0.10	0.06-0.14	0.08	0.05-0.12	0.07	0.04-0.11	0.05	0.03-0.09	0.08	0.05-0.12	0.08	0.05-0.13
Glioblastoma	3.82	3.58-4.07	4.00	3.76-4.25	3.99	3.75-4.24	4.06	3.83-4.31	3.96	3.73-4.20	4.04	3.81-4.28	4.11	3.88-4.35	4.07	3.84-4.31
Oligodendroglioma	0.27	0.21-0.34	0.28	0.22-0.35	0.26	0.20-0.32	0.26	0.20-0.33	0.26	0.20-0.33	0.33	0.27-0.41	0.24	0.19-0.31	0.24	0.19-0.31
Anaplastic oligodendroglioma	0.24	0.18-0.30	0.24	0.18-0.30	0.16	0.12-0.22	0.26	0.20-0.32	0.21	0.16-0.27	0.28	0.22-0.35	0.23	0.18-0.29	0.20	0.15-0.26
Oligoastrocytic tumours	0.38	0.31-0.46	0.36	0.29-0.44	0.29	0.23-0.37	0.36	0.29-0.44	0.24	0.19-0.31	0.13	0.09-0.18	0.04	0.02-0.08	0.04	0.02-0.07
Ependymal tumours	0.39	0.32-0.47	0.38	0.31-0.46	0.41	0.34-0.49	0.39	0.32-0.47	0.34	0.28-0.42	0.35	0.29-0.43	0.39	0.32-0.47	0.36	0.29-0.44
Glioma malignant, NOS	0.49	0.41-0.59	0.57	0.48-0.67	0.53	0.45-0.63	0.51	0.43-0.61	0.36	0.29-0.43	0.47	0.39-0.56	0.41	0.34-0.49	0.47	0.40-0.56
Choroid plexus tumours	0.05	0.02-0.08	0.05	0.03-0.08	0.04	0.02-0.07	0.03	0.01-0.05	0.06	0.03-0.10	0.04	0.02-0.07	0.02	0.01-0.05	0.05	0.03-0.08
Neuronal and mixed neuronal-glial tumours	0.31	0.25-0.38	0.33	0.26-0.40	0.31	0.24-0.38	0.36	0.30-0.44	0.31	0.24-0.38	0.28	0.22-0.36	0.26	0.20-0.33	0.32	0.25-0.39
Tumours of the pineal region	0.05	0.02-0.08	0.03	0.01-0.06	0.06	0.03-0.09	0.05	0.03-0.08	0.03	0.01-0.05	0.03	0.01-0.05	0.03	0.01-0.05	0.04	0.02-0.07
Embryonal tumours	0.23	0.17-0.29	0.17	0.12-0.22	0.26	0.20-0.32	0.23	0.18-0.30	0.19	0.14-0.25	0.22	0.17-0.29	0.22	0.17-0.29	0.15	0.11-0.20
Other neuroepithelial tumours	-[b]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	1.80	1.64-1.97	1.58	1.43-1.74	1.71	1.56-1.88	1.53	1.39-1.69	1.73	1.58-1.89	1.45	1.31-1.60	1.43	1.29-1.58	1.53	1.38-1.68
Tumours of meninges	5.82	5.52-6.12	5.86	5.57-6.16	6.04	5.75-6.35	5.65	5.37-5.94	5.38	5.11-5.66	5.28	5.01-5.55	5.36	5.10-5.64	5.01	4.76-5.28
Meningioma	5.43	5.15-5.72	5.52	5.23-5.81	5.63	5.35-5.93	5.29	5.02-5.58	5.08	4.81-5.35	4.96	4.70-5.22	5.00	4.75-5.27	4.66	4.42-4.92
Mesenchymal tumours	0.12	0.08-0.18	0.11	0.08-0.16	0.16	0.11-0.21	0.09	0.06-0.13	0.09	0.06-0.13	0.09	0.06-0.14	0.11	0.07-0.15	0.08	0.05-0.12
Primary melanocytic lesions	0.03	0.01-0.06	-	-	0.03	0.01-0.05	-	-	-	-	-	-	-	-	0.02	0.01-0.05
Other neoplasms related to the meninges	0.23	0.18-0.30	0.22	0.17-0.29	0.23	0.17-0.29	0.26	0.21-0.33	0.21	0.16-0.27	0.22	0.17-0.29	0.25	0.20-0.32	0.25	0.19-0.31
Lymphomas and hematopoietic neoplasms	0.36	0.29-0.44	0.46	0.38-0.55	0.45	0.37-0.54	0.48	0.40-0.57	0.48	0.40-0.57	0.55	0.46-0.64	0.49	0.41-0.58	0.48	0.41-0.57
Lymphoma	0.35	0.28-0.44	0.44	0.36-0.53	0.44	0.37-0.53	0.47	0.39-0.56	0.46	0.39-0.55	0.54	0.46-0.64	0.48	0.41-0.57	0.46	0.39-0.55
Other hematopoietic neoplasms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.01-0.05
Germ cell tumours, cysts, and heterotopias	0.12	0.08-0.17	0.14	0.10-0.19	0.11	0.08-0.16	0.13	0.09-0.19	0.06	0.03-0.09	0.09	0.06-0.14	0.09	0.06-0.13	0.11	0.08-0.16
Tumours of sellar region	2.72	2.52-2.93	2.85	2.65-3.06	2.57	2.38-2.77	2.59	2.40-2.79	2.57	2.38-2.76	2.30	2.12-2.49	2.45	2.27-2.64	2.21	2.04-2.39
Unclassified tumours	4.29	4.04-4.55	3.87	3.64-4.12	3.87	3.64-4.11	3.93	3.69-4.17	4.03	3.80-4.28	3.87	3.64-4.11	3.85	3.63-4.09	4.18	3.95-4.42
Not classified by CBTRUS	0.08	0.05-0.13	0.12	0.08-0.17	0.09	0.06-0.14	0.08	0.05-0.12	0.09	0.06-0.13	0.07	0.04-0.11	0.16	0.12-0.22	0.18	0.14-0.24
Total	22.51	21.93-23.10	22.29	21.72-22.87	22.16	21.60-22.73	21.92	21.37-22.49	21.21	20.67-21.76	20.79	20.26-21.33	20.81	20.29-21.35	20.56	20.04-21.09

Notes: Rates are age-standardized to the 2011 Canadian standard population. Columns may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 17: Age-standardized incidence rates (per 100,000) for primary malignant central nervous system tumours by histology group and diagnosis year, Canada (excluding Quebec), 2010-2017

	2010		2011		2012		2013		2014		2015		2016		2017	
Histology group[a] (**major**/specific)	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumours of neuroepithelial tissue	6.82	6.50-7.15	6.91	6.60-7.24	6.80	6.49-7.12	7.00	6.69-7.32	6.40	6.11-6.71	6.71	6.41-7.02	6.58	6.28-6.88	6.35	6.06-6.65
Pilocytic astrocytoma	0.29	0.23-0.37	0.26	0.20-0.32	0.25	0.20-0.32	0.20	0.15-0.26	0.26	0.21-0.33	0.28	0.22-0.35	0.23	0.18-0.29	0.22	0.17-0.29
Diffuse astrocytoma	0.43	0.35-0.52	0.45	0.38-0.54	0.39	0.32-0.48	0.35	0.29-0.43	0.28	0.22-0.35	0.37	0.30-0.44	0.39	0.32-0.47	0.30	0.24-0.38
Anaplastic astrocytoma	0.29	0.23-0.36	0.28	0.22-0.35	0.26	0.20-0.33	0.38	0.31-0.46	0.30	0.24-0.38	0.29	0.23-0.36	0.32	0.26-0.40	0.28	0.23-0.35
Unique astrocytoma variants	0.06	0.03-0.09	0.03	0.01-0.06	0.07	0.04-0.11	0.07	0.04-0.10	0.05	0.03-0.08	0.04	0.02-0.07	0.05	0.03-0.09	0.05	0.02-0.08
Glioblastoma	3.82	3.58-4.07	4.00	3.76-4.25	3.99	3.75-4.24	4.06	3.83-4.31	3.96	3.73-4.20	4.04	3.81-4.28	4.11	3.88-4.35	4.07	3.84-4.31
Oligodendroglioma	0.27	0.21-0.34	0.28	0.22-0.35	0.26	0.20-0.32	0.26	0.20-0.33	0.26	0.20-0.33	0.33	0.27-0.41	0.24	0.19-0.31	0.24	0.19-0.31
Anaplastic oligodendroglioma	0.24	0.18-0.30	0.24	0.18-0.30	0.16	0.12-0.22	0.26	0.20-0.32	0.21	0.16-0.27	0.28	0.22-0.35	0.23	0.18-0.29	0.20	0.15-0.26
Oligoastrocytic tumours	0.38	0.31-0.46	0.36	0.29-0.44	0.29	0.23-0.37	0.36	0.29-0.44	0.24	0.19-0.31	0.13	0.09-0.18	0.04	0.02-0.08	0.04	0.02-0.07
Ependymal tumours	0.25	0.19-0.32	0.19	0.14-0.25	0.25	0.19-0.31	0.22	0.17-0.29	0.21	0.16-0.27	0.20	0.15-0.26	0.24	0.18-0.30	0.21	0.16-0.27
Glioma malignant, NOS	0.49	0.41-0.59	0.57	0.48-0.67	0.53	0.45-0.63	0.51	0.43-0.61	0.36	0.29-0.43	0.47	0.39-0.56	0.41	0.34-0.49	0.47	0.40-0.56
Choroid plexus tumours	-[b]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Neuronal and mixed neuronal-glial tumours	0.05	0.02-0.08	0.08	0.05-0.12	0.05	0.03-0.08	0.06	0.03-0.10	0.05	0.03-0.09	0.05	0.03-0.08	0.07	0.04-0.11	0.08	0.05-0.12
Tumours of the pineal region	0.02	0.01-0.05	0.02	0.01-0.05	0.04	0.02-0.07	0.04	0.02-0.07	0.02	0.01-0.04	-	-	-	-	0.02	0.01-0.05
Embryonal tumours	0.22	0.17-0.28	0.16	0.12-0.22	0.25	0.20-0.32	0.23	0.18-0.29	0.19	0.14-0.25	0.21	0.16-0.28	0.22	0.17-0.29	0.15	0.10-0.20
Other neuroepithelial tumours	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	-	-	0.02	0.01-0.04	-	-	-	-	-	-	-	-	0.03	0.01-0.05	-	-
Tumours of meninges	0.20	0.15-0.26	0.21	0.16-0.27	0.22	0.17-0.29	0.16	0.12-0.22	0.15	0.11-0.20	0.11	0.08-0.16	0.12	0.08-0.17	0.20	0.15-0.26
Meningioma	0.11	0.07-0.16	0.15	0.10-0.20	0.12	0.08-0.17	0.12	0.08-0.17	0.10	0.07-0.15	0.07	0.04-0.11	0.08	0.05-0.12	0.15	0.11-0.20
Mesenchymal tumours	0.05	0.02-0.08	0.05	0.02-0.08	0.08	0.05-0.12	0.03	0.01-0.06	0.03	0.01-0.06	0.03	0.01-0.06	0.04	0.02-0.07	0.03	0.01-0.06
Primary melanocytic lesions	0.02	0.01-0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other neoplasms related to the meninges	0.02	0.01-0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lymphomas and hematopoietic neoplasms	0.36	0.29-0.44	0.46	0.38-0.55	0.45	0.37-0.54	0.48	0.40-0.57	0.47	0.40-0.56	0.55	0.46-0.64	0.49	0.41-0.58	0.48	0.41-0.57
Lymphoma	0.35	0.28-0.44	0.44	0.36-0.53	0.44	0.37-0.53	0.47	0.39-0.56	0.46	0.39-0.55	0.54	0.46-0.64	0.48	0.41-0.57	0.46	0.39-0.55
Other hematopoietic neoplasms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.01-0.05
Germ cell tumours, cysts, and heterotopias	0.09	0.05-0.13	0.08	0.05-0.12	0.08	0.05-0.12	0.07	0.04-0.11	0.04	0.02-0.07	0.06	0.04-0.10	0.08	0.05-0.12	0.07	0.04-0.11
Tumours of sellar region	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unclassified tumours	0.66	0.57-0.77	0.65	0.56-0.76	0.57	0.48-0.66	0.66	0.56-0.76	0.61	0.52-0.71	0.60	0.52-0.70	0.57	0.49-0.67	0.39	0.32-0.47
Not classified by CBTRUS	0.02	0.01-0.05	0.05	0.03-0.08	0.03	0.01-0.06	-	-	0.02	0.01-0.05	0.02	0.01-0.05	0.03	0.01-0.06	0.05	0.03-0.09
Total	8.18	7.83-8.54	8.39	8.04-8.75	8.17	7.83-8.52	8.41	8.07-8.76	7.72	7.39-8.05	8.07	7.74-8.41	7.91	7.59-8.24	7.56	7.25-7.88

Notes: Rates are age-standardized to the 2011 Canadian standard population. Columns may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 18: Age-standardized incidence rates (per 100,000) for primary non-malignant central nervous system tumours by histology group and diagnosis year, Canada (excluding Quebec), 2010-2017

	2010		2011		2012		2013		2014		2015		2016		2017	
Histology group[a] (**major**/specific)	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumours of neuroepithelial tissue	0.50	0.41-0.59	0.50	0.42-0.60	0.50	0.42-0.60	0.53	0.44-0.62	0.47	0.39-0.56	0.47	0.39-0.56	0.40	0.33-0.48	0.50	0.42-0.59
Unique astrocytoma variants	0.02	0.01-0.04	-[b]	-	0.03	0.01-0.06	-	-	0.02	0.01-0.05	0.02	0.01-0.04	0.02	0.01-0.05	0.04	0.02-0.07
Ependymal tumours	0.14	0.10-0.20	0.19	0.14-0.25	0.16	0.12-0.22	0.17	0.12-0.23	0.14	0.10-0.19	0.15	0.11-0.20	0.15	0.11-0.21	0.15	0.11-0.20
Choroid plexus tumours	0.04	0.02-0.07	0.04	0.02-0.07	0.03	0.02-0.06	0.02	0.01-0.05	0.06	0.03-0.09	0.04	0.02-0.07	-	-	0.05	0.02-0.08
Neuronal and mixed neuronal-glial tumours	0.26	0.20-0.33	0.25	0.19-0.32	0.26	0.20-0.33	0.31	0.24-0.38	0.25	0.19-0.32	0.23	0.18-0.30	0.19	0.14-0.25	0.24	0.18-0.30
Tumours of the pineal region	0.02	0.01-0.05	-	-	0.02	0.01-0.04	-	-	-	-	-	-	-	-	0.02	0.01-0.05
Embryonal tumours	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other neuroepithelial tumours	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tumours of cranial and spinal nerves	1.79	1.63-1.96	1.56	1.41-1.72	1.70	1.55-1.87	1.52	1.37-1.67	1.72	1.57-1.88	1.45	1.31-1.60	1.41	1.27-1.55	1.52	1.38-1.67
Tumours of meninges	5.62	5.33-5.92	5.65	5.37-5.95	5.82	5.54-6.12	5.49	5.22-5.78	5.23	4.97-5.51	5.16	4.90-5.44	5.24	4.98-5.52	4.81	4.56-5.07
Meningioma	5.32	5.04-5.61	5.37	5.09-5.66	5.51	5.23-5.80	5.17	4.91-5.45	4.97	4.71-5.24	4.89	4.63-5.15	4.92	4.67-5.19	4.51	4.27-4.76
Mesenchymal tumours	0.08	0.05-0.12	0.07	0.04-0.11	0.08	0.05-0.12	0.06	0.03-0.10	0.06	0.04-0.10	0.06	0.03-0.10	0.07	0.04-0.11	0.05	0.03-0.09
Primary melanocytic lesions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other neoplasms related to the meninges	0.21	0.16-0.27	0.21	0.16-0.28	0.22	0.17-0.28	0.26	0.20-0.32	0.20	0.15-0.26	0.22	0.17-0.28	0.25	0.19-0.31	0.24	0.18-0.30
Lymphomas and hematopoietic neoplasms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other hematopoietic neoplasms	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germ cell tumours, cysts, and heterotopias	0.03	0.02-0.07	0.06	0.03-0.09	0.03	0.02-0.06	0.06	0.04-0.10	-	-	0.03	0.01-0.06	-	-	0.04	0.02-0.07
Tumours of sellar region	2.71	2.51-2.92	2.84	2.64-3.05	2.56	2.37-2.76	2.58	2.40-2.78	2.56	2.37-2.75	2.30	2.12-2.48	2.44	2.26-2.63	2.20	2.04-2.38
Unclassified tumours	3.63	3.40-3.87	3.22	3.01-3.45	3.30	3.09-3.53	3.27	3.06-3.49	3.42	3.21-3.65	3.27	3.06-3.49	3.28	3.07-3.50	3.79	3.57-4.02
Not classified by CBTRUS	0.06	0.03-0.10	0.07	0.04-0.11	0.06	0.04-0.10	0.06	0.04-0.10	0.07	0.04-0.11	0.05	0.03-0.09	0.13	0.09-0.18	0.13	0.09-0.18
Total	14.33	13.87-14.80	13.90	13.45-14.36	13.99	13.54-14.44	13.52	13.08-13.96	13.49	13.06-13.93	12.72	12.30-13.14	12.90	12.49-13.33	13.00	12.58-13.42

Notes: Rates are age-standardized to the 2011 Canadian standard population. Only applicable histologies are displayed. Columns may not sum to totals due to rounding. CI = confidence interval.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Estimates based on fewer than 5 observed cases are suppressed.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 19: Average annual cases and age-standardized incidence rates (per 100,000 using the 2000 US standard population) for all primary central nervous system tumours by histology group and behaviour, Canada (excluding Quebec), US Cancer Statistics, 2013-2017

	Canada									United States								
	Total			Malignant			Non-malignant			Total			Malignant			Non-malignant		
Histology group[a]	per year	Rate	95% CI	per year	Rate	95% CI	per year	Rate	95% CI	per year	Rate	95% CI	per year	Rate	95% CI	per year	Rate	95% CI
Tumours of neuroepithelial tissue	1997	6.44	6.31-6.58	1867	5.96	5.84-6.09	130	0.48	0.44-0.52	22611	6.56	6.52-6.60						
Pilocytic astrocytoma	65	0.28	0.25-0.31	65	0.28	0.25-0.31	[b]			1033	0.35	0.34-0.36	1033	0.35	0.34-0.36			
Diffuse astrocytoma	94	0.32	0.29-0.36	94	0.32	0.29-0.36				1486	0.45	0.44-0.46	1486	0.45	0.44-0.46			
Anaplastic astrocytoma	88	0.29	0.27-0.32	88	0.29	0.27-0.32				1423	0.42	0.41-0.43	1423	0.42	0.41-0.43			
Unique astrocytoma variants	20	0.07	0.06-0.09	14	0.05	0.04-0.06	6	0.02	0.02-0.04	225	0.07	0.07-0.08	154	0.05	0.04-0.05	71	0.02	0.02-0.03
Glioblastoma	1159	3.41	3.33-3.51	1159	3.41	3.33-3.51				12011	3.23	3.20-3.25	12011	3.23	3.20-3.25			
Oligodendroglioma	73	0.26	0.23-0.29	73	0.26	0.23-0.29				740	0.23	0.23-0.24	740	0.23	0.23-0.24			
Anaplastic oligodendroglioma	65	0.21	0.19-0.24	65	0.21	0.19-0.24				372	0.11	0.11-0.12	372	0.11	0.11-0.12			
Oligoastrocytic tumours	44	0.15	0.13-0.17	44	0.15	0.13-0.17				314	0.10	0.09-0.10	314	0.10	0.09-0.10			
Ependymal tumours	102	0.36	0.33-0.40	60	0.22	0.19-0.25	42	0.14	0.12-0.17	1369	0.42	0.41-0.43	794	0.25	0.24-0.26	574	0.17	0.17-0.18
Glioma malignant, NOS	125	0.44	0.40-0.48	125	0.44	0.40-0.48				1619	0.51	0.50-0.52	1619	0.51	0.50-0.52			
Choroid plexus tumours	11	0.04	0.03-0.06	1	0.00	0.00-0.01	10	0.04	0.03-0.05	165	0.05	0.05-0.06	26	0.01	0.01-0.01	140	0.05	0.04-0.05
Neuronal and mixed neuronal-glial tumours	84	0.31	0.28-0.35	17	0.06	0.05-0.07	66	0.26	0.23-0.29	987	0.32	0.31-0.33	189	0.06	0.05-0.06	797	0.26	0.25-0.27
Tumours of the pineal region	9	0.03	0.02-0.04	6	0.02	0.01-0.03	4	0.01	0.01-0.02	157	0.05	0.05-0.05	89	0.03	0.03-0.03	68	0.02	0.02-0.02
Embryonal tumours	56	0.24	0.21-0.27	55	0.24	0.21-0.27	1	0.00	0.00-0.01	689	0.23	0.23-0.24						
Other neuroepithelial tumours	2	0.01	0.00-0.01	[c]	-	-	-	-	-	21	0.01	0.01-0.01	13	0	0.00-0.01	8	0	0.00-0.00
Tumours of cranial and spinal nerves	426	1.38	1.32-1.44	3	0.01	0.01-0.02	423	1.37	1.31-1.43	7120	2.03	2.01-2.05						
Tumours of meninges	1507	4.63	4.52-4.74	42	0.14	0.12-0.16	1465	4.49	4.39-4.60	32724	9.09	9.04-9.13						
Meningioma	1413	4.31	4.21-4.42	29	0.09	0.08-0.11	1384	4.22	4.12-4.33	31808	8.81	8.77-8.86	350	0.10	0.09-0.10	31458	8.72	8.67-8.76
Mesenchymal tumours	26	0.08	0.07-0.10	9	0.03	0.02-0.04	17	0.05	0.04-0.07	292	0.09	0.08-0.09						
Primary melanocytic lesions	2	0.01	0.00-0.01	1	0.00	0.00-0.01	-	-	-	22	0.01	0.00-0.01						
Other neoplasms related to the meninges	66	0.22	0.20-0.25	2	0.01	0.00-0.02	**64**	**0.22**	**0.19-0.24**	602	0.18	0.17-0.19						
Lymphomas and hematopoietic neoplasms	143	0.42	0.39-0.45	142	0.42	0.39-0.45	-	-	-	1630	0.45	0.44-0.46						
Lymphoma	139	0.41	0.38-0.44	139	0.41	0.38-0.44				1584	0.43	0.42-0.44	1584	0.43	0.42-0.44			
Other hematopoietic neoplasms	3	0.01	0.01-0.02	3	0.01	0.01-0.02	-	-	-	46	0.01	0.01-0.02						
Germ cell tumours, cysts, and heterotopias	26	0.11	0.09-0.13	17	0.07	0.06-0.09	9	0.04	0.03-0.05	317	0.11	0.10-0.11	219	0.07	0.07-0.08	98	0.03	0.03-0.03
Tumours of sellar region	677	2.20	2.12-2.27	2	0.01	0.00-0.01	675	2.19	2.12-2.27	14668	4.39	4.36-4.43						
Unclassified tumours	1131	3.55	3.45-3.64	163	0.50	0.46-0.53	969	3.05	2.96-3.14	4012	1.16	1.14-1.17						
Not classified by CBTRUS	33	0.12	0.10-0.14	8	0.03	0.02-0.04	25	0.09	0.07-0.11									
Total	5941	18.84	18.62-19.06	2245	7.13	7.00-7.27	3695	11.70	11.53-11.88	83082	23.79	23.71-23.86	24697	7.08	7.04-7.12	58385	16.71	16.64-16.77

Notes: Rates are age-standardized to the 2000 US standard population. Columns and rows may not sum to totals due to rounding. CI = confidence interval; NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

[b] Empty cells indicate the histology is not applicable for non-malignant tumours.

[c] Estimates based on fewer than 5 observed cases over the five-year period are suppressed.

Dark grey cells in the United States columns represent data not reported.

Data Source: Canadian Cancer Registry at Statistics Canada and Table 3 adapted from CBTRUS[18]

Table 20: Projected number of all newly diagnosed primary central nervous system tumours by histology group, sex and in children, Canada, 2020 and 2021

	2020				2021			
Histology group[a] (**major**/specific)	Total	Males	Females	Children (0-14 years)	Total	Males	Females	Children (0-14 years)
Tumours of neuroepithelial tissue	2875	1670	1205	210	2926	1700	1226	212
Pilocytic astrocytoma	87	43	44	47	88	43	45	47
Diffuse astrocytoma	131	76	56	11	133	77	56	11
Anaplastic astrocytoma	124	69	55	5	126	70	56	5
Unique astrocytoma variants	27	17	11	5	28	17	11	5
Glioblastoma	1717	1009	708	11	1754	1030	723	11
Oligodendroglioma	100	61	40	0	101	61	40	0
Anaplastic oligodendroglioma	90	53	36	0	91	54	37	0
Oligoastrocytic tumours	61	34	27	1	62	34	28	1
Ependymal tumours	141	82	58	22	142	83	59	22
Glioma malignant, NOS	179	98	81	33	182	100	82	33
Choroid plexus tumours	14	7	7	6	14	7	7	6
Neuronal and mixed neuronal-glial tumours	114	66	48	20	115	66	48	20
Tumours of the pineal region	13	7	5	2	13	8	5	2
Embryonal tumours	75	48	27	46	75	48	28	47
Other neuroepithelial tumours	2	1	1	1	2	1	1	1
Tumours of cranial and spinal nerves	598	296	302	8	605	300	306	8
Tumours of meninges	2185	701	1484	7	2227	717	1511	7
Meningioma	2054	633	1421	3	2095	648	1447	4
Mesenchymal tumours	36	15	21	1	36	16	21	1
Primary melanocytic lesions	3	2	1	1	3	2	1	1
Other neoplasms related to the meninges	92	51	41	1	93	52	42	1
Lymphomas and hematopoietic neoplasms	214	118	96	1	219	121	98	1
Lymphoma	209	116	94	0	215	118	96	0
Other hematopoietic neoplasms	4	2	2	1	4	2	2	1
Germ cell tumours, cysts, and heterotopias	35	25	10	16	35	25	10	17
Tumours of sellar region	960	499	460	15	975	508	467	15
Unclassified tumours	1668	733	935	38	1707	752	955	38
Not classified by CBTRUS	46	24	22	7	47	24	23	8
Total	8580	4067	4514	302	8741	4146	4594	304

Notes: Projected estimates are for all of Canada, including Quebec. Columns and rows may not sum to totals due to rounding. NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 21: Projected number of newly diagnosed primary malignant central nervous system tumours by histology group, sex and in children, Canada, 2020 and 2021

	2020				2021			
Histology group[a] (**major**/specific)	Total	Males	Females	Children (0-14 years)	Total	Males	Females	Children (0-14 years)
Tumours of neuroepithelial tissue	2699	1567	1132	181	2748	1595	1153	182
Pilocytic astrocytoma	87	43	44	47	88	43	45	47
Diffuse astrocytoma	131	76	56	11	133	77	56	11
Anaplastic astrocytoma	124	69	55	5	126	70	56	5
Unique astrocytoma variants	19	12	7	2	20	12	7	2
Glioblastoma	1717	1009	708	11	1754	1030	723	11
Oligodendroglioma	100	61	40	0	101	61	40	0
Anaplastic oligodendroglioma	90	53	36	0	91	54	37	0
Oligoastrocytic tumours	61	34	27	1	62	34	28	1
Ependymal tumours	82	45	37	19	83	46	38	19
Glioma malignant, NOS	179	98	81	33	182	100	82	33
Choroid plexus tumours	1	0	1	1	1	0	1	1
Neuronal and mixed neuronal-glial tumours	24	15	10	1	25	15	10	1
Tumours of the pineal region	8	5	3	2	8	5	3	2
Embryonal tumours	74	47	27	46	74	47	27	46
Other neuroepithelial tumours	1	1	1	1	1	1	1	1
Tumours of cranial and spinal nerves	4	3	2	0	4	3	2	0
Tumours of meninges	60	29	31	3	61	29	32	3
Meningioma	42	21	21	1	43	21	22	1
Mesenchymal tumours	12	4	8	1	12	4	8	1
Primary melanocytic lesions	2	1	1	1	2	1	1	1
Other neoplasms related to the meninges	3	2	1	1	3	2	1	1
Lymphomas and hematopoietic neoplasms	214	118	96	1	219	121	98	1
Lymphoma	209	116	94	0	215	118	96	0
Other hematopoietic neoplasms	4	2	2	1	4	2	2	1
Germ cell tumours, cysts, and heterotopias	23	19	4	11	23	19	4	11
Tumours of sellar region	3	1	2	0	3	1	2	0
Unclassified tumours	246	125	121	4	252	129	123	4
Not classified by CBTRUS	11	6	6	1	12	6	6	1
Total	3260	1867	1393	201	3322	1903	1419	202

Notes: Projected estimates are for all of Canada, including Quebec. Columns and rows may not sum to totals due to rounding. NOS = not otherwise specified.

[a] Defined as per the Central Brain Tumour Registry of the United States.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 22: Projected number of newly diagnosed primary non-malignant central nervous system tumours by histology group, sex and in children, Canada, 2020 and 2021

	2020				2021			
Histology group[a] (**major**/specific)	Total	Males	Females	Children (0-14 years)	Total	Males	Females	Children (0-14 years)
Tumours of neuroepithelial tissue	176	104	72	30	178	105	73	30
Unique astrocytoma variants	8	5	3	3	8	5	4	3
Ependymal tumours	58	37	21	2	59	38	21	2
Choroid plexus tumours	13	7	6	5	13	7	6	5
Neuronal and mixed neuronal-glial tumours	89	51	38	19	90	52	38	19
Tumours of the pineal region	5	3	2	0	5	3	2	0
Embryonal tumours	1	1	1	0	1	1	1	0
Other neuroepithelial tumours	1	1	1	0	1	1	1	0
Tumours of cranial and spinal nerves	593	293	300	8	601	297	304	8
Tumours of meninges	2125	673	1453	4	2167	688	1479	4
Meningioma	2012	612	1400	3	2052	626	1425	3
Mesenchymal tumours	24	11	13	0	24	11	13	0
Primary melanocytic lesions	1	1	1	0	1	1	1	0
Other neoplasms related to the meninges	89	49	40	1	90	50	41	1
Lymphomas and hematopoietic neoplasms	0	0	0	0	0	0	0	0
Other hematopoietic neoplasms	0	0	0	0	0	0	0	0
Germ cell tumours, cysts, and heterotopias	12	6	6	5	12	6	6	5
Tumours of sellar region	957	498	458	15	972	507	465	15
Unclassified tumours	1422	608	814	34	1454	623	831	34
Not classified by CBTRUS	35	18	17	7	35	18	17	7
Total	5320	2200	3121	101	5419	2243	3175	102

Notes: Projected estimates are for all of Canada, including Quebec. Only applicable histologies are displayed. Columns and rows may not sum to totals due to rounding.

[a] Defined as per the Central Brain Tumour Registry of the United States.

Data Source: Canadian Cancer Registry at Statistics Canada

Table 23: Average annual deaths and age-standardized mortality rates (per 100,000) for all primary central nervous system tumours by site and behaviour, Canada, 2014-2018 (excluding Yukon Territory for 2017/2018)

	Total			Malignant			Non-malignant		
Site[a]	Deaths per year	Rate	95% CI	Deaths per year	Rate	95% CI	Deaths per year	Rate	95% CI
Brain (C71, D33.0, D33.1, D33.2, D43.0, D43.1, D43.2)	2359	6.11	6.00-6.22	2184	5.66	5.55-5.77	175	0.45	0.42-0.48
Meninges (C70, D32, D42)	169	0.43	0.40-0.46	25	0.06	0.05-0.08	144	0.37	0.34-0.39
Pituitary and craniopharyngeal duct (C75.1, C75.2, D35.2, D35.3, D44.3, D44.4)	38	0.10	0.09-0.11	4	0.01	0.01-0.02	34	0.09	0.08-0.10
Other nervous system (C72, C75.3, D33.3, D33.4, D33.7, D33.9, D35.4, D43.3, D43.4, D43.7, D43.9, D44.5)	33	0.09	0.07-0.10	21	0.06	0.05-0.07	12	0.03	0.02-0.04
Total	2599	6.73	6.61-6.85	2235	5.79	5.69-5.90	364	0.94	0.89-0.98

Notes: Rates are age-standardized to the 2011 Canadian standard population. Columns and rows may not sum to totals due to rounding. Yukon death data were not available for 2017 and 2018. CI = confidence interval.

[a] Site definitions are based on the International Statistical Classification of Diseases and Related Health Problems, 10th revision.

Data Source: Canadian Vital Statistics Death Database at Statistics Canada

Table 24: Average annual deaths and age-standardized mortality rates (per 100,000 using the 2000 US standard population) for all primary central nervous system tumours by site and behaviour, Canada, 2014-2018 (excluding Yukon Territory for 2017/2018)

	Total			Malignant			Non-malignant		
Site[a]	Deaths per year	Rate	95% CI	Deaths per year	Rate	95% CI	Deaths per year	Rate	95% CI
Brain (C71, D33.0, D33.1, D33.2, D43.0, D43.1, D43.2)	2359	5.26	5.16-5.36	2184	4.87	4.78-4.96	175	0.39	0.37-0.42
Meninges (C70, D32, D42)	169	0.37	0.34-0.40	25	0.06	0.05-0.07	144	0.31	0.29-0.34
Pituitary and craniopharyngeal duct (C75.1, C75.2, D35.2, D35.3, D44.3, D44.4)	38	0.09	0.07-0.10	4	0.01	0.01-0.01	34	0.08	0.07-0.09
Other nervous system (C72, C75.3, D33.3, D33.4, D33.7, D33.9, D35.4, D43.3, D43.4, D43.7, D43.9, D44.5)	33	0.09	0.07-0.10	21	0.06	0.05-0.07	12	0.03	0.02-0.04
Total	2599	5.80	5.70-5.91	2235	4.99	4.90-5.09	364	0.81	0.77-0.85

Notes: Rates are age-standardized to the 2000 US standard population. Columns and rows may not sum to totals due to rounding. Yukon death data were not available for 2017 and 2018. CI = confidence interval.

[a] Site definitions are based on the International Statistical Classification of Diseases and Related Health Problems, 10th revision.

Data Source: Canadian Vital Statistics Death Database at Statistics Canada

Table 25: Age-standardized mortality rates (per 100,000) for all primary central nervous system tumours by site and year of death, Canada, 2010-2018 (excluding Yukon Territory for 2017/2018)

	2010		2011		2012		2013		2014		2015		2016		2017		2018	
Site[a]	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Brain (C71, D33.0, D33.1, D33.2, D43.0, D43.1, D43.2)	6.12	5.85-6.39	6.17	5.91-6.44	6.10	5.84-6.36	6.25	5.99-6.51	6.25	6.00-6.51	6.21	5.96-6.47	6.20	5.95-6.45	6.14	5.90-6.39	5.77	5.53-6.01
Meninges (C70, D32, D42)	0.42	0.36-0.50	0.40	0.34-0.47	0.41	0.35-0.49	0.42	0.35-0.49	0.43	0.36-0.50	0.43	0.36-0.50	0.42	0.36-0.49	0.46	0.39-0.53	0.42	0.36-0.49
Pituitary and craniopharyngeal duct (C75.1, C75.2, D35.2, D35.3, D44.3, D44.4)	0.09	0.06-0.12	0.07	0.04-0.10	0.07	0.05-0.11	0.09	0.06-0.12	0.11	0.08-0.15	0.08	0.05-0.11	0.11	0.08-0.15	0.10	0.07-0.14	0.10	0.07-0.13
Other nervous system (C72, C75.3, D33.3, D33.4, D33.7, D33.9, D35.4, D43.3, D43.4, D43.7, D43.9, D44.5)	0.09	0.06-0.12	0.08	0.06-0.12	0.08	0.05-0.11	0.09	0.06-0.13	0.09	0.06-0.13	0.09	0.06-0.12	0.08	0.06-0.12	0.11	0.08-0.14	0.07	0.05-0.10
Total	6.71	6.44-7.00	6.72	6.45-7.00	6.66	6.40-6.94	6.84	6.57-7.12	6.88	6.62-7.16	6.80	6.54-7.07	6.81	6.55-7.08	6.80	6.55-7.07	6.35	6.11-6.61

Notes: Rates are age-standardized to the 2011 Canadian standard population. Columns may not sum to totals due to rounding. Yukon death data were not available for 2017 and 2018. CI = confidence interval.

[a] Site definitions are based on the International Statistical Classification of Diseases and Related Health Problems, 10th revision.

Data Source: Canadian Vital Statistics Death Database at Statistics Canada

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Appendix

Brain Tumour Registry of Canada (BTRC), brain and other central nervous system tumour histology groupings

Histology Groups	**ICD-O-3 Histology and Behavior Code***
Tumours of Neuroepithelial Tissue	
pilocytic astrocytoma	9421/1,3; 9425/3
diffuse astrocytoma	9400/3; 9410/3; 9410/3; 9420/3
anaplastic astrocytoma	9401/3
unique astrocytoma	9381/3; 9384/1; 9424/3
glioblastoma	9440/3; 9441/3; 9442/3
oligodendroglioma	9450/3
anaplastic oligoodendroglioma	9401/3
choroid plexus tumours	9390/0,1,3;
oligoastrocytic tumours	9382/3
ependymal tumours	9383/1; 9391/3; 9392/3; 9393/3; 9394/1
glioma malignant, Not otherwise specified	9380/3
neuronal and mixed neuronal-glial tumours	8680/0,1,3; 8681/1; 8690/1; 8693/1,3; 9412/1; ; 9413/0; 9442/1; 9492/0 Site C751 excluded; 9493/0; 9505/1,3; 9506/1; 9509/1; 9522/3; 9523/3
tumors of the pineal region	9360/1; 9361/1; 9362/3; 9395/3;
embryonal tumours	8963/3; 9364/3; 9470-9474/3; 9480/3; 9490/3,0; 9500-9502/3; 9508/3
other neuroepithelial tumours	9363/0, 9423/3, 9430/3, 9444/1
Tumors of Cranial and Spinal nerves	9540/0,1,3; 9541,0; 9550/0; 9560/0,1,3; 9561/3, 9570/0; 9571/0,3; 9562/0
Tumours of the Meninges	
meningioma	9530/0,1,3; 9531/0; 9532/0; 9533/0; 9534/0; 9537/0; 9538/1,3; 9539/1,3
mesenchymal tumours	8324/0; 8800/0,3; 8801-8806/3; 8810/0,3; 8815/0,3; 8824/0,1; 8830/0,1,3; 8831/0; 8835/0; 8836/0; 8850/0,1,3; 8851-8852/0,3; 8853/3; 8854/0,3; 8857/0,3; 8861/0; 8870/0; 8880/0; 8890/0,1,3; 8897/1; 8901-8902/3; 8910/3; 8912/3; 8920/1,3; 8921/3; 8935/0,1; 8990/0,1,3; 9040/0,3; 9136/1; 9150/0,1,3; 9170/0,3; 9180/0,3; 9210/0; 9241/0; 9260/3; 9373/0;
primary melanocytic lesions	8720/3; 8728/0,1,3; 8770-8771/0,3;

other neoplasms related to the meninges	9160/1; 9220/0,1,3; 9231/3; 9240/3; 9243/3; 9370-9372/3; 9535/0
Lymphomas & Hematopoietic Neoplasms	
lymphoma	9590-9591/3; 9596/3; 9650-9655/3; 9659/3; 9661-9665/3; 9667/3; 9670/3; 9671/3; 9673/3; 9675/3; 9680/3; 9684/3; 9687/3; 9690/3; 9691/3; 9695/3; 9698-9699/3; 9701/3; 9702/3; 9705/3; 9714/3; 9719/3; 9728/3; 9729/3;
other hematopoietic neoplasms	9727/3; 9731/3; 9733-9734/3; 9740/1,3; 9741/3; 9750/3; 9751-9753/1; 9754-9758/3; 9760/3; 9766/1; 9823/3; 9826/3; 9827/3; 9832/3; 9827/3; 9832/3; 9837/3; 9860/3; 9861/3; 9866/3; 9930/3; 9970/1
Germ Cell Tumors, Cysts and Heterotopias	8020/3; 8440/0,3; 9060-9061/3; 9064-9065/3; 9070-9072/3; 9080/0,1,3; 9081-9083/3; 9084/0,3; 9085/3; 9100/3; 9101/3;
Tumours of the Sellar Region	8040/0,1; 8140/0,1,3; 8146/0; 8246/3; 8260/0,3; 8270/0,3; 8271/0; 8272/0,3; 8280/0,3; 8281/0,3; 8290/0,3; 8300/0,3; 8310/0,3; 8323/0,3; 9492/0 Site C751 only; 9582/0; 9350-9352/1;
Unclassified Tumors	9120/0,3; 9121/0; 9122/0,3; 9123/0; 9125/0; 9130/0,1,3; 9131/0; 9133/1,3; 9140/3; 8000/0,1,3; 8001/0,1,3; 8002-8004/3; 8005/0,3; 8010/0, 8010/1,3; 8021/3; 8320/3; 8452/1; 8710/3; 8711/0,3; 8713/0; 8811/3; 8840/0,3; 8896/3; 8980/3; 91730/0; 9503/3; 9580/0,3;
Not Classified by Central Brain Tumor Registry of United States (CBTRUS)	8050/1; 8246/0; 8272/1; 8683/3; 8712/0; 8720/0; 8726/0; 8772/0; 8821/1; 8858/3; 9084/1; 9120-9121/1; 9160/0; 9161/0,3; 9172/0; 9350/0,3; 9380/0,1; 9383/3; 9384/0; 9391/0,1; 9393/0; 9394/3; 9400/0,1; 9401/0; 9413/1; 9424/0; 9430/0; 9440/1; 9451/0; 9490/1; 9505/0; 9522/1; 9531/1,3; 9532/1; 9534/1; 9537/1,3; 9538-9539/0; 9571/1; 9581/3; 9688/3; 9712/3; 9751/3; 9971/3

*International Classification of Diseases for Oncology, 3rd Edition, 2000. World Health Organization, Geneva, Switzerland.

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