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CBTRUS Statistical Report: Primary Brain and Other Central Nervous System Tumors Diagnosed in the United States in 2009–2013

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Introduction

The objective of the *CBTRUS Statistical Report: Primary Brain and Other Central Nervous System Tumors Diagnosed in the United States in 2009–2013* is to provide a comprehensive summary of the current descriptive epidemiology of primary brain and other central nervous system (CNS) tumors in the United States (US) population. CBTRUS obtained the latest available data on all newly diagnosed primary brain and CNS tumors from the Centers for Disease Control and Prevention (CDC), National Program of Cancer Registries (NPCR), and the National Cancer Institute (NCI), Surveillance, Epidemiology, and End Results (SEER) program for diagnosis years 2009–2013. Incidence counts and rates of primary malignant and non-malignant brain and other CNS tumors are documented by histology, sex, age, race, and Hispanic ethnicity. Mortality rates calculated using the National Vital Statistics System (NVSS) data from 2009–2013, and relative survival rates for selected malignant and non-malignant histologies calculated using SEER data for the period 2000–2013 are also presented.

Background

CBTRUS is a unique professional research organization that focuses exclusively on providing high quality statistical data on the population-based incidence of primary brain and other CNS tumors in the US (for more information on CBTRUS see: http://www.cbtrus.org/aboutus.html). CBTRUS was incorporated as a nonprofit 501(c)(3) in 1992 following a study conducted by the American Brain Tumor Association (ABTA) to determine the feasibility of a central registry focused on primary brain and other CNS tumors in the US.

CBTRUS is currently the only population-based site-specific registry in the US that works in partnership with a public cancer surveillance organization, the CDC's NPCR, and from which data are directly received under a special agreement. This agreement permits transfer of data through the National Program of Central Registries Cancer Surveillance System (NPCR-CSS) Submission Specifications mechanism,[1] the system utilized for collection of central (state) cancer data as mandated in 1992 by Public Law 102–515, the Cancer Registries Amendment Act.[2] This mandate was expanded with the 2002 passage of Public Law 107–260 to include non-malignant CNS tumors diagnosed starting January 1, 2004.[3] CBTRUS researchers combine the NPCR data with data from the SEER program[4] of the NCI, which was established for national cancer surveillance in the early 1970s. All data from NPCR and SEER originate from tumor registrars who adhere to the Uniform Data Standards (UDS) for malignant and non-malignant brain and other CNS tumors as directed by the North American Association of Cancer Registries (NAACCR) (http://www.naaccr.org). Along with the UDS, there are quality control checks and a system for rating each central cancer registry (CCR) to further insure that these data are reported as accurately and completely as possible. As a surveillance partner, CBTRUS can, therefore, report high quality data on brain and other CNS tumors with histological specificity useful to the communities it serves. Its database is comprised of the largest histology-specific aggregation of population-based data limited to the incidence of primary brain and other CNS tumors in the US, and it is likely the largest histology-specific aggregation of primary brain and other CNS tumor cases in the world. There are several other brain-specific registry systems in existence, including the Austrian Brain Tumor Registry,[5] the Swedish Brain Tumor Registry,[6] as well as other population-based epidemiological studies of brain and other central nervous system tumors which cover a smaller population base. Aggregate information on all cancers from all CCR in the US, including primary brain and other CNS tumors, is available from the *United States Cancer Statistics*.[7]

For this nineteenth statistical report and fifth report published as a supplement to *Neuro-Oncology*, the official journal of the Society for Neuro-Oncology (http://www.soc-neuro-onc.org), CBTRUS continues its past efforts to provide the most up-to-date population-based incidence rates for all primary brain and other CNS tumors by histology, age, sex, race, and Hispanic

ethnicity. These data have been organized by clinically relevant histology groupings and reflect the *2007 WHO Classification of Tumours of the Central Nervous System*.[8,9] These data provide important information for allocation and planning of specialty healthcare services such as clinical trials, disease prevention and control programs, and research activities. These data may also lead to clues that will stimulate research into the causes of this group of diseases which cause significant morbidity and mortality.

Technical Notes

Data Collection

CBTRUS does not collect data directly from patients' medical records. Registration of individual cases is conducted by cancer registrars at the institution where diagnosis occurs and is then transmitted to the CCR, which further transmits this information to NPCR or SEER. As noted, data for CBTRUS analyses come from the NPCR and SEER programs. By law, all primary malignant and non-malignant CNS tumors are reportable diseases. Hence, tumor registrars in treatment centers collect these data and send this information to CCR in their states where they are collated and de-identified and sent to NPCR and SEER. Brain and other CNS tumors are reported using the site definition described in Public Law 107–260.[3] On an annual basis, NPCR secures permission from CCR to release their data on brain and other CNS tumors to CBTRUS. CCR play an essential role in the collection process, diagrammatically presented in Fig. 1. These data are population-based and, therefore, by definition, represent a comprehensive documentation of all cancers diagnosed within a geographic region over a period of time.

CBTRUS obtained incidence data from 51 CCR (46 NPCR and 5 SEER) that include cases of malignant and non-malignant (benign and uncertain) primary brain and other CNS tumors. The population-based CCR include 50 state registries and the District of Columbia. **Data were requested for all newly-diagnosed primary malignant and non-malignant tumors from 2009 to 2013 at any of the following anatomic sites: brain, meninges, spinal cord, cranial nerves, and other parts of the central nervous system, pituitary and pineal glands, and olfactory tumors of the nasal cavity** (Table 1).[10]

NPCR provided data on 361,802 primary brain and CNS tumors diagnosed from 2009 to 2013. An additional 15,357 primary brain and CNS tumor case records for the time period were obtained from SEER. These data were combined into a single data set for analyses. A total of 9,042 records (2.5%) were deleted from the final analytic data set for one or more of the following reasons: invalid site/histology combination, duplicate records that included a less accurate reporting source than microscopic confirmation (e.g. radiographic versus microscopic confirmation. Microscopic confirmation may also be referred to as histologic confirmation), duplicate records for bilateral vestibular schwannoma or meningioma, duplicate record for recurrent disease, and errors in time sequence of diagnosis. The final analytic data set included 368,117 records from all 51 population-based CCR.

Age-adjusted incidence rates per 100,000 population for the entire US for selected other cancers were obtained from the United States Cancer Statistics (USCS),[7] produced by the CDC and the NCI, via CDC Wide-ranging Online Data for Epidemiologic Research (WONDER), for the purpose of comparison with brain and CNS tumor incidence rates.[7] This database includes both NPCR and SEER data and represents approximately 100% of the US population.

Survival data for malignant brain and other CNS tumors were obtained from 18 SEER registries for the years 2000 to 2013, and survival data for non-malignant brain and other CNS tumors were obtained from 18 SEER registries for the years 2004 to 2013. This dataset provides population-based information for approximately 26% of the US population,[11] and is a subset of the data used for the incidence calculations presented in this report. Survival information derived from active patient follow-up is not available in the data that CBTRUS receives from NPCR registries, so the SEER data are used for the generation of these tables.

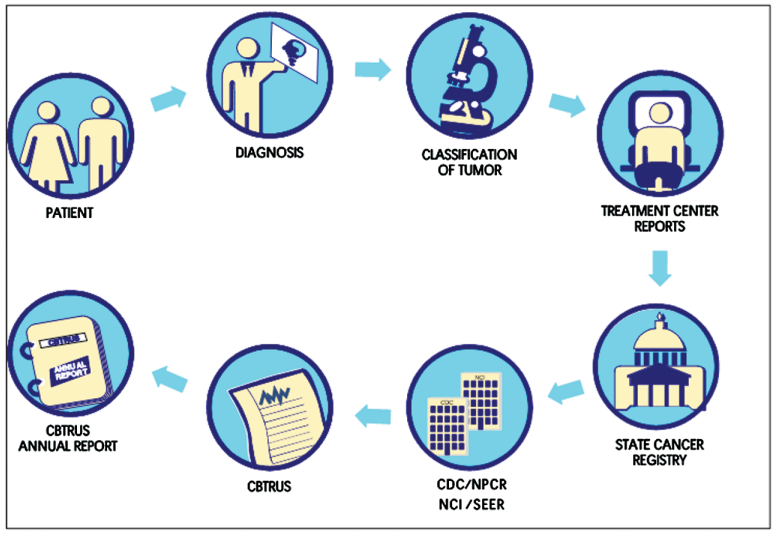


Fig. 1. Schematic of Cancer Registration Process for CBTRUS Reporting.

Mortality data used in this report are from the National Center for Health Statistics and include deaths where primary brain or other CNS tumor was listed as cause of death on the death certificate for individuals from all 50 states and the District of Columbia. These data were obtained from the National Vital Statistics System[12] (which includes death certification data for 100% of the US population) for malignant brain and other CNS tumors and comparison via SEER*Stat (for malignant brain tumors and comparison cancers).

Definitions

Measures in Surveillance Epidemiology

This report presents the following population-based measures: incidence rates, mortality rates, and relative survival rates (for more information on definitions of terms and measures used see: http://www.cbtrus.org/glossary/glossary1.html).

Comparing incidence rates between statistical reports from different reporting agencies or previous CBTRUS statistical reports is not recommended due to differences in case definition, data collection, rate calculations, and/or reporting delays.

Classification by Behavior, Histology, and WHO Grade

There are over 100 histologically distinct types of primary central nervous system (CNS) tumors, each with its own spectrum of clinical presentations, treatments, and outcomes. This report uses the most recent 2012 CBTRUS histology grouping scheme (Table 2a). The classification scheme utilizes ICD-O-3 codes[10] and may include morphology codes that were not previously reported to CBTRUS.[13] Tables 2b and 2c list malignant only and non-malignant only histologies, respectively. In this report, incidence rates are provided by major histology grouping and specific histology.

Unlike other types of cancer, brain tumors are not staged. They are classified according to the World Health Organization (WHO) 2000 *Classification of Tumours of the Central Nervous System*[14] which assigns a grade (grade I through grade IV) based on predicted clinical behavior. Though the WHO classification scheme was also updated in 2007[8] and 2016[15] these updated schema have not been fully implemented by US CCR. Updates made in 2007 may affect diagnostic practices used in characterization of individual tumors included in this report, though the newest revision would not affect any cases included in this report. With the increased recognition of the value of biomarkers for specific brain tumor histologies in classification, the *WHO Classification of Tumours of the Central Nervous System* has included biomarkers in its 2016 revision. However, implementing the collection of these markers in cancer registration is multi-faceted and includes among other tasks software accommodations. WHO grading assignments are recorded by cancer registrars as Collaborative Stage Site-Specific Factor 1 - World Health Organization (WHO) Grade Classification according to the American Joint Commission on Cancer's (AJCC) Collaborative Staging (CS) schema.[16] Cancer staging is a critical component of determining cancer prognosis and treatment in clinical care and provides a rubric for evaluating how much cancer is in a person's body and where the cancer is located. The AJCC CS schema provides a consistent framework for recording variables related to staging. This variable has been a required component of cancer registry data collection for brain and other CNS tumors since 2004 for SEER registries, and since 2011 for NPCR registries. A previous study by CBTRUS analyzed the completeness and concordance of WHO grading in SEER data from 2004–2011, and found that both of these factors have improved significantly over time.[17] As a result, CBTRUS reports statistics related to this variable in the *CBTRUS Statistical Report: Primary Brain and Other Central Nervous System Tumors Diagnosed in the United States in 2009–2013*. Completeness of this variable is defined as having a value equal to WHO grade I, II, III, or IV. Cases where WHO grade is marked as not applicable, or not documented, are considered to be incomplete.

Gliomas are tumors that arise from glial or precursor cells and include astrocytoma (including glioblastoma), oligodendroglioma, ependymoma, oligoastrocytoma (mixed glioma), malignant glioma, not otherwise specified (NOS), and a few rare histologies. Because there is no standard definition for glioma, CBTRUS defines glioma as ICD-O-3 histology codes 9380–9384, and 9391–9460 as starred in Tables 2a, 2b, and 2c. It is also important to note that the statistics for lymphomas and hematopoietic neoplasms contained in this report refer only to those lymphomas and hematopoietic neoplasms that arise in the brain and CNS.

This report also utilizes the International Classification of Childhood Cancer (ICCC) grouping system for pediatric cancers. ICCC categories for this report were generated using the SEER Site/Histology ICCC-3 Recode[18] based on the ICCC, Third edition[19] and 2007 WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues (See the CBTRUS website for additional information on this classification scheme: http://www.cbtrus.org). The ICCC was developed in 1996 with subsequent changes made to correlate with revisions to ICD-O in order to provide a standard classification of childhood tumors for comparing incidence and survival across regions and time periods. As shown, the Table 17 age-group category total, age 0–19 years age-group count, and age-specific and age-adjusted rates are equivalent to those presented throughout this report, even though the histology grouping scheme differs from that used by CBTRUS. The CBTRUS grouping scheme is specific to brain and other CNS tumors and correlates with the 2000 *WHO Classification of Tumours of the Central Nervous System* that is the current standard for cancer registration procedures in the US.

Anatomic Location of Tumor Sites

Various terms are used to describe the regions of the brain and other central nervous system. The specific sites used in this report are broadly based on the categories and site codes defined in the SEER Site/Histology Validation List.[20] See Table 1 for an overview of CBTRUS primary site groupings. The CBTRUS Site/Validation List can be found on the CBTRUS website (http://www.cbtrus.org).

Measurement and Statistical Methods

Counts, means, rates, ratios, proportions, and other relevant statistics were calculated using R 3.2.3 statistical software[21] and/or SEER*Stat 8.3.2.[22] Figures were created in R 3.2.3[21] using rgeos,[23] rgdal,[24] maptools,[25] ggplot2,[26] plotrix,[27] and SEER2R.[28] Statistics are suppressed when counts are fewer than 16 within a cell but included in totals except when data are suppressed from only one cell within a category to prevent identification of the number in the suppressed cell. Note that reported percentages may not add up to 100% due to rounding.

Population data for each geographic region were obtained from the SEER program website[29] for the purpose of rate calculation.

Age-adjusted incidence rates and 95% confidence intervals[30] for malignant and non-malignant tumors and for selected histology groupings by sex, race, Hispanic ethnicity, and pediatric, adolescent, young adult, and adult age groups were estimated per 100,000 population. Age-adjustment was based on one-year age groupings and standardized to the 2000 US standard population. The age distribution of the 2000 US standard population is shown in Appendix A. Combined populations for the regions included in this report are shown in Appendix B and Appendix C.

CBTRUS presents statistics on the pediatric and adolescent age group 0–19 years for clinical relevance and describes specific brain and other CNS tumor patterns in age groups 0–4, 5–9, 10–14, and 15–19 years. However, the 0–14 year age group is a standard age category for childhood cancer used by other cancer surveillance organizations and has been included in this report for consistency and comparison purposes. Race categories in this report are all races, White, Black, American Indian/Alaskan Native (AIAN), and Asian/Pacific Islander (API). Other race, unspecified, and unknown race are included in statistics that are not race-specific. Hispanic ethnicity was defined using the NAACCR Hispanic Identification Algorithm, version 2, data element, which utilizes a combination of cancer registry data fields (Spanish/Hispanic Origin data element, birthplace, race, and surnames) to directly and indirectly classify cases as Hispanic or non-Hispanic.[31]

When comparing two rates to one another, it is important to consider whether they are truly different or whether the difference in the estimates may be due to random error. There are several methods used in this report for determining whether two values are 'significantly different,' meaning whether the evidence meets a level of strength (usually a 5% chance of error) where the difference can be assumed to not be due to random error. There are two methods that are used to determine whether a difference between rates is statistically significant in this report. The first is through 95% confidence intervals, which are calculated for all presented rates. A 95% confidence interval is a range around an estimate which, if sampling of the population was repeated, should contain the 'true' value for the population 95% of the time. If the confidence intervals of two estimates do not overlap, these values are considered to be significantly different with a less than 5% probability of happening by chance. The second method for determining whether two values are different is through the calculation of p values. A p value is the probability of finding the observed or more extreme results by chance alone, and a p value of < 0.05 (or 5% chance of results being due to chance) is conventionally used as a cut off for considering a value statistically significant. Therefore, a p value < 0.0001 could be interpreted as meaning the observed value (or a more extreme value) had a $< 0.01\%$ chance of occurring by chance alone and the difference can be considered statistically significant at the 0.01% level.

Brain Tumor Definition Differences

It should be noted that NPCR, SEER, and NAACCR report brain tumors differently from CBTRUS. The definition of brain and other CNS tumors used by these organizations in their published incidence and mortality statistics includes tumors located in the following sites with their ICD-O-3 site codes in parentheses: brain, meninges, and other central nervous system tumors (C70.0–9, C71.0–9, and C72.0–9), but *excludes* lymphoma and leukemia histologies (9590–9989) from all brain and other CNS sites.[9]

In contrast, CBTRUS reports data on all tumor morphologies located within the Consensus Conference site definition including lymphoma and other hematopoietic histologies (9590–9989), as well as olfactory tumors of the nasal cavity [C30.0 (9522–9523)].[13] Additionally, CBTRUS reports data on all brain and other CNS tumors irrespective of behavior, whereas many reporting organizations may only publish rates for malignant brain and other CNS tumors. **It is important to understand these differences in definition, as they influence the direct comparison of published rates.**

In the US, cancer registries and surveillance groups only collect data on primary CNS tumors (meaning tumors that originate within the brain and spinal cord) and do not collect data on tumors that metastasize to the brain or spinal cord from other primary sites. As a result, **only primary brain and other CNS tumors are included in this report.**

Estimation of Expected Numbers of Brain and Other CNS Tumors in 2016 and 2017

Estimated numbers of expected malignant and non-malignant brain and other CNS tumors were calculated for 2016 and 2017. To project estimates of newly diagnosed brain and other CNS tumors in 2016 and 2017, age-adjusted annual brain tumor incidence rates were generated for 2000–2013 for malignant tumors, and 2006–2013 for non-malignant tumors. These were generated by state, age, and histologic type. Joinpoint 4.2.0.2[32] was used to fit regression models to these incidence rates,[33] which were used to predict numbers of cases in future years using the parameter from the selected models. The models allowed for a maximum of 2 joinpoints (1 for non-malignant tumors), a minimum of 3 observations from a joinpoint to either end of the data, and a minimum of 3 observations between joinpoints.[34] Modified Bayesian Information Criterion procedures included in Joinpoint were used to select the best fitting model.

Estimation of Mortality Rates for Brain and Other CNS Tumors

Age-adjusted mortality rates for deaths resulting from all malignant brain and other CNS tumors were calculated using

the mortality data available in the CDC WONDER Online Database provided by National Center for Health Statistics (NCHS) per 100,000 population.[35] In addition to the total age-adjusted rate for the US, age-adjusted rates are presented by sex and state.

Estimation of Survival Rates

SEER*Stat 8.3.2 statistical software was used to estimate one-, two-, three-, four-, five-, and ten-year relative survival rates for primary malignant CNS tumor cases diagnosed between 2000–2013 in eighteen SEER areas[22,36] and for primary non-malignant CNS tumor cases diagnosed between 2004–2013. This software utilizes life-table (actuarial) methods to compute survival estimates and accounts for current follow-up. Survival was estimated for brain (C71.0-C71.9), meninges (C70.0-C70.9), spinal cord, cranial nerves, and other parts of the central nervous system (C72.0-C72.9), pituitary and pineal glands (C75.1-C75.3), and olfactory tumors of the nasal cavity [C30.0 (9522–9523)]. Second or later primary tumors, cases diagnosed at autopsy, cases in which race or sex is coded as other or unknown, and cases known to be alive but for whom follow-up time could not be calculated, were excluded from the SEER survival data analyses. For selected non-malignant brain and other CNS tumors relative survival rates were estimated for one-, two-, five-, and ten- years using the 18 SEER areas for 2004–2013. Relative survival for NCI age groups and selected non-malignant histologies was also estimated for one-, two-, and five- years.

Estimation of Time Trends

Joinpoint 4.2.02[32] was used to estimate incidence time trends and generate annual percentage change (APC) and 95% confidence intervals. The joinpoint regression program fits a linear regression to annual incidence rates to test significance of changes over-time, with different trends lines connected at 'joinpoints' where there are changes in the direction of incidence trends. Annual percent change (APC) is the average percent change in incidence per year over the time period included in the trend segment. The best fitting model was determined through permutation tests, with a minimum of three observations required between two joinpoints as well as a minimum of three observations required between a joinpoint and either end of the data.

Data Interpretation

The CBTRUS works diligently to support the broader surveillance efforts aimed at improving the collection and reporting of primary brain and other CNS tumors. CCR data provided to NPCR and SEER and, subsequently, to CBTRUS vary from year-to-year due to ongoing updates in collection and data refinement aimed to improve completeness and accuracy. **Therefore, it is important to note that data from previous CBTRUS Reports cannot be compared to data in this current report, *CBTRUS Statistical Report: Primary Brain and Other Central Nervous System Tumors Diagnosed in the United States in 2009–2013. This current report supersedes all previous Reports in terms of coverage of the US population with the most up-to-date information, making these data the most accurate and timely to reference.***

Random fluctuations in average annual rates are common, especially for rates based on small case counts. The CBTRUS policy to suppress data presentation for cells with counts of fewer than 16 cases is consistent with the NPCR policy.

As noted in the *Annual Report to the Nation on the Status of Cancer, 1975–2010, Featuring Prevalence of Comorbidity and Impact on Survival Among Persons with Lung, Colorectal, Breast, or Prostate Cancer* and in the *2013 CBTRUS Statistical Report*, the policy change enacted in 2007 guiding the Veterans Health Administration (VHA) had resulted in underreporting of cancer data—especially for men—to central cancer registries. The ongoing process to clarify this policy indicates that underreporting for VHA facilities has diminished over time, and that the Veterans Affairs Central Cancer Registry (VACCR) now captures approximately 87–90% of cases.[37,38]

Delays in reporting and late ascertainment are a reality and a known issue influencing registry completeness and, consequently, rate underestimations occur, especially for the most recent years.[39,40] The SEER program allows for reporting delay of up to 22 months prior to public data release, but additional cases may still be discovered after that point.[41] On average across all cancer sites, the submissions for the most recent diagnosis year are approximately 4% lower than the total number of cases that will eventually be submitted. CBTRUS also recognizes that this problem may be even more likely to occur in the reporting of non-malignant brain and other CNS tumors, where reporting often comes from non-hospital-based sources, and mandated collection is relatively recent (January 1, 2004). Type of diagnostic confirmation may also lead to increased reporting delay, with histologically confirmed tumors being subject to less reporting delay than radiographically confirmed tumors.

CBTRUS editing practices are conducted yearly. These practices are aimed at refining the data for accuracy and clinical relevance and play a role in interpreting these Report data. Exclusion of site and histology combinations considered to be invalid by the consulting neuropathologists who revised the CBTRUS site/histology validation list in 2012 may have the impact of underestimating the incidence of brain and other CNS tumors. Editing changes, such as reconsidering paired sites as multiple tumors rather than a single bilateral tumor beginning in 2004, also incorporate updates to the cancer registration coding rules that influence case ascertainment and data collection.[9]

Population estimates used for denominators affect incidence rates. CBTRUS has utilized population estimates based on the 2000 US Census in this report.

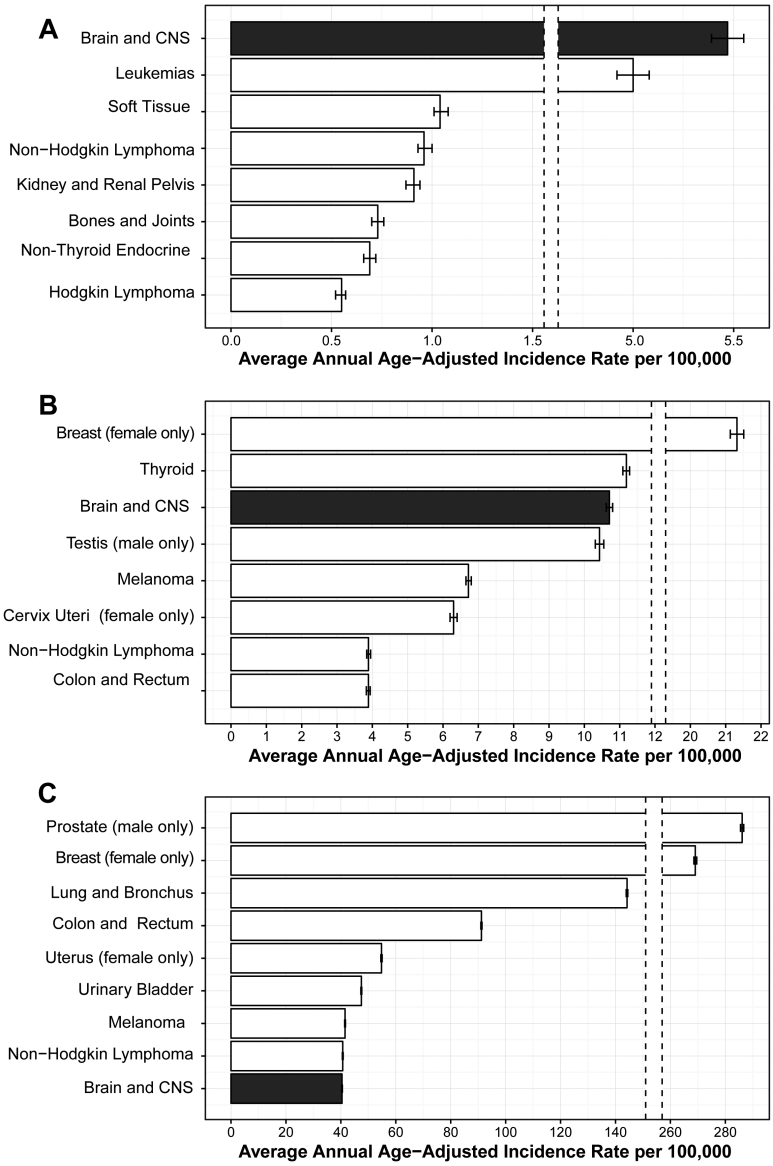
Results

Primary Brain and Other CNS Tumors: Incidence and Mortality in Comparison to Other Common Neoplasms in the US

Average annual age-adjusted incidence rates for primary brain and other CNS tumors (2009–2013) and a selection of common

cancers (2009–2013) in the US are presented by age in Fig. 2, A) Children (Age 0–14 Years), 2, B) Adolescents and Young Adults (Age 15–39 Years), and 2, C) Adults (Age 40+ Years).

- Brain and other CNS tumors are the most common cancer site among those age 0–14 years, with an average annual age-adjusted incidence rate of 5.47 per 100,000 population. Leukemia is the second most common neoplasm in those age 0–14 years, with an average annual age-adjusted incidence rate of 5.00 per 100,000 population.
- Breast cancer (females only) is the most common cancer among those age 15–39 years, with average annual age-adjusted incidence rates of 21.32 per 100,000. Thyroid cancer is the most common cancer in males age 15–39 years, and second most common cancer for females age 15–39 years, with overall average annual adjusted incidence rates of 11.19 per 100,000. Brain and other CNS (both malignant and non-malignant tumors) among those age 15–39 years have an average annual age-adjusted incidence of 10.71 per 100,000 population.
- Prostate and breast cancer are the most common cancers among those age 40+ years in the US, with average annual age-adjusted incidence rates of 286.11 per 100,000 population (males only) and 269.06 per 100,000 (females only) population, respectively.[7]
- Brain and other CNS (both malignant and non-malignant) tumors among those age 40+ years have an average annual age-adjusted incidence of 40.10 per 100,000 population.



a. Rates per 100,000 and age-adjusted to the 2000 United States standard population.

Fig. 2. Average Annual Age-Adjusted Incidence Rates[a] of All Primary Brain and Other CNS Tumors in Comparison to Other Common Cancers for A) Children Age 0-14 Years, B) Adolescents and Young Adults Age 15-39 Years, and C) Older Adults Age 40+ Years, CBTRUS Statistical Report: NPCR and SEER 2009-2013, USCS, 2009-2013.

Average annual age-adjusted mortality rates for primary brain and other CNS tumors, a selection of common cancers, and the top three non-cancer causes of death in the US are presented by age in Figs. 3, A) (Age 0–14 Years), 3, B) (Age 15–39 Years), and 3, C) (Age 40+ Years).

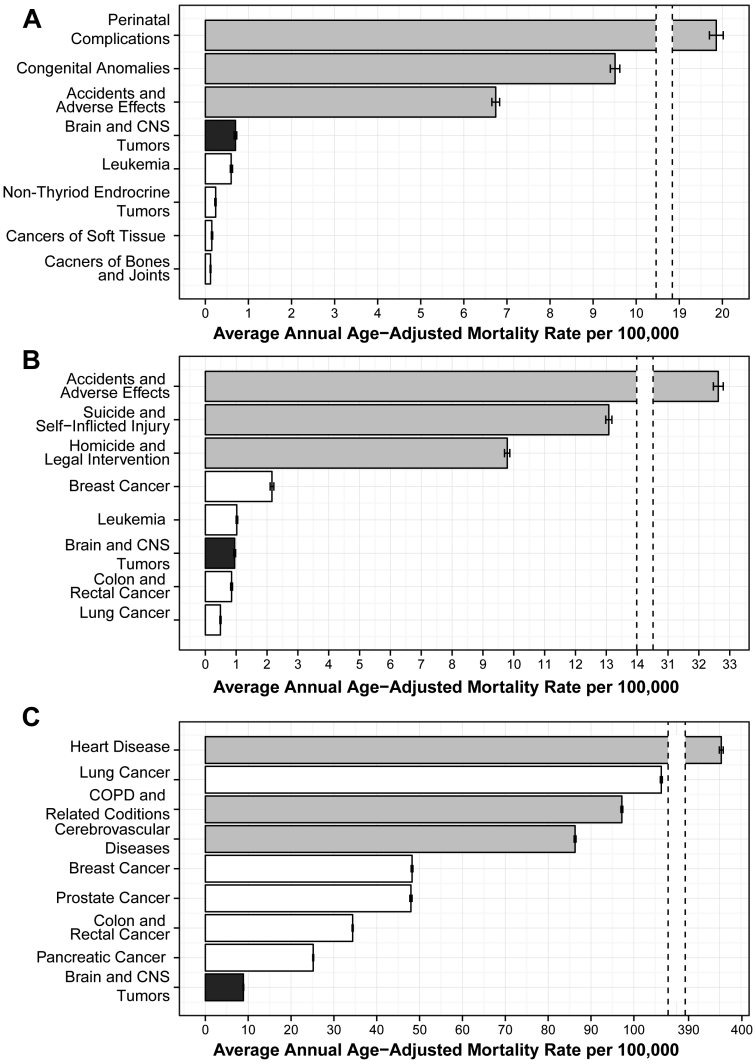
- The most common causes of death in persons age 0–14 years are conditions originating in the perinatal period (19.86 per 100,000). Brain and other CNS tumors among persons age 0–14 years have an average annual age-adjusted mortality rate of 0.70 per 100,000.
- Accidents and adverse effects are the leading causes of death in persons age 15–39 years. Brain and other CNS tumors among persons age 15–39 years have an average annual age-adjusted mortality rate of 0.95 per 100,000.
- Heart disease is largest contributor to mortality in persons age 40+ years in the US, with an average annual age adjusted mortality rate of 397.40 per 100,000. Brain and other CNS tumors among persons age 40+ years have an average annual age-adjusted mortality rate of 8.89 per 100,000.

Primary Brain and Other CNS Tumors: Distributions and Incidence by Sex, Age, Year, Behavior, WHO Grade, and CCR

Counts and rates from the 368,117 incident brain and other CNS tumors (117,906 malignant; 250,211 non-malignant shown in Fig. 4) reported during 2009–2013 by histology and demographic characteristics for all ages are presented in Tables 3–6. The predominant tumor categories by behavior are presented in Fig. 4.

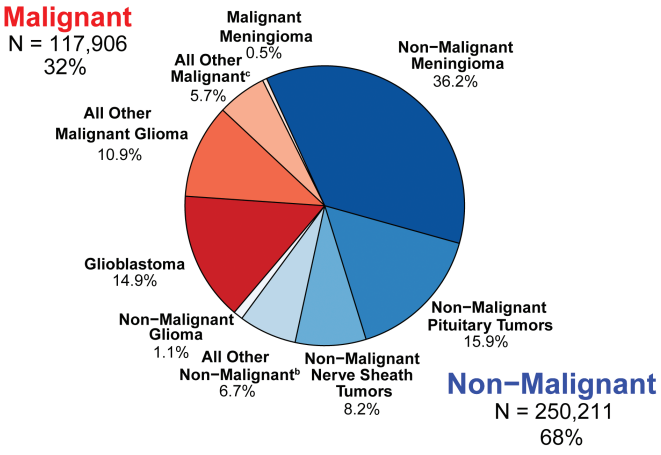
Incidence Rates by Sex and Behavior

- Overall, 42.1% of all tumors diagnosed between 2009 and 2013 occurred in males (154,816 tumors) and 57.9% in females (213,301 tumors).



a. National Vital Statistics System

Fig. 3. Average Annual Age-Adjusted Mortality Rates of All Primary Brain and Other CNS Tumors in Comparison to Other Common Cancers and Top Three Non-Cancer Causes of Death for A) Children Age 0-14 Years, B) Adolescents and Young Adults Age 15-39 Years, and C) Older Adults Age 40+ Years, CBTRUS Statistical Report: NVSS[a], 2009-2013.



a. Percentages may not add up to 100% due to rounding. b. Includes histologies with ICD-O-3 behavior code of 0 or 1 from Neuronal and Mixed Neuronal Glial Tumors, Tumors of the Pineal Region, Embryonal Tumors, Other Tumors of Cranial and Spinal Nerves, Mesenchymal Tumors, Primary Melanocytic Lesions, Other Neoplasms Related to the Meninges, Other Hemopoietic Neoplasms, Germ Cell Tumors, Cysts and Heterotopias, Craniopharyngioma, Hemangioma, Neoplasm Unspecified and All Other. c. Includes histologies with ICD-O-3 behavior code of 3 from Choroid Plexus Tumors, Neuronal and Mixed Neuronal Glial Tumors, Tumors of the Pineal Region, Embryonal Tumors, Nerve Sheath Tumors, Mesenchymal Tumors, Primary Melanocytic Lesions, Other Neoplasms Related to the Meninges, Lymphoma, Other Hemopoietic Neoplasms, Germ Cell Tumors, Cysts and Heterotopias, Tumors of the Pituitary, Craniopharyngioma, Hemangioma, Neoplasm Unspecified, and All Other

Fig. 4. Distribution[a] of Primary Brain and Other CNS Tumors by Behavior (N=368,117), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

- Approximately 55.2% of the malignant tumors occurred in males (65,121 tumors between 2009 and 2013) and 44.8% in females (52,785 tumors between 2009 and 2013).
- Approximately 35.8% of the non-malignant tumors occurred in males (89,695 tumors between 2009 and 2013) and 64.2% in females (160,516 tumors between 2009 and 2013).

Incidence Rates by Age

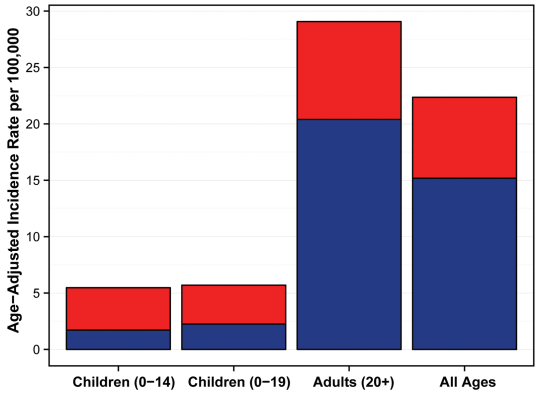
The overall average annual age-adjusted incidence rate for 2009–2013 for all primary brain and other CNS tumors was 22.36 per 100,000 population (Table 3). The overall incidence rate was 5.70 per 100,000 population for children and adolescents age 0–19 years, 5.47 per 100,000 population for children age 0–14 years (Table 4), and 29.18 per 100,000 population for adults age 20+ years (Table 5). The overall incidence rates of tumors by behavior and age group (age 0–19 years and 20+ years) are shown in Fig. 5 and Table 5.

Incidence Rates by Year and Behavior

Fig. 6 presents the overall annual age-adjusted incidence rates of all primary brain and other CNS tumors by year, 2009–2013, and behavior. The incidence rates for all primary brain and other CNS tumors, 2009–2013, did not differ significantly by year, both overall and by behavior.

Distribution and Incidence Rates by CCR, Age, WHO Grade, Diagnostic Confirmation, and Behavior

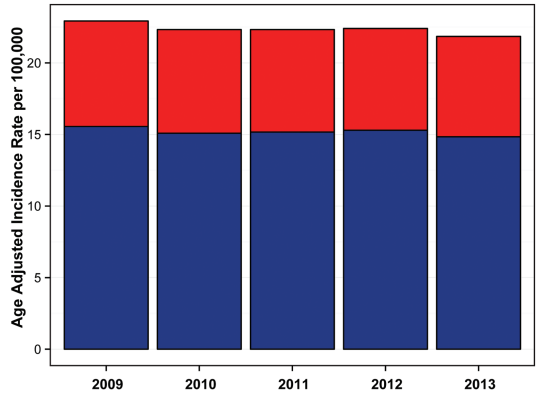
The overall number of reported tumors is listed by CCR in Table 6a and 6b. The average annual combined 2009–2013 population of 311,689,966 covered by the central cancer registries with data available for this report represents approximately 99.9% of the US population for those years.



	Children (0–14)	Children (0–19)	Adults (20+)	All Ages
Malignant	3.76	3.45	8.68	7.18
Non–Malignant	1.71	2.25	20.39	15.18

a. Rates per 100,000 and age-adjusted to the 2000 United States standard population.

Fig. 5. Average Annual Age-Adjusted Incidence Rates[a] of Primary Brain and Other CNS Tumors by Age and Behavior, CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



	2009	2010	2011	2012	2013
Malignant	7.37	7.24	7.16	7.11	7.01
Non–Malignant	15.56	15.09	15.17	15.30	14.84

a. Rates per 100,000 and age-adjusted to the 2000 United States standard population.

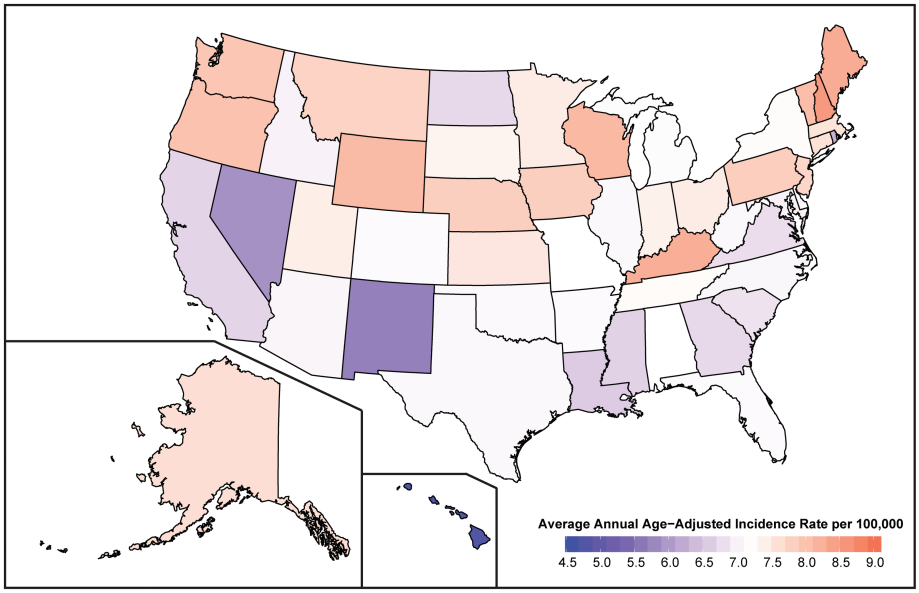
Fig. 6. Annual Age-Adjusted Incidence Rates[a] of Primary Brain and Other CNS Tumors by Year and Behavior, CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

While most malignant tumors are diagnosed by histologic confirmation (where the patient receives surgery and diagnosis is confirmed by a pathologist), brain and other CNS tumors may also be diagnosed by radiographic confirmation only (where the tumor was visualized on MRI, CT, X-ray, or other imaging technology but surgery was not performed).

- Approximately 68% of tumors are non-malignant, but there was variation by cancer registry (range: 56.2%-73.9%).
- Overall, a larger proportion of malignant tumors were histologically confirmed (85.3%) as compared to non-malignant tumors (47.5%).
- A slight majority of non-malignant brain and other CNS tumors are radiographically confirmed (49.3%).

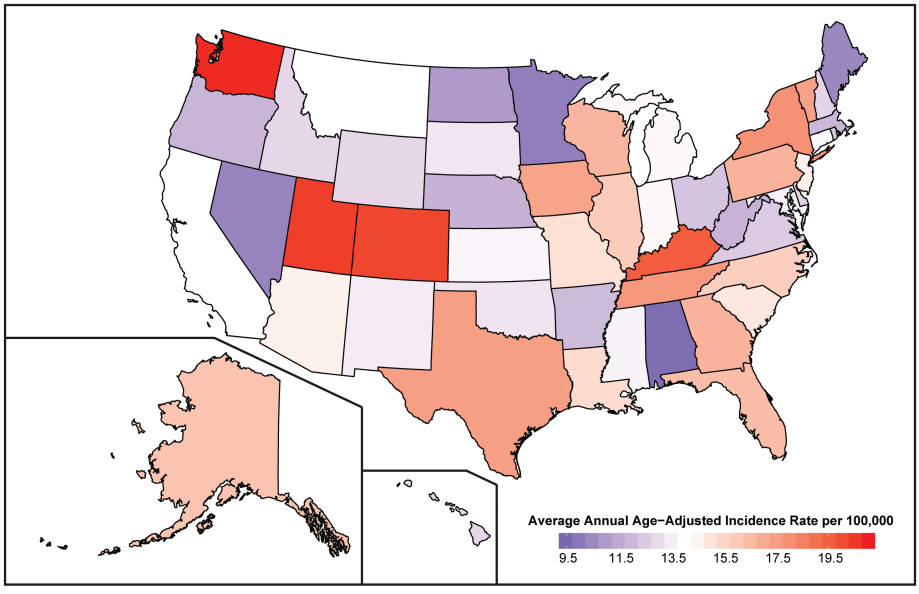
The overall average annual age-adjusted incidence rates by age, behavior, and CCR are presented in Table 5, Figs. 7a-b.

- There is less variation by region for malignant tumor incidence rates as compared to incidence rates for non-malignant tumors. CCR and regional variations likely reflect differences in reporting and case ascertainment practices.
- The overall average annual age-adjusted incidence rates of all tumors (malignant and non-malignant) for each individual CCR range from 16.32 to 28.74 per 100,000 population.
- Average annual age-adjusted incidence rates of all primary malignant tumors ranged from 4.78 to 8.53 per 100,000 population, and average annual age-adjusted incidence rates of all primary non-malignant tumors range from 9.69 to 20.79 per 100,000 population.
- Among adults 20 years of age and older, CCR-specific incidence rates range from 5.71 to 10.25 per 100,000 population for malignant tumors and from 12.71 to 27.77 per 100,000 population for non-malignant tumors.
- In those persons less than 20 years of age, incidence rates listed range from 2.37 to 4.81 per 100,000 population for malignant tumors and from 1.07 to 3.77 per 100,000 population for non-malignant tumors.



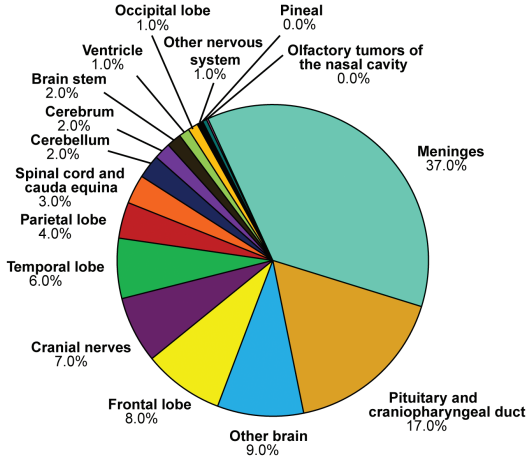
a. Rates per 100,000 and age-adjusted to the 2000 United States standard population. b. Data only available from 2009-2010 for Nevada.

Fig. 7a. Average Annual Age-Adjusted Incidence Rates[a] of Malignant Primary Brain and Other CNS Tumors by Central Cancer Registry, CBTRUS Statistical Report: NPCR and SEER, 2009-2013[b].



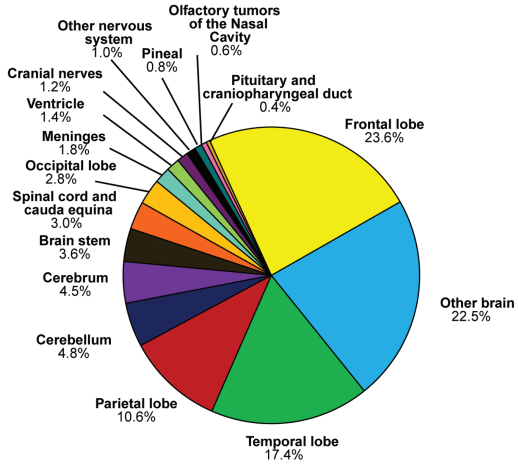
a. Rates per 100,000 and age-adjusted to the 2000 United States standard population. b. Data only available from 2009-2010 for Nevada.

Fig. 7b. Average Annual Age-Adjusted Incidence Rates[a] of Non-Malignant Primary Brain and Other CNS Tumors by Central Cancer Registry, CBTRUS Statistical Report: NPCR and SEER, 2009-2013[b].



a. Percentages may not add up to 100% due to rounding.

Fig. 8a. Distribution[a] of All Primary Brain and Other CNS Tumors by Site (N=368,117), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



a. Percentages may not add up to 100% due to rounding.

Fig. 8b. Distribution[a] of Malignant Primary Brain and Other CNS Tumors by Site (N=117,906), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

Primary Brain and Other CNS Tumors: Incidence by Site, Histology, WHO Grade, Sex, Race, Hispanic Ethnicity, and Age

Distribution of Tumors by Site and Histology

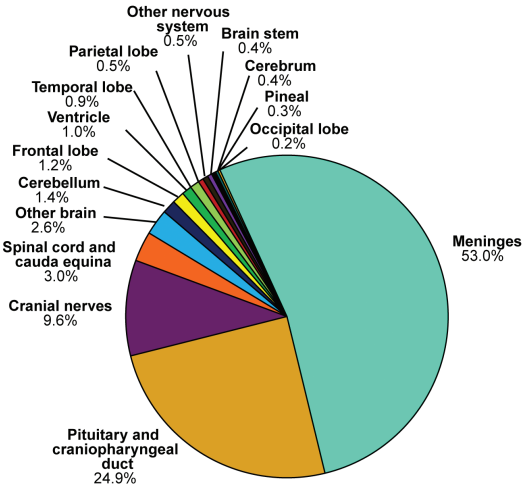
The distribution of brain and other CNS tumors by site is shown in Figs. 8a-c.

- Overall, frontal (8.0%), temporal (6.0%), parietal (4.0%), and occipital lobes (1.0%) account for 19.0% of all tumors.
- Overall, the most common tumor site is the meninges, representing 37.0% of all tumors.
- Cerebrum, ventricle, cerebellum, and brain stem tumors account for 7.0% of all tumors.
- Brain stem tumors account for 2.0% of all tumors and 3.6% of all malignant tumors.
- The cranial nerves and the spinal cord/cauda equina account for 10.0% of all tumors.
- The pituitary and craniopharyngeal duct account for 17.0% of all tumors.
- For **malignant** tumors, frontal (23.6%), temporal (17.4%), parietal (10.6%), and occipital (2.8%) account for 54.4% of tumors.
- For **non-malignant** tumors, 53.0% of all tumors occur in the meninges.

The distribution by brain and other CNS histologies is shown in Fig. 9a.

- **The most frequently reported histology overall is meningioma (36.6%),** followed by tumors of the pituitary (15.9%) and glioblastoma (14.9%).
- Tumors of the pituitary and nerve sheath tumors combined account for slightly less than one-fourth of all tumors (24.1%), the vast majority of which are non-malignant.

The distribution of malignant and non-malignant brain and other CNS tumors by histology are shown in Figs. 9b and 9c, respectively, as well as in Table 7.



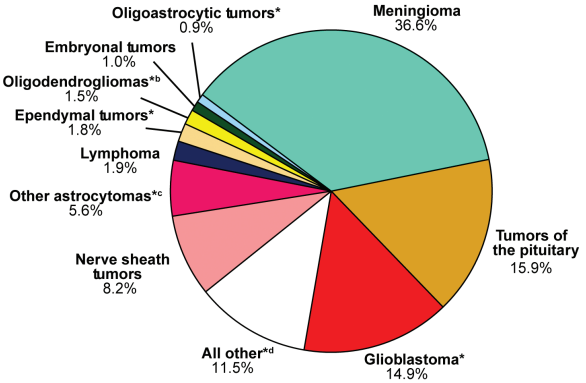
a. Percentages may not add up to 100% due to rounding.

Fig. 8c. Distribution[a] of Non-Malignant Primary Brain and Other CNS Tumors by Site (N=250,211), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

- The most common of all **malignant** CNS tumors is glioblastoma (46.6%).
- The most common of all **non-malignant** tumors is meningioma (53.2%).
- The most common non-malignant nerve sheath tumor (based on multiple sites in the brain and CNS) is vestibular schwannomas (defined by histology code 9560, also formerly called acoustic neuromas) (94.8%).

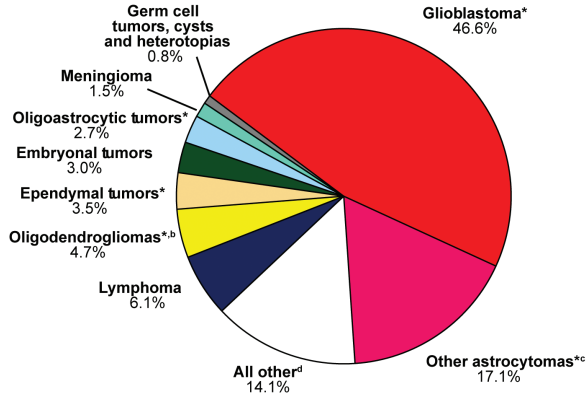
The broad category glioma represents approximately 24.7% of all primary brain and other CNS tumors (Fig. 9a) and 74.6% of malignant tumors (Fig. 9b). The distribution of gliomas by histology and site are shown in Figs. 10 and 11, respectively.

- Glioblastoma accounts for the majority of gliomas (55.4%).
- Other astrocytomas and glioblastoma combined account for about 74.9% of all gliomas.



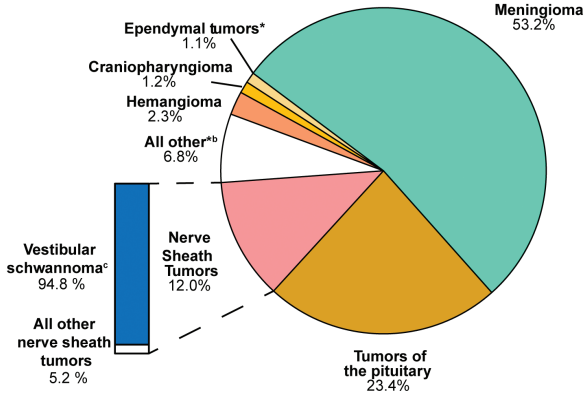
* All or some of this histology is included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460 (Table 2a).
a. Percentages may not add up to 100% due to rounding. b. Includes oligodendroglioma and anaplastic oligodendroglioma (Table 2a). c. Includes pilocytic astrocytoma, diffuse astrocytoma, anaplastic astrocytoma, and unique astrocytoma variants (Table 2a). d. Includes glioma malignant, NOS, choroid plexus tumors, other neuroepithelial tumors, neuronal and mixed neuronal-glial tumors, tumors of the pineal region, other tumors of cranial and spinal nerves, mesenchymal tumors, primary melanocytic lesions, other neoplasms related to the meninges, other hematopoietic neoplasms, hemangioma, neoplasm, unspecified, and all other (Table 2a). e. ICD-O-3 histology codes: 9380- 9384, 9391-9460,9480 .

Fig. 9a. Distribution[a] of All Primary Brain and Other CNS Tumors by CBTRUS Histology Groupings and Histology (N=368,117), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



* All or some of this histology is included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460 (Table 2b).
a. Percentages may not add up to 100% due to rounding. b. Includes oligodendroglioma and anaplastic oligodendroglioma (Table 2b). c. Includes glioma malignant, NOS, choroid plexus tumors, other neuroepithelial tumors, neuronal and mixed neuronal-glial tumors, tumors of the pineal region, nerve sheath tumors, other tumors of cranial and spinal nerves, mesenchymal tumors, primary melanocytic lesions, other neoplasms related to the meninges, other hematopoietic neoplasms, hemangioma, neoplasm, unspecified, and all other (Table 2b). d. Includes pilocytic astrocytoma, diffuse astrocytoma, anaplastic astrocytoma, and unique astrocytoma variants (Table 2b).

Fig. 9b. Distribution[a] of Malignant Primary Brain and Other CNS Tumors by CBTRUS Histology Groupings and Histology (N=117,906), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



* All or some of this histology is included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460 (Table 2c).
a. Percentages may not add up to 100% due to rounding. b. Includes unique astrocytoma variants, choroid plexus tumors, other neuroepithelial tumors, neuronal and mixed neuronal- glial tumors, tumors of the pineal region, embryonal tumors, other tumors of cranial and spinal nerves, mesenchymal tumors, primary melanocytic lesions, other neoplasms related to the meninges, other hematopoietic neoplasms, germ cell tumors, neoplasm, unspecified, and all other (Table 2c). c. ICD-O-3 histology code 9560.

Fig. 9c. Distribution[a] of Non-Malignant Primary Brain and Other CNS Tumors by CBTRUS Histology Groupings and Histology (N=250,211), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

- The majority of gliomas occur in the frontal, temporal, parietal, and occipital lobes combined (61.0%). Only a very small proportion of gliomas occur outside the brain.

The distribution of reported tumors with histologically confirmed diagnosis from 2011 to 2013 is listed by histology and reported WHO grade in Table 8. The *WHO Classification of Tumours of the Central Nervous System* designates a grading system for most histologic types, which correlates with predicted prognosis and malignancy of tumor. There are many reasons that this information may not be included in the patients record.[17] It is not possible to conclusively determine WHO grade, which is based on the appearance of tumor cells, when a tumor is radiographically confirmed only. Some tumor types (including tumors of the pituitary and lymphomas) are not assigned a grade within the WHO system. This information may also be assigned but not included in the pathology report.

- Overall, 61.9% of tumors had complete WHO grade information, but there was substantial variation by histology.
- The histologic types with the highest WHO grade completeness were anaplastic oligodendroglioma (94.8%) and oligoastrocytic tumors, (95.2%).

Incidence Rates by Site and Sex

Incidence counts and average annual age-adjusted rates for brain and other CNS tumors by site and sex are provided in Table 9.

- Incidence rates were highest for tumors located in the meninges (8.03 per 100,000 population).
- Incidence rates were lowest for olfactory tumors of the nasal cavity (0.04 per 100,000 population).
- Incidence rates were higher in females than in males for tumors located in the meninges, pituitary and craniopharyngeal duct, and cranial nerves.
- Males had higher incidence rates of tumors located in the frontal lobe, occipital lobe, temporal lobe, parietal lobe, cerebrum, ventricle, cerebellum, brain stem, other brain, spinal cord and cauda equina, other nervous system, pineal, and olfactory tumors of the nasal cavity compared to females.

Incidence Rates by Major Histology Groupings and Specific Histologies

Incidence rates of all primary brain and other CNS tumors by major histology groupings and specific histologies are provided in Table 3.

- Among CBTRUS major histology groupings, incidence rates are highest for tumors of the meninges (8.30 per 100,000 population), followed by tumors of the neuroepithelial tissue (6.60 per 100,000 population), tumors of the sellar region (3.85 per 100,000 population), and tumors of the cranial and spinal nerves (1.83 per 100,000 population).

- Among CBTRUS specific histology groupings, incidence rates are highest for meningiomas (8.03 per 100,000 population), tumors of the pituitary (3.66 per 100,000 population), glioblastomas (3.20 per 100,000 population), and nerve sheath tumors (1.82 per 100,000 population).

Incidence Rates by Behavior and Histology

Brain and other CNS tumor incidence rates by behavior (malignant and non-malignant) and by major histologies are presented in Table 7.

- For **malignant** tumors, the incidence rate is highest for glioblastoma (3.20 per 100,000 population), followed by diffuse astrocytoma (0.51 per 100,000 population) and lymphoma (0.43 per 100,000 population).
- For **non-malignant** tumors, the incidence rate is highest for meningioma (7.93 per 100,000 population), followed by tumors of the pituitary (3.65 per 100,000 population), and nerve sheath tumors (1.81 per 100,000 population).

Incidence Rates by Sex and Histology

Incidence rates by sex and histology are presented in Table 3. Incidence rates for **all** primary brain and other CNS tumors combined are higher among females (24.46 per 100,000 population) than among males (20.10 per 100,000 population).

- The incidence rate of tumors of neuroepithelial tissue is higher in males (7.75 per 100,000 population) than in females (5.60 per 100,000 population).
- The incidence rate of tumors of meninges is higher in females (11.11 per 100,000 population) than in males (5.09 per 100,000 population).

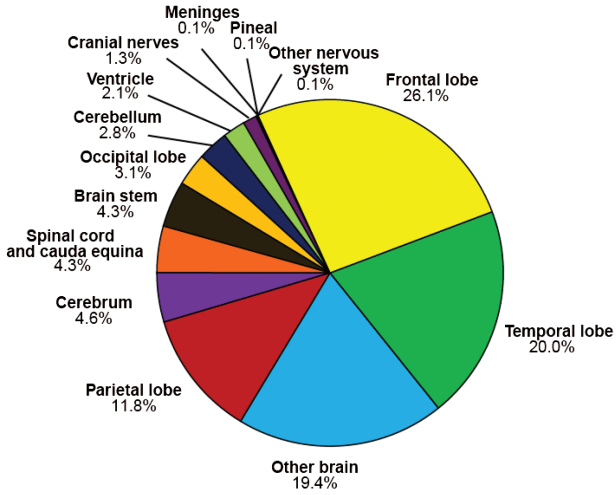
Incidence rate ratios (male:female) for selected histologies and histology groupings are shown in Fig. 12.

- Incidence was higher in males for many histologies, such as germ cell tumors (p<0.0001), most glial tumors, lymphomas (p<0.0001), and embryonal tumors (p<0.0001).
- In addition to non-malignant (p<0.0001) and malignant (p=0.0013) meningiomas, tumors of the pituitary (p<0.0001) were also more common in females than in males.

Incidence Rates by Race and Histology

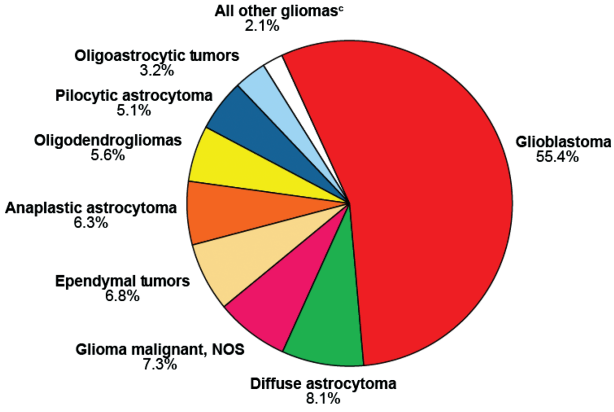
Incidence rates by race and histology are shown in Table 10.

- Incidence rates for **all** primary brain and other CNS tumors combined are lower for race groups AIAN (14.44 per 100,000 population) as compared to Whites (22.46 per 100,000 population), Blacks (22.52 per 100,000 population), and API (20.44 per 100,000 population).
- Incidence rates of meningioma, tumors of the pituitary, and craniopharyngioma for Blacks exceed those observed for Whites, AIAN, and API.



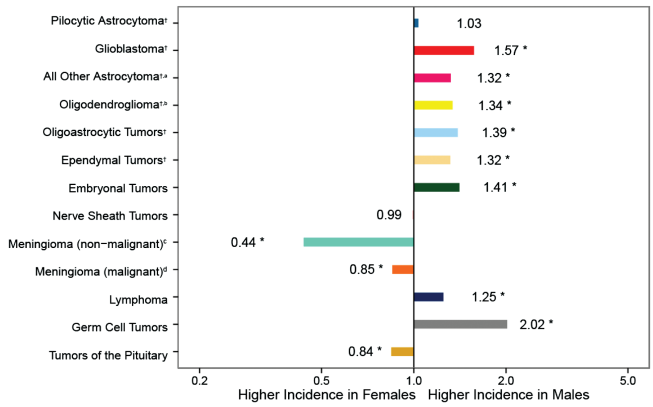
a. Percentages may not add up to 100% due to rounding.

Fig. 11. Distribution[a] of Primary Brain and Other CNS Gliomas[a] by Site (N=99,165), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



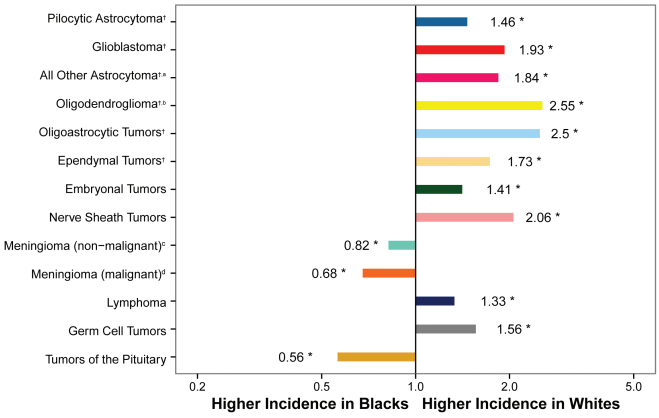
a. Percentages may not add up to 100% due to rounding. b. ICD-O-3 codes = 9380-9384,9391-9460.(Table 2a). c. Includes histologies from unique astrocytoma variants, other neuroepithelial tumors, and neuronal and mixed neuronal-glial tumors (Table 2a).

Fig. 10. Distribution[a] of Primary Brain and Other CNS Gliomas[b] by Histology Subtypes (N=99,165), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



* Incidence Rate is significantly different in males and females.
† All or some of this histology are included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460, (Table 2a).
a. ICD-O-3 Histology Codes: 9381, 9384, 9424, 9400, 9401, 9410, 9411, 9420. b. ICD-O-3 Histology Codes: 9450, 9451, 9460.
c. ICD-O-3 Histology Codes: 9530/0,9530/1, 9531/0, 9532/0, 9533/0, 9534/0, 9537/0, 9538/1, 9539/1. d. ICD-O-3 Histology Codes: 9530/3, 9538/3, 9539/3.

Fig. 12. Incidence Rate Ratios by Sex (Males:Females) for Selected CBTRUS Histology Groupings and Histology, CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



* Incidence Rate is significantly different in whites and blacks.
† All or some of this histology are included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460, (Table 2a).
a. ICD-O-3 Histology Codes: 9381, 9384, 9424, 9400, 9401, 9410, 9411, 9420. b. ICD-O-3 Histology Codes: 9450, 9451, 9460.
c. ICD-O-3 Histology Codes: 9530/0,9530/1, 9531/0, 9532/0, 9533/0, 9534/0, 9537/0, 9538/1, 9539/1. d. ICD-O-3 Histology Codes: 9530/3, 9538/3, 9539/3.

Fig. 13. Incidence Rate Ratios by Race (Whites:Blacks) for Selected CBTRUS Histology Groupings and Histologies, CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

- The average annual incidence rate for tumors of the cranial and spinal nerves in the API group is the highest for all racial groups.

Incidence rate ratios (White:Black) for selected histologies are shown in Fig. 13.

- Incidence rates for glioblastoma (p<0.0001), all other astrocytoma (p<0.0001), oligoastrocytic tumors (p<0.0001), and nerve sheath tumors (p<0.0001) are approximately 2 times greater in Whites than in Blacks.
- Incidence of oligodendroglioma is approximately 2.5 times greater in Whites than in Blacks (p<0.0001).
- Incidence rates for pilocytic astrocytoma (p<0.0001), ependymal tumors (p<0.0001), embryonal tumors (p<0.0001), lymphoma (p<0.0001), and germ cell tumors (p<0.0001) are also higher among Whites than among Blacks.
- Incidence rates for non-malignant (p<0.0001) and malignant (p<0.0001) meningioma and tumors of the pituitary (p<0.0001) are higher among Blacks than among Whites.

Incidence Rates by Hispanic Ethnicity and Histology

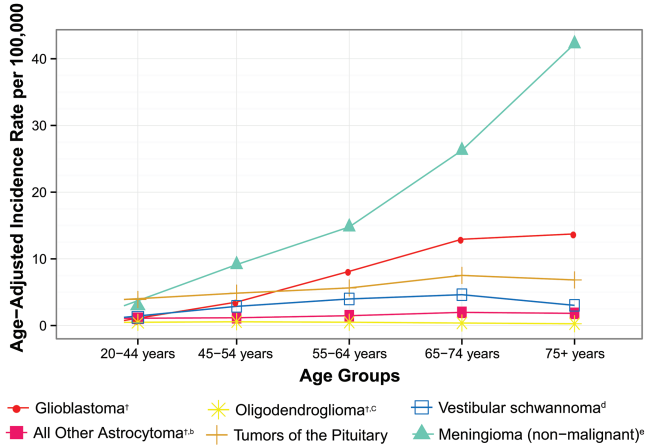
Incidence rates by Hispanic ethnicity and histology are shown in Table 11.

- The overall incidence rate for primary brain and other CNS tumors is 20.62 per 100,000 population among Hispanics and 22.56 per 100,000 population among non-Hispanics.
- Tumors of the pituitary, neoplasm unspecified, and other hematopoietic neoplasms are the only histologies that are higher in Hispanics than in non-Hispanics.

Incidence Rates by Age and Histology

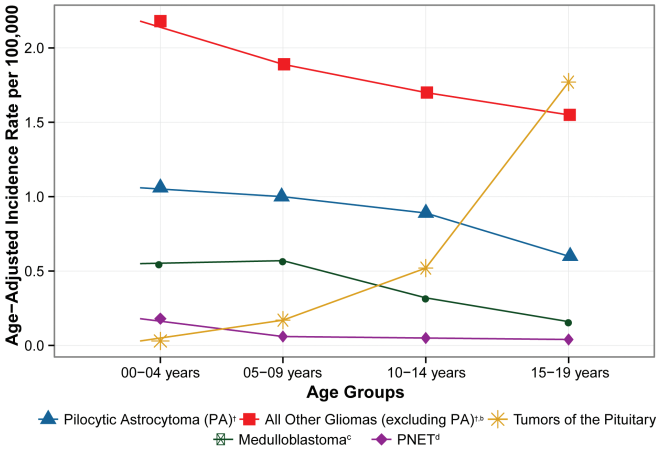
The age-adjusted incidence rates by age and histology at diagnosis are presented in Table 12, Fig. 14 (Age 20+ Years), and Fig. 15 (Age 0–19 Years).

- The incidence rate for **all** brain and other CNS tumors is highest among age 85+ years (84.52 per 100,000 population)



† All or some of this histology are included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460 (Table 2a).
a. Rates per 100,000 and age-adjusted to the 2000 United States standard population. b. ICD-O-3 Histology Codes: 9381, 9384, 9424, 9400, 9401, 9410, 9411, 9420. c. ICD-O-3 Histology Codes: 9450, 9451, 9460. d. ICD-O-3 Code: 9560. e. ICD-O-3 Histology Codes: 9530/0,9530/1, 9531/0, 9532/0, 9533/0, 9534/0, 9537/0, 9538/1, 9539/1.

Fig. 14. Age-Adjusted Incidence Rates[a] of Brain and Other CNS Tumors by Selected Histologies and Age Groups (Age 20+ Years), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



† All or some of this histology are included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460 (Table 2a).
a. Rates per 100,000 and age-adjusted to the 2000 United States standard population. b. ICD-O-3 Histology Codes: 9380-9384, 9391-9420, 9422-9460, 9480. c. ICD-O-3 histology codes: 9470/3, 9471/3, 9472/3,9474/3. d. ICD-O-3 Histology Code: 9473/3.

Fig. 15. Age-Adjusted Incidence Rates[a] in Children and Adolescents of Brain and Other CNS Tumors by Selected Histologies and Age Groups (Age 0-19 Years), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

and lowest among children and adolescents age 0–19 years (5.67 per 100,000 population).
- Incidence rates of pilocytic astrocytoma, germ cell tumors, and embryonal tumors are higher in the younger age groups and decrease with advancing age.
- Incidence rate of meningioma increases with age.
- Incidence rates decline with increasing age for those age 0–19 years, particularly for the gliomas and embryonal tumors (primitive neuroectodermal tumor (PNET) and medulloblastoma).
- After peaking in the 0–9 year age group, incidence rates of pilocytic astrocytoma decreases in the age groups 10–14, and 15–19 years.
- The incidence of tumors of the pituitary increase substantially between the 10–14 years age-group and 15–19 years age-group.

- The incidence rate of PNET peaks in the 0–4 years age group.
- The incidence of medulloblastoma peaks in those age 9 years and younger.

The distribution patterns of histologies within age groups differ substantially as is apparent in Table 13, which shows the four most common brain and other CNS tumor histologies by age group at diagnosis.

Median Age at Diagnosis

The median age at diagnosis for **all** primary brain and other CNS tumors is 59.0 years (Table 7).

- The histology-specific median ages range from 9.0 years for embryonal tumors to 69.0 years for neoplasm, unspecified.
- Pilocytic astrocytoma, choroid plexus tumors, neuronal and mixed neuronal-glial tumors, tumors of the pineal region, embryonal tumors, and germ cell tumors and cysts are histologies with younger median ages at diagnosis.
- Meningioma and glioblastoma are primarily diagnosed at older ages (median age of 66.0 and 64.0 years, respectively).

Childhood and Adolescence: Incidence and Distribution of Primary Brain and Other CNS Tumors by Site, Histology, Sex, and Age

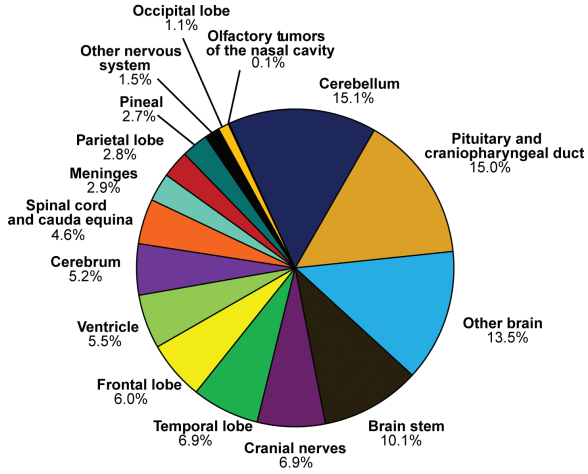
Distribution of Tumors by Site and Histology in Children and Adolescents (Age 0–19 Years)

Brain and other CNS tumors are the most common form of solid tumors in children,[42,43] and account for the majority of cancer mortality in this age-group.[44] About 6% of the reported brain and other CNS tumors during 2009–2013 occurred in children and adolescents age 0–19 years, and approximately 5% of all these reported tumors occurred in children age 0–14 years. The distribution of brain and other CNS tumors for children and adolescents age 0–19 years by site is shown in Fig. 16a.

- The largest percentages of tumors in childhood and adolescence are located in the pituitary and pineal glands (17.7%).
- A similar proportion of tumors are located within the frontal, temporal, parietal, and occipital lobes of the brain combined (16.8%).
- Cerebrum, ventricle, brain stem, and cerebellum tumors account for 5.2%, 5.5%, 10.1%, and 15.1% of all brain and other CNS tumors in childhood and adolescence, respectively.
- Tumors of the meninges represent 2.9% of all tumors in childhood and adolescence.
- The cranial nerves and the spinal cord and cauda equina account for 6.9% and 4.6% of all brain and other CNS tumors in childhood and adolescence, respectively.

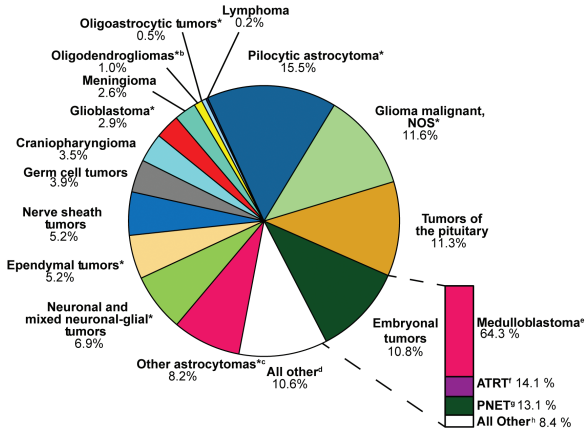
Fig. 16b presents the most common brain and other CNS histologies in children and adolescents age 0–19 years.

- For children and adolescents age 0–19 years, pilocytic astrocytomas, glioma malignant, NOS, and embryonal tumors account for 15.5%, 11.6%, and 10.8%, respectively.
- Tumors of the pituitary are the most common non-malignant histology, and account for 11.3% of all tumors in this age group.



a. Percentages may not add up to 100% due to rounding.

Fig. 16a. Distribution[a] in Children and Adolescents (Age 0-19 Years) of Primary Brain and CNS Tumors by Site (N=23,522), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



* All or some of this histology are included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460 (Table 2a).
a. Percentages may not add up to 100% due to rounding. b. Includes oligodendrogliomas and anaplastic oligodendrogliomas (Table 2a). c. Includes diffuse astrocytoma, anaplastic astrocytoma, unique astrocytoma variants (Table 2a). d. Includes choroid plexus tumors, other neuroepithelial tumors, tumors of the pineal region, other tumors of cranial and spinal nerves, mesenchymal tumors, primary melanocytic lesions, other neoplasms related to the meninges, other hematopoietic neoplasms, hemangioma, neoplasm unspecified, all other (Table 2a). e. ICD-O-3 histology codes: 9470/3, 9471/3, 9472/3,9474/3. f. ICD-O-3 histology code: 9508/3. g. ICD-O-3 histology code: 9473/3. h. ICD-O-3 histology codes: 8963/3, 9364/3, 9480/0, 9480/3, 9490/0 , 9490/3, 9500/3, 9501/3, 9502/3.

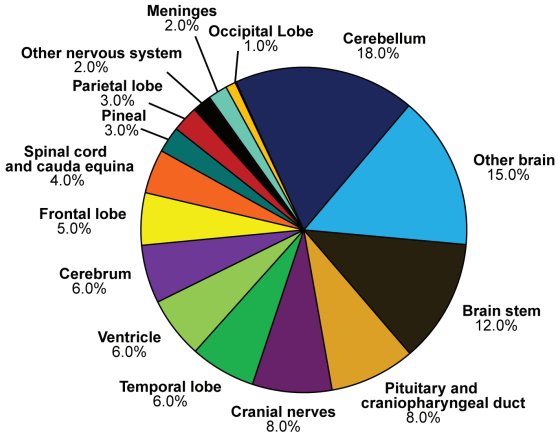
Fig. 16b. Distribution[a] in Children and Adolescents (Age 0-19 Years) of Primary Brain and Other CNS Tumors by CBTRUS Histology Groupings and Histology (N=23,522), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

- Gliomas account for approximately 47.4% of tumors in children and adolescents age 0–19 years.
- Medulloblastoma accounts for 64.3% of all embryonal tumors in this age group.

Distribution of Tumors by Site and Histology in Children (Age 0–14 Years)

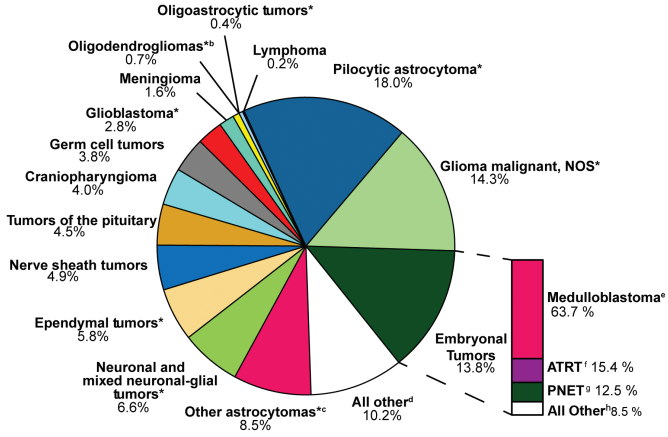
The distribution of brain and other CNS tumors for children age 0–14 years by site is shown in Fig. 17a.

- Tumors of the cerebellum comprise the largest proportion of tumors (18.0%), followed by other brain (15.0%) and brain stem (12.0%).



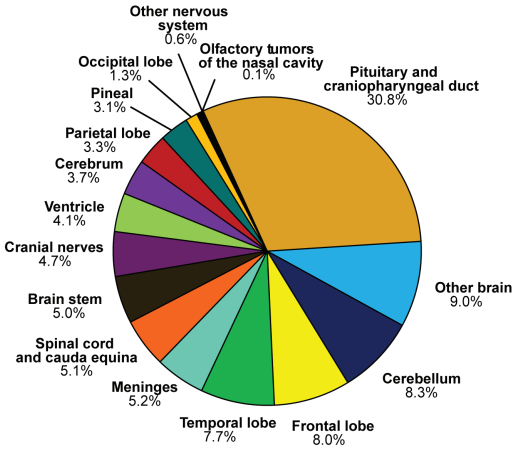
a. Percentages may not add up to 100% due to rounding.

Fig. 17a. Distribution[a] in Children (Age 0-14 Years) of Primary Brain and Other CNS Tumors by Site (N=16,653), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



* All or some of this histology are included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460 (Table 2a).
a. Percentages may not add up to 100% due to rounding. b. Includes oligodendrogliomas and anaplastic oligodendrogliomas (Table 2a). c. Includes diffuse astrocytoma, anaplastic astrocytoma, unique astrocytoma variants (Table 2a). d. Includes choroid plexus tumors, other neuroepithelial tumors, tumors of the pineal region, other tumors of cranial and spinal nerves, mesenchymal tumors, primary melanocytic lesions, other neoplasms related to the meninges, other hematopoietic neoplasms, hemangioma, neoplasm unspecified, all other (Table 2a). e. ICD-O-3 histology codes: 9470/3, 9471/3, 9472/3,9474/3. f. ICD-O-3 histology code: 9508/3. g. ICD-O-3 histology code: 9473/3. h. ICD-O-3 histology codes: 8963/3, 9364/3, 9480/0, 9480/3, 9490/0 , 9490/3, 9500/3, 9501/3, 9502/3.

Fig. 17b. Distribution[a] in Children (Age 0-14 Years) of Primary Brain and Other CNS Tumors by CBTRUS Histology Groupings and Histology (N=16,653), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



a. Percentages may not add up to 100% due to rounding.

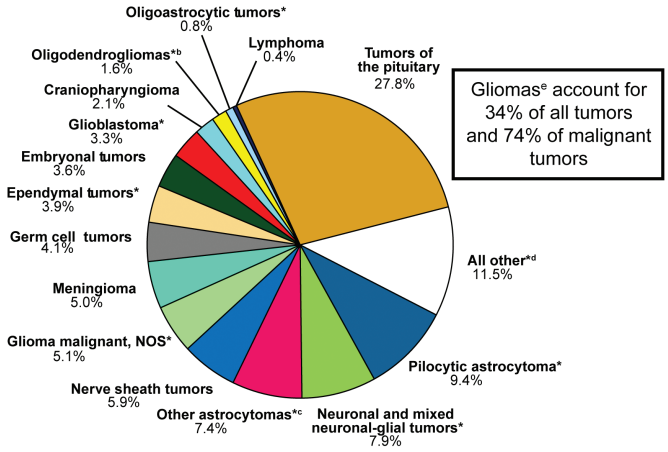
Fig. 18a. Distribution[a] in Adolescents[b] (Age 15-19 Years) of Primary Brain and Other CNS Tumors by Site (N=6,869), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

Fig. 17b presents the most common brain and other CNS histologies in children age 0–14 years.

- For children age 0–14 years, pilocytic astrocytomas, glioma malignant, NOS, and embryonal tumors account for 18.0%, 14.3%, and 13.8%, respectively.
- Gliomas account for approximately 53.1% of tumors in children age 0–14 years.
- Of embryonal tumors, medulloblastoma, atypical teratoid/rhabdoid tumor (ATRT), and primitive neuroectodermal tumor (PNET) account for 63.7%, 15.4%, and 12.5%, respectively.

Distribution of Tumors by Site and Histology in Adolescents (Age 15–19 Years)

About 2% of all brain and other CNS tumors occurred in adolescents age 15–19 years for a total of 6,869 tumors diagnosed



* All or some of this histology are included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460 (Table 2a).
a. Percentages may not add up to 100% due to rounding. b. Includes oligodendrogliomas and anaplastic oligodendrogliomas (Table 2a). c. Includes diffuse astrocytoma, anaplastic astrocytoma, unique astrocytoma variants (Table 2a). d. Includes choroid plexus tumors, other neuroepithelial tumors, tumors of the pineal region, other tumors of cranial and spinal nerves, mesenchymal tumors, primary melanocytic lesions, other neoplasms related to the meninges, other hematopoietic neoplasms, hemangioma, neoplasm unspecified, all other (Table 2a). e. ICD-O-3 histology codes: 9380- 9384, 9391-9460,9480.

Fig. 18b. Distribution[a] in Adolescents (Age 15-19 Years) of Primary Brain and Other CNS Tumors by Histology (N=6,869), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

between 2009 and 2013 (Table 4). The distribution of these tumors by site is presented in Fig. 18a.

- Approximately 31% of these tumors are diagnosed in the pituitary and craniopharyngeal duct.
- The frontal lobe, temporal lobe, occipital lobe, and parietal lobe account for 20.3% of tumors in adolescents age 15–19 years.

The distribution of brain and other CNS tumors in adolescents age 15–19 years by histology is presented in Fig. 18b.

- The most common histology in adolescents is tumors of the pituitary (27.8%).

- Gliomas account for approximately 33.8% of tumors in adolescents. Of these gliomas, the histology pilocytic astrocytoma accounts for 9.4% of all tumors in this age group.

Incidence Rates by Histology, Histology Groupings, and Sex in Children and Adolescents (Age 0–19 Years)

The incidence rates of the most common brain and other CNS tumors in children and adolescents by major histology groupings, histology, and sex are shown in Table 14.

- Average annual incidence rates are highest for tumors of neuroepithelial tissue (3.74 per 100,000 population). Among these tumors, the most common histologies are pilocytic astrocytoma (0.89 per 100,000 population), glioma malignant, NOS (0.67 per 100,000 population), and embryonal tumors (0.62 per 100,000 population).
- There are notable differences in incidence rates between males and females for ependymal tumors, embryonal tumors, germ cell tumors, and tumors of the pituitary.

Incidence Rates by Histology and Race in Children and Adolescents (Age 0–19 Years)

Table 15 shows incidence rates for brain and other CNS tumors by histology and race for children and adolescents age 0–19 years.

- Incidence rates are highest among API (6.21 per 100,000 population) as compared to Whites (5.92 per 100,000 population), Blacks (4.48 per 100,000 population), and AIAN (3.16 per 100,000 population).

Incidence Rates by Histology and Hispanic Ethnicity in Children and Adolescents (Age 0–19 Years)

Incidence rates of brain and other CNS tumors for children and adolescents age 0–19 years by Hispanic ethnicity are shown in Table 16.

- Incidence rates for non-Hispanics (5.94 per 100,000 population, 3,776 total tumors) are higher than those for Hispanics (4.71 per 100,000 population, 865 total tumors).
- The largest differences between non-Hispanics and Hispanics are in incidence rates of tumors of neuroepithelial tissue and tumors of cranial and spinal nerves.

Incidence Rates by Age and Histology in Children and Adolescents (Age 0–19 Years)

The detailed age-adjusted incidence rates for brain and other CNS tumors by histology for childhood age 0–14 years overall, childhood and adolescence age 0–19 years overall, and age groups 0–4 years, 5–9 years, 10–14 years, and 15–19 years are shown in Table 4.

- Overall, incidence rates for age groups 0–4 years (5.98 per 100,000 population) and 15–19 years (6.38 per 100,000 population) significantly exceed those observed in age groups 5–9 years (5.12 per 100,000 population) and 10–14 years (5.34 per 100,000 population).
- Individual histology distributions vary substantially within these age groups.
- Incidence rates of pilocytic astrocytoma, glioma malignant, NOS, ependymal tumors, choroid plexus tumors, and embryonal tumors decrease with increasing age.

Incidence Rates by Histology Defined by ICCC in Children and Adolescents (Age 0–19 Years)

Table 17 presents the CBTRUS brain and other CNS tumor data for children and adolescents used for this report according to the International Classification of Childhood Cancer (ICCC) grouping system for pediatric cancers (See the CBTRUS website for additional information on this classification scheme: http://www.cbtrus.org).[19]

Primary Brain and Other CNS Tumors: Estimated Numbers of Expected Cases, Mortality Rates, and Relative Survival

Estimated Numbers of Expected Cases of All Primary Brain and Other CNS Tumors by State

The estimated number of cases of all primary brain and other CNS tumors for 2016 and 2017 by state and behavior are shown in Table 18. The estimated number of cases of malignant and non-malignant tumors projected using age-adjusted annual CNS tumor incidence rates were generated for 2000–2013 for malignant tumors, and 2006–2013 for non-malignant tumors.

- The total number of new cases of primary brain and other CNS tumors for all 50 states and the District of Columbia in 2016 is estimated to be 78,450, with 25,850 malignant and 52,600 non-malignant.
- For 2017, the estimate is 79,270 new cases of primary brain and other CNS tumors of which 26,070 and 53,200 are expected to be malignant and non-malignant, respectively.

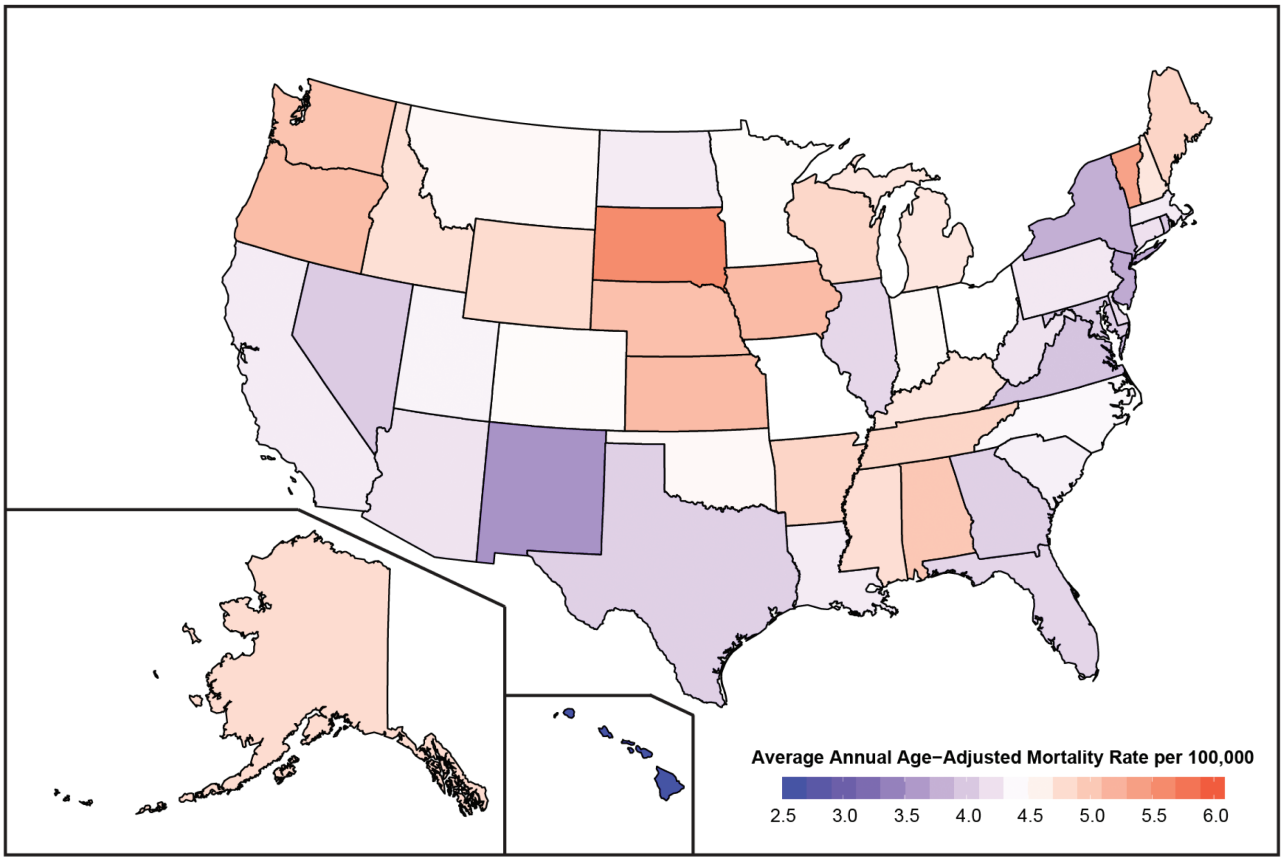
Estimated Number of Expected Cases of All Primary Brain and Other CNS Tumors by Histology, Histology Grouping, and Age

The estimated number of cases of all primary brain and other CNS tumors for 2016 and 2017 by histology are shown in Table 19.

- **Meningiomas have the highest number of all estimated new cases, with 27,080 cases projected in 2016 and 27,110 in 2017**. Tumors of the pituitary have the second highest number of all estimated cases, with 13,760 cases in 2016 and 14,230 in 2017.
- **Glioblastoma has the highest number of cases of all malignant tumors, with 12,150 cases projected in 2016 and 12,390 in 2017.**

The estimated numbers of cases for 2016 and 2017 by age are presented in Table 20.

- For 2016, the highest number of new cases is predicted in those age 65+ years, with 32,870 cases. For 2017, the highest number of new cases is estimated to be in those age 65+ years, with 33,820 cases.



a. Rates per 100,000 and age-adjusted to the 2000 United States standard population.

Fig. 19. Average Annual Age-Adjusted Mortality Rates[a] for Malignant Primary Brain and Other CNS Tumors by Central Cancer Registry, CBTRUS Statistical Report: NCHS, 2009-2013.

- For 2016 and 2017, children age 0–14 years are estimated to have 4,770 and 4,830 new cases of primary brain and other CNS tumors each year, respectively.

Estimated Mortality Rates for Malignant Brain and Other CNS Tumors by State and Sex

Table 21 and Fig. 19 show average annual age-adjusted mortality rates for primary malignant brain and other CNS tumors in the US during 2009–2013 by state and sex.

- The aggregate total number of observed deaths is 73,450, for an average annual age-adjusted mortality rate of 4.32 per 100,000 population.
- There is considerable variation by individual state, which range from a low of 2.59 deaths per 100,000 population to a high of 5.59 deaths per 100,000 population. Rates may vary by state for multiple reasons, including demographic variation and procedures for deciding primary cause of death on a death certificate.
- Males have higher mortality rate for brain and other CNS tumors than females in the US population, with 5.27 per 100,000 population as compared to 3.51 per 100,000 population.

Relative Survival Rates for Malignant Brain and Other CNS Tumors by Site

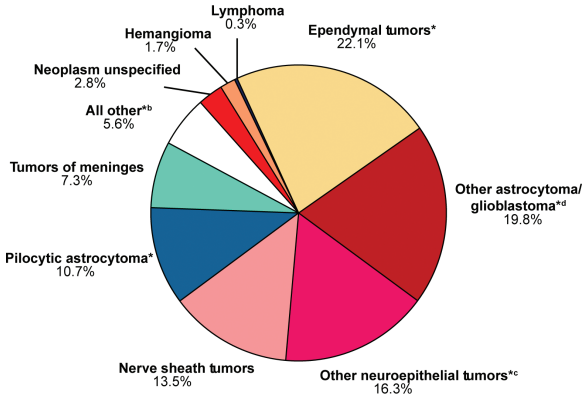
Relative survival estimates by site are presented in Table 22.

- The highest ten-year survival is for tumors occurring in the cranial nerves (91.4%).
- The lowest ten-year survival is for tumors of the parietal lobe (15.0%).

Survival Rates for Malignant Brain and Other CNS Tumors by Histology and Age

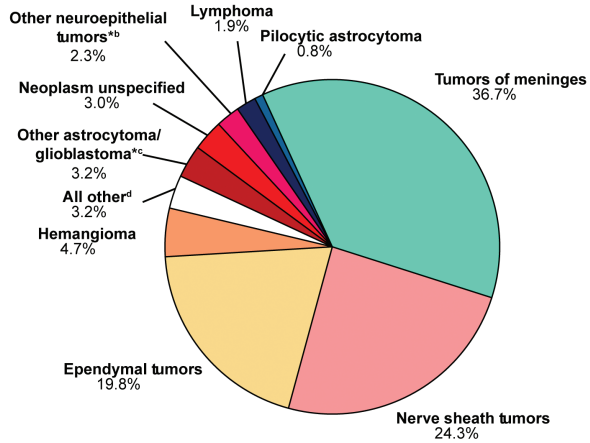
Survival estimates for malignant brain and other CNS tumors by histology and age at diagnosis are presented in Tables 23 and 24. The one- through ten-year relative survival rates by histology and age group are shown in Table 24.

- The estimated five- and ten-year relative survival rates for all malignant brain and other CNS tumors are 34.9% and 29.3%, respectively.
- There is large variation in survival estimates depending upon tumor histology; five-year survival rates are 94.2% for pilocytic astrocytoma but are 5.5% for glioblastoma.



* All or some of this histology are included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460 (Table 2a). a. Percentages may not add up to 100% due to rounding. b. Includes embryonal tumors, other tumors of cranial and spinal nerves, other hematopoietic neoplasms, germ cell tumors, neoplasm unspecified, and all other (Table 2a). c. Includes oligodendroglioma, anaplastic oligodendroglioma, oligoastrocytic tumors, glioma malignant, NOS, choroid plexus tumors, other neuroepithelial tumors, and neuronal and mixed neuronal-glial tumors (Table 2a). d. Includes diffuse astrocytoma, anaplastic astrocytoma, unique astrocytoma variants (Table 2a).

Fig. 20a. Distribution[a] of Primary Spinal Cord, Spinal Meninges, and Cauda Equina Tumors in Children and Adolescents (Age 0-19 Years), CBTRUS Histology Groupings and Histology (N=1,307), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



*All or some of this histology are included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460 (Table 2a).
a. Percentages may not add up to 100% due to rounding. b. Includes oligodendroglioma, anaplastic oligodendroglioma, oligoastrocytic tumors, glioma malignant, NOS, choroid plexus tumors, other neuroepithelial tumors, and neuronal and mixed neuronal-glial tumors (Table 2a). c. Includes diffuse astrocytoma, anaplastic astrocytoma, unique astrocytoma variants (Table 2a). d. Includes embryonal tumors, other tumors of cranial and spinal nerves, other hematopoietic neoplasms, germ cell tumors, neoplasm unspecified, and all other (Table 2a).

Fig. 20b. Distribution[a] of Primary Spinal Cord, Spinal Meninges, and Cauda Equina Tumors in Adults (Age 20+ Years), CBTRUS Histology Groupings and Histology (N=16,014) CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

- Survival generally decreases with older age at diagnosis; children and young adults generally have better survival outcomes for most histologies.

Survival Rates for Non-Malignant Brain and Other CNS Tumors by Histology and Age

Data on newly diagnosed non-malignant primary brain and other CNS tumors have been collected by central cancer registries in the US since 2004, with incidence and survival data now available for the ten years from 2004 to 2013. **Survival statistics for these tumors are reported for the first time in the *CBTRUS Statistical Report: Primary Brain and Other Central Nervous System Tumors Diagnosed in the United States in 2009–2013*.** Survival estimates for non-malignant brain and other CNS tumors by histology and age at diagnosis are presented in Tables 27 and 28. The one- through five-year relative survival rates by histology and age group are shown in Table 28. Histology-specific rates are presented for the CBTRUS histology groupings which contain a substantial number of incident non-malignant tumors.

- Overall, 90.4% of persons with a non-malignant tumor survive five years after diagnosis.
- Five-year survival is lowest in craniopharyngioma and meningioma, which have five-year relative survival of 83.9% and 86.4%, respectively.
- Five-year survival is highest in nerve sheath tumors and tumors of the pituitary, which have five-year relative survival of 99.3% and 96.4%, respectively.
- Overall, five-year survival in adolescents and young adults is highest (97.7%) as compared to children (96.4%) and older adults (88.8%).

Descriptive Summary of Spinal Cord Tumors

Although spinal cord tumors account for a relatively small percentage of brain and other CNS tumors, they result in significant morbidity. The most common histologies found in the spinal cord, spinal meninges, and cauda equina are presented in Figs. 20a and 20b for both children (age 0–19 years) and adults (age 20+ years), respectively.

- The predominant histology group for those age 0–19 years is ependymal tumors (22.1%) followed by other astrocytomas (19.8%), including glioblastoma.
- Tumors of meninges (36.7%) account for the largest proportion of spinal cord tumors among those age 20 years and older.
- Five-year survival after diagnosis with a malignant tumor of the spinal cord and cauda equine is 81.0%, with ten-year survival of 76.9%

Descriptive Summary of Meningioma, Glioblastoma, and Embryonal Tumors

The data in the CBTRUS Statistical Report 2009–2013 are synthesized to describe the three of the most common histologic types: meningioma and glioblastoma for adults, and embryonal tumors for children and adolescents.

Meningioma

- **Meningiomas are the most frequently reported brain and other CNS tumors, accounting for 37.0% of tumors overall** (Fig. 9a).
- Non-malignant meningiomas with ICD-O-3 behavior codes /0 (benign) or /1 (uncertain) account for 98.7% of meningiomas reported to CBTRUS (Table 7).
- Of tumors with documented WHO grade (77.6%, Table 8), 81.1% of meningioma were WHO grade I, 16.9% were WHO grade II, and 1.7% were WHO grade III.
- Meningiomas are most common in adults age 65 years and older (Table 13), and one of the least common in children age 0–14 years (Table 4).

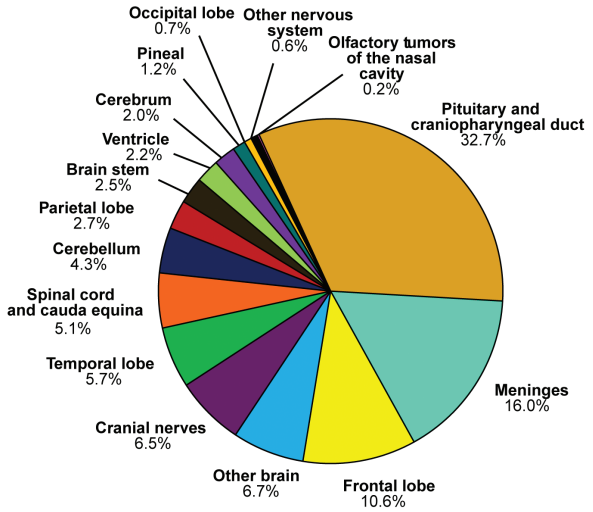
- Incidence of meningiomas increases with age, with a dramatic increase after age 65 years. Even among the population age 85 years and older, these rates continue to be high (Table 12).
- Non-malignant meningiomas are 2.27 times more common in females as compared to males (Fig. 12). Incidence rate ratios are lowest between males and females in childhood (where incidence rates for males and females are approximately equal), and highest from 35–54, where incidence rates are approximately 3 times higher in females.
- Incidence of meningioma is significantly higher in Blacks than in Whites (Fig. 13).
- Ten-year relative survival for malignant meningioma is 57.1% (Table 23).
- Age had a large effect on relative survival after diagnosis with malignant meningioma: 10-year survival was 77.7% for age group 20–44 years, and 37.1% for age 75+ years (Table 24).

Glioblastoma

- **Glioblastoma is the third most frequently reported CNS histology and the most common malignant tumor overall** (Tables 3 and 7).
- Glioblastoma accounts for 14.9% of all primary brain and other CNS tumors (Fig. 9a) and 46.6% of primary malignant brain tumors (Fig. 9b).
- Glioblastoma is more common in older adults (Table 12) and is less common in children; these tumors comprise approximately 2.9% of all brain and other CNS tumors reported among age 0–19 years (Fig. 16b).
- Incidence of glioblastoma increases with age, with rates highest in the age 75 to 84 years (Table 12).
- Glioblastoma is 1.57 times more common in males (Fig. 12).
- Glioblastoma is about 1.93 times higher among Whites as compared to Blacks (Fig. 13).
- Relative survival estimates for glioblastoma are quite low; 5.5% of patients survived five years post diagnosis (Table 23). These survival estimates are somewhat higher for the small number of patients who are diagnosed under age 20 years (Table 24).

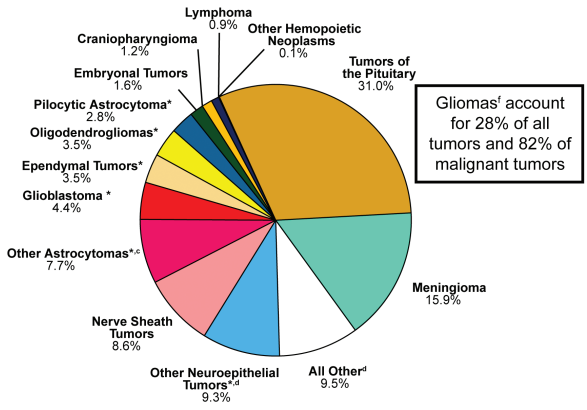
Embryonal Tumors

- **Embryonal tumors are the most frequently reported brain and other CNS tumor histology grouping in children age 0–4 years, and the second most common tumor type overall in children and adolescents age 0–19 years** (Tables 12 and13).
- Embryonal tumors account for 13.8% of all primary brain and other CNS tumors in children age 0–14 years (Fig. 17b), 10.8% of tumors in children and adolescents age 0–19 years (Fig. 16b), and 1.0% of tumors diagnosed overall (Fig. 8a).
- Embryonal tumors within the CBTRUS histologic grouping scheme includes multiple different histologies: primitive neuroectodermal tumor (PNET) (ICD-O-3 histology code 9473), medulloblastoma (ICD-O-3 histology codes 9470–9472), atypical teratoid/rhabdoid tumor (ATRT) (ICD-O-3 histology code 9508), and several other histologies (Table 2a).
- Incidence of medulloblastoma decreases with age. Incidence was 0.55 per 100,000 population, 0.57 per 100,000 population, 0.32 per 100,000 population, and 0.16 per 100,000 population in children age 0–4, 5–9, and 10–14 years, and adolescents age 15–19 years, respectively (Table 4).
- Incidence of PNET was 0.18 per 100,000 population, 0.06 per 100,000 population, 0.05 per 100,000 population, and 0.04 per 100,000 population in children age 0–4, 5–9, and 10–14 years, and adolescents age 15–19 years, respectively (Table 4).
- Incidence of ATRT was 0.32 per 100,000 population and 0.02 per 100,000 population in children age 0–4 and 5–9 years,



a. Percentages may not add up to 100% due to rounding.

Fig. 21a. Distribution[a] in Adolescents and Young Adults[b] (Age 15-39 Years) of Primary Brain and Other CNS Tumors by Site (N=54,388), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.



* All or some of this histology are included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460 (Table 2a).
a. Percentages may not add up to 100% due to rounding. b. Adolescents and Young Adults (AYA), as defined by the National Cancer Institute, see: http://www.cancer.gov/researchandfunding/snapshots/adolescent-young-adult.
c. Includes diffuse astrocytoma, anaplastic astrocytoma, unique astrocytoma variants (Table 2a). d. Includes other tumors of cranial and spinal nerves, mesenchymal tumors, primary melanocytic lesions, other neoplasms related to the meninges, hemangioma, neoplasm unspecified, all other (Table 2a). e. Includes oligoastrocytic tumors, glioma malignant, NOS, choroid plexus tumors, other neuroepithelial tumors, neuronal and mixed neuronal-glial tumors, tumors of the pineal region (Table 2a).

Fig. 21b. Distribution[a] in Adolescents and Young Adults[b] (Age 15-39 Years) of Primary Brain and Other CNS Tumors by Histology (N=54,388), CBTRUS Statistical Report: NPCR and SEER, 2009-2013.

respectively. There are too few of these cases in older age-groups to report (Table 4).
- Relative survival estimates for embryonal tumors are low but vary significantly by histology. 10-year survival is 64.7% for medulloblastoma, 39.7% for PNET, and 25.8% for ATRT (Table 23).

Descriptive Summary of Adolescent and Young Adult Primary Brain and Other CNS Tumors (Age 15–39 Years)

Brain and other CNS tumors are less common in adolescents and young adults (AYA; age 15–39 years)[45] as compared to older adults (Table 25). These tumors are the third most commonly occurring cancer in persons age 15–39 years in the US, and the third most common cause of cancer death.[46]

- There were 54,388 primary brain and other CNS tumors diagnosed in AYA between 2009 and 2013, which is 14.8% of all brain and other CNS tumors (Fig. 21a-b).
- The overall incidence rate in this age-group was 10.71 per 100,000 population (Table 25).
- Tumors of neuroepithelial tissue had the highest incidence (3.45 per 100,000 population), followed by tumors of the sellar region (3.42 per 100,000 population) (Table 25).
- The most common histology in AYA was tumors of the pituitary (3.29 per 100,000 population), followed by meningioma (1.79 per 100,000 population) and nerve sheath tumors (0.94 per 100,000 population) (Table 25).
- The majority of AYA brain and other CNS tumors occurred in the pituitary and craniopharyngeal duct (32.7%), followed by the meninges (16.0%) (Fig. 21a).
- Approximately 19.7% of tumors diagnosed in AYA are located within the frontal, temporal, parietal, and occipital lobes of the brain combined (Fig. 21a).
- Cerebrum, ventricle, cerebellum, and brain stem tumors combined account for about 11.0% of all AYA tumors (Fig. 21a).
- The predominately non-malignant tumors of the pituitary (31.0%), meningioma (15.9%), and nerve sheath (8.6%) represent over half of CNS tumors diagnosed in AYA. (Fig. 21b).
- Glioma accounts for approximately 27.7% of all brain and other CNS tumors in AYA, and about 82.3% of all malignant tumors. (Fig. 21b).
- AYA are estimated to have 22,310 new primary brain and other CNS tumors in both 2016 and 2017 (Table 20).
- AYA have higher rates of relative survival than adults greater than 40 years old for all histologic types. Though 1-year relative survival for most tumor types is higher for AYA than children, 5- and 10-year survival are usually higher for children as compared to AYA (Table 26).

Descriptive Summary of Time Trends in Primary Brain and Other CNS Tumors

Time trends in cancer incidence rates are an important measure of the changing burden of cancer in a population over time. Incidence rates of cancer overall, and many specific cancer histologies, have decreased over time.[47] Overall, there have been some changes in incidence rates of brain and other CNS tumors between 2000 and 2013 (2004–2013 for non-malignant tumors), but the scale of these changes has been small. There are many things that can affect incidence rates over time that are not related to 'true' incidence of these tumors, including demographic changes, changes in histologic classification, and changes in cancer registration procedures. It has been previously reported that there was increasing incidence of non-malignant brain tumors during the first years of their mandatory collection (2004–2006).[48] **It is important to consider all the factors that may affect fluctuations in rates over time when interpreting time trends results.** When assessing trends in incidence over time it is critical to use the most recent data release, as delay in reporting may cause small fluctuations in incidence. **In addition to assessing statistical significance of changes in incidence over time, the size of this change must also be considered because with datasets as large as CBTRUS very small fluctuations in incidence over time may be statistically significant but not truly represent a large proportion of individuals.**

- From 2008–2013, there was a slight decrease in incidence of malignant brain tumors (Annual percentage change [APC] of -1.18%). There was a small but statistically significant increase in incidence in children (age 0–14 years, APC=0.58%), and a small but statistically significant decrease in AYA (APC=-0.49%) from 2000–2013, and a small but statistically significant decrease in older adults from 2008–2013 (APC=-1.39%)
- There was a significant increase in incidence of non-malignant brain tumors from 2004–2009 (APC=4.75%), and no significant change between 2009 and 2013. There was a small but statistically significant increase in incidence of these tumors in children (2004–2013, APC=1.99%), in AYA (2004–2009, APC=5.99%), and older adults (2004–2009, APC=4.52%). When analysis was limited to histologically confirmed tumors only, there was a small but significant increase in incidence of non-malignant brain and other CNS tumors from 2004–2009 (APC=1.54%), followed by a small decrease from 2009–2013 (APC=-1.89%). There was a statistically significant increase in incidence of radiographically confirmed non-malignant tumors from 2004–2009 (APC=8.83%), with no significant change from 2009–2013. **The increases in incidence in these tumors are at least partially attributable to improved collection of radiographically diagnosed cases as well as improvement in collection of non-malignant cases in general over time**.
- There was a slight increase in incidence of glioma between 2000 and 2007 (APC=0.86%), but no change in incidence from 2006–2013. There was a significant increase in incidence in children (age 0–14 years, APC=1.59%) from 2000–2013, and a significant increase in incidence in AYA from 2000–2006 (APC=2.21%). There was a statistically significant increase in incidence of glioma in older adults (age 40+ years) from 2000–2007 (APC=0.50%), followed by a statistically significant decrease from 2007–2013 (APC=-0.86%).
- There was a significant increase of non-malignant meningioma between 2004 and 2009 (APC=4.81%), but no significant change after 2009. When analysis was limited to histologically confirmed cases, there was no substantial change in incidence from 2004–2009 and a slight decrease (APC=-2.38%) from 2009–2013. There was a significant increase in incidence of radiographically diagnosed cases from 2004–2009 (APC=8.55%) with no significant change between

2009 and 2013. **The increases in incidence in these tumors are at least partially attributable to improved collection of radiographically diagnosed cases as well as improvement in collection of non-malignant cases in general over time**.

- There was a significant decrease in incidence of malignant meningioma between 2000 and 2013 (APC= -5.24%). **Changes were made to histological classification of meningioma in both the 2000 and 2007 revisions of the WHO classification, and gradual uptake of these classification changes may result in changing incidence of these tumors.**[49]
- There was no significant change in the incidence of non-malignant nerve sheath tumors between 2004 and 2013. When analysis was limited to histologically confirmed cases only, there was a slight but statistically significant decrease in incidence (APC=-1.02%) from 2004–2013. There was a significant increase in incidence of radiographically diagnosed tumors (APC=13.72%) between 2004 and 2006, with no significant change in incidence from 2006–2013. **The increases in incidence in these tumors are at least partially attributable to improved collection of radiographically diagnosed cases as well as improvement in collection of non-malignant cases in general over time**.
- There was a significant increase in non-malignant tumors of the pituitary from 2004–2009 (APC=6.88%), but no significant change in incidence from 2009–2013. When analysis was limited to histologically confirmed tumors only, there was a significant increase (APC=4.41%) from 2004–2009, followed by a small but significant decrease from 2009–2013 (APC= -2.41%). There was a significant increase in incidence of radiographically diagnosed tumors of the pituitary from 2004–2009 (APC=10.39%), with no significant change in incidence from 2009–2013. **The increases in incidence in these tumors are at least partially attributable to improved collection of radiographically diagnosed cases as well as improvement in collection of non-malignant cases in general over time**.
- There was a significant increase in non-malignant hemangioma from 2004–2011 (APC=16.28%), but no significant change in incidence from 2011–2013. When analysis was limited to tumors with histologically confirmation only, there was an increase in incidence of 13.10% from 2004–2009, with no significant change from 2009–2013. For radiographic confirmed tumors only, there was a statistically significant increase of 20.24% from 2004–2011, with no significant change from 2011–2013. **The increases in incidence in these tumors are at least partially attributable to improved collection of radiographically diagnosed cases as well as improvement in collection of non-malignant cases in general over time**.

Risk Factors for Primary Brain and Other CNS Tumors

Many environmental and behavioral risk factors have been investigated for brain and other CNS tumors. The only well-validated factors are increased risk for these tumors (particularly meningiomas) with exposure to ionizing radiation[50] (the type of radiation generated by atomic bombs, therapeutic radiation treatment, CT scans, and X-rays) and decreased risk for these tumors (particularly glioma) in persons with a history of allergy or other atopic disease[51] (including eczema, psoriasis, and asthma). Several recent review articles have elaborated on the current state of risk factor research in primary brain and other CNS tumors.[52–54]

Biomarkers for Primary Brain and Other CNS Tumors

Primary brain and other CNS tumors are a highly heterogeneous group of diseases, and characterization of unique tumor histologies within this group has been refined over time. The development of technologies for characterizing DNA, RNA, and DNA methylation has led to the discovery of several factors (known as 'biomarkers') that can be used to more accurately classify these tumors than histologic appearance alone.

Gliomas, as the most common malignant primary brain and other CNS tumor type, have been subject to the greatest amount of investigation. One of the earliest discoveries in glioma biomarkers was that oligodendrogliomas often had large deletions (missing parts of the chromosome, also known as loss of heterozygosity) in the short arm of chromosome 1 (1p) and the long arm of chromosome 19 (19q).[55] In general, these deletions significantly predict positive response to chemotherapy and radiation treatment in oligodendroglioma and anaplastic oligodendroglioma.[56–58] Mutations to the genes in isocitrate dehydrogenase 1 (*IDH1*) and in isocitrate dehydrogenase 2 (*IDH2*) have also been shown to be associated with improved prognosis in glioma. These mutations are common in lower grade gliomas (WHO grade II and WHO grade III), but are rare in glioblastoma.[59] Both of these alterations are thought to occur relatively early in the development of gliomas. Recent analyses of data collected by the Cancer Genome Atlas have demonstrated that the combination of these two factors can be used to more accurately stratify glioma by prognosis than the previous existing histological criteria,[60,61] and have been incorporated into the definition of oligodendroglioma and astrocytoma in the 2016 revision to the WHO classification.[15]

Another alteration that is associated with improved survival in glioma is increased methylation (where methyl molecules are bonded to the DNA) of the promotor region of the gene O-6-methylguanine-DNA methyltransferase (*MGMT*).[62,63] The promoter region of a gene is located upstream of where the coding part of the gene is located, and exerts control over whether a gene is transcribed into RNA. Methylation of this region effectively silences the gene, and prevents transcription into RNA. *MGMT* is a DNA repair protein, and it is assumed that the decreases in protein levels increase sensitivity to the alkylating chemotherapies (e.g. temozolomide) often used in the treatment of gliomas that combat tumor through DNA damage.[64] This alteration is common in glioblastoma, and less common in lower grade glioma. Recent analyses of data generated by The Cancer Genome Atlas have shown that genome-wide DNA methylation predicts improved prognosis in addition to methylation of specific genes.[60] Persons whose tumor has a higher proportion of methylation across the genome are termed to have glioma-CpG island methylator phenotype (G-CIMP).[65] G-CIMP and *MGMT* methylation are correlated,[66] but G-CIMP is much rarer in glioblastoma than *MGMT*.

Medulloblastoma is another tumor type that has been subject to significant molecular analysis. Using an analysis of gene expression (based on quantity of RNA transcribed from a gene), medulloblastoma was able to be subdivided into four distinct subtypes: wingless (WNT), sonic hedgehog (SHH), group 3 (also called group C), and group 4 (also called group D).[67] These groups are associated with specific age groups, with SHH being most common in infants and adults, and all other groups being more common in childhood. Several review articles have elaborated on the details of these subgroups and their implications for diagnosis and treatment.[68,69]

As of 2011, SEER registries currently collect information on three validated biomarkers for primary brain and other CNS tumors as Site Specific Factors (SSF): promoter methylation status of *MGMT* (SSF 4), deletion of the 1p (SSF 5), and deletion of 19q (SSF 6).[70] Completeness of these biomarker data varies significantly by histology, but is gradually improving over time.

Strengths and Limitations of Cancer Registry Data

CBTRUS is the largest population-based registry focused exclusively on primary brain and other CNS tumors in the US and represents cases collected from 99.9% of the US population (for 2011–2013 only, data were available for 50 out of 51 registries). The *CBTRUS Statistical Report: Primary Brain and Other Central Nervous System Tumors Diagnosed in the United States in 2009–2013* contains the most up-to-date population-based data on primary brain tumor and other CNS tumors available through the surveillance system in the US.

Registration of individual cases is conducted by cancer registrars at the institution where diagnosis occurs and is then transmitted to the central cancer registry, which further transmits this information to NPCR or SEER. Central cancer registries (both NPCR and SEER) only report cases to the CDC and NCI for persons that are residents of that particular state, so duplicate records should not occur for persons that may have traveled across state lines for treatment. As a result, the CBTRUS dataset is a complete recording of all cases for the time period examined (with the exception of cases from one registry from 2011–2013) with minimal duplicates.

Currently, there is no publically available data source for the collection of survival and outcomes data from all geographic regions in the US via the cancer registry system. SEER registries are specifically funded to collect active follow-up on patients, and as a result have highly accurate survival data for patients who are diagnosed within the geographic regions covered by these registries. The SEER 18 population dataset used for the survival analyses is a subset of the larger CBTRUS dataset used to generate incidence (99.9% of the US population)[11] and covers approximately 26% of the US population. Survival estimates obtained from the SEER dataset may be less reliable as representations of 'real' relative survival rates for the US than if they were based on data from a larger portion of the population. Survival data are collected by NPCR registries—primarily through linkage with death records—but the feasibility of these data for use in survival studies has been evaluated[71,72] and are currently available for public use from a limited number of NPCR registries.

No mechanism currently exists for central pathology review of cases within the US cancer registry system, and histology code assignment at case registration is based on histology information contained in the patient's medical record. The *WHO Classification of Tumours of the Central Nervous System* underwent revision in 1993,[73] 2000,[14] 2007,[8] and 2016.[15] The US cancer registry system is currently using the 2000 classification for data abstraction, but tumors included in this report may have been diagnosed using any of the available classifications prior to 2013 due to the variation in adoption of new standards by individual physicians and medical practices. As a result, histologies are reflective of the prevailing criteria for a histology at the time of registration. This means that despite changes to the histology schema that may occur over time, it is not possible without additional variables to go back and re-classify any tumors based on new criteria. In addition to changes in histologic criteria over time, there is significant inter-rater variability in histopathological diagnosis of glioma.[74,75] This also means that incomplete, incorrect, or alternatively stated diagnoses included in a pathology report or other medical record can result in an incorrect reporting of the details of an individual case. For example, an anaplastic oligodendroglioma recorded in a pathology record as oligodendroglioma WHO grade III may be incorrectly recorded as an oligodendroglioma when the accurate category is an anaplastic oligodendroglioma.

US cancer registration requires the reporting of cases that are confirmed by any type of diagnostic procedure, including both histologic confirmation (where surgery was performed and the diagnosis confirmed by a pathologist) and radiographic confirmation (where diagnosis was made based solely on imaging criteria, such as an MRI, CT scan, or X-ray). Only histologic confirmation allows certainty on the assignment of a specific histology as well as for an assignment of a WHO grade. Many tumors have unique characteristics that make them identifiable on imaging and, thereby qualify as a valid type of diagnostic procedure, but it is important to consider the lower level of certainty of specifying correct histology in these tumors.

The 2016 *WHO Classification of Tumours of the Central Nervous System*[15] contains significant revision to diagnostic criteria for glioma. Oligoastrocytoma has been long considered an entity that is distinct from astrocytoma and oligodendroglioma, and is included as a unique histologic grouping within the CBTRUS classification scheme. Due to recent molecular analyses that have suggested that these tumors are not molecularly distinct from oligodendrogliomas or astrocytomas[76] and can be separated into as astrocytoma and oligodendroglioma using molecular markers, the diagnosis of oligoastrocytoma is strongly discouraged and qualified with a "not otherwise specified" designation under the 2016 revision to the *WHO Classification of Tumours of the Central Nervous System*. With this recent revision to the WHO criteria for central nervous system tumors,[15] *IDH1/2* mutation and 1p/19q codeletion will become the primary factors by which gliomas are classified. Data on *IDH1/2* mutation status are not currently collected in the US cancer registry system, and while 1p/19q deletion data are collected, these data vary significantly in completeness by histology.[70] Though the coding changes contained within this revision are not currently adopted by the US cancer registry system, it is likely that these changes to diagnostic criteria may affect the incidence of these tumor types in future years.

Concluding Comment

The *CBTRUS Statistical Report: Primary Brain and Other Central Nervous System Tumors Diagnosed in the United States in 2009–2013* comprehensively describes the current population-based incidence, mortality, and relative survival of primary malignant and non-malignant brain and other CNS tumors collected and reported by central cancer registries covering approximately 99.9% of the US population (for 2011–2013 only, data was available for 50 out of 51 registries). This report aims to serve as a useful resource for researchers, clinicians, patients, and families. In keeping with its mission, CBTRUS continually revises its reports to reflect the current collection and reporting practices of the broader surveillance community in which it works, while integrating the input it receives from the clinical and research community, especially from neuropathologists, when possible. In this way, the CBTRUS facilitates communication between the cancer surveillance and the brain tumor research and clinical communities and contributes meaningful insight into the descriptive epidemiology of all primary brain and other CNS tumors in the United States.

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Abbreviations

AIAN – American Indian/Alaskan Native
AJCC – American Joint Commission on Cancer
APC – Annual Percent Change
API – Asian/Pacific Islander
AYA – Adolescents and Young Adults
ATRT – Atypical Teratoid/Rhabdoid Tumor
CBTRUS – Central Brain Tumor Registry of the United States
CCR – Central Cancer Registry
CDC – Centers for Disease Control and Prevention
CS – Collaborative Staging
CSS – Cancer Surveillance System
CI – Confidence interval
CNS – Central nervous system
ICD-O-3 – International Classification of Diseases for Oncology Third Edition
ICCC – International Classification of Childhood Cancer
IDH1/2 – Isocitrate dehydrogenase 1/2
MGMT – O-6-methylguanine-DNA methyltransferase
NAACCR – North American Association of Central Cancer Registries
NCDB – National Cancer Data Base
NCHS – National Center for Health Statistics
NCI – National Cancer Institute
NOS – Not otherwise specified
NPCR – National Program of Cancer Registries
NVSS – National Vital Statistics System
PNET – Primitive Neuroectodermal Tumor
SEER – Surveillance Epidemiology and End Results
US – United States
USCS – United States Cancer Statistics
VHA – Veteran's Health Administration
WHO – World Health Organization

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Table 1. Central Brain Tumor Registry of the United States (CBTRUS), Brain and Other Central Nervous System Tumor Site Groupings

Site	ICD-O-3[a] Site Code
Frontal lobe of brain	C71.1
Temporal lobe of brain	C71.2
Parietal lobe of brain	C71.3
Occipital lobe of brain	C71.4
Cerebrum	C71.0
Ventricle	C71.5
Cerebellum	C71.6
Brain stem	C71.7
Other brain	C71.8-C71.9
Overlapping lesion of brain	*C71.8*
Brain, NOS	*C71.9*
Spinal cord and cauda equina	C72.0-C72.1
Spinal cord	*C72.0*
Cauda equina	*C72.1*
Cranial nerves	C72.2-C72.5
Olfactory nerve	*C72.2*
Optic nerve	*C72.3*
Acoustic nerve	*C72.4*
Cranial nerve, NOS	*C72.5*
Other nervous system	C72.8-C72.9
Overlapping lesion of brain and central nervous system	*C72.8*
Nervous system, NOS	*C72.9*
Meninges (cerebral & spinal)	C70.0-C70.9
Cerebral meninges	*C70.0*
Spinal meninges	*C70.1*
Meninges, NOS	*C70.9*
Pituitary and craniopharyngeal duct	C75.1-C75.2
Pituitary gland	*C75.1*
Craniopharyngeal duct	*C75.2*
Pineal gland	C75.3
Olfactory tumors of the nasal cavity[b]	C30.0

[a] International Classification of Diseases for Oncology, 3rd Edition, 2000. World Health Organization, Geneva, Switzerland.
[b] ICD-O-3 histology codes 9522-9523 only.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NOS, not otherwise specified.

Table 2a. Central Brain Tumor Registry of the United States (CBTRUS), Brain and Other Central Nervous System Tumor Histology Groupings

Histology	ICD-O-3[a] Histology Code[b]
Tumors of Neuroepithelial Tissue	
Pilocytic astrocytoma*	9421, 9425[c]
Diffuse astrocytoma*	9400, 9410, 9411, 9420
Anaplastic astrocytoma*	9401
Unique astrocytoma variants*	9381, 9384, 9424
Glioblastoma*	9440, 9441, 9442/3[d]
Oligodendroglioma*	9450
Anaplastic oligodendroglioma*	9451, 9460
Oligoastrocytic tumors*	9382
Ependymal tumors*	9383, 9391, 9392, 9393, 9394
Glioma malignant, NOS*	9380 9431[c], 9432[c]
Choroid plexus tumors	9390
Other neuroepithelial tumors*	9363, 9423, 9430, 9444
Neuronal and mixed neuronal-glial tumors*	8680, 8681, 8690, 8693, 9412, 9413, 9442/1[e], 9492 (excluding site C75.1), 9493, 9505, 9506, 9522, 9523
Tumors of the pineal region	9360, 9361, 9362, 9395[c]
Embryonal tumors	8963, 9364, 9470, 9471, 9472, 9473, 9474, 9480, 9490, 9500, 9501, 9502, 9508
Tumors of Cranial and Spinal Nerves	
Nerve sheath tumors	9540, 9541, 9550, 9560, 9561, 9570, 9571
Other tumors of cranial and spinal nerves	9562
Tumors of Meninges	
Meningioma	9530, 9531, 9532, 9533, 9534, 9537, 9538, 9539
Mesenchymal tumors	8324, 8800, 8801, 8802, 8803, 8804, 8805, 8806, 8810, 8815, 8824, 8830, 8831, 8835, 8836, 8850, 8851, 8852, 8853, 8854, 8857, 8861, 8870, 8880, 8890, 8897, 8900, 8901, 8902, 8910, 8912, 8920, 8921, 8935, 8990, 9040, 9136, 9150, 9170, 9180, 9210, 9241, 9260, 9373
Primary melanocytic lesions	8720, 8728, 8770, 8771
Other neoplasms related to the meninges	9161, 9220, 9231, 9240, 9243, 9370, 9371, 9372, 9535
Lymphomas and Hemopoietic Neoplasms	
Lymphoma	9590, 9591, 9596, 9650, 9651, 9652, 9653, 9654, 9655, 9659, 9661, 9662, 9663, 9664, 9665, 9667, 9670, 9671, 9673, 9675, 9680, 9684, 9687, 9690, 9691, 9695, 9698, 9699, 9701, 9702, 9705, 9714, 9719, 9728, 9729
Other hemopoietic neoplasms	9727, 9731, 9733, 9734, 9740, 9741, 9750, 9751, 9752, 9753, 9754, 9755, 9756, 9757, 9758, 9760, 9766, 9823, 9826, 9827, 9832, 9837, 9860, 9861,9866, 9930, 9970
Germ Cell Tumors and Cysts	
Germ cell tumors, cysts and heterotopias	8020, 8440, 9060, 9061, 9064, 9065, 9070, 9071, 9072, 9080, 9081, 9082, 9083, 9084, 9085, 9100, 9101
Tumors of Sellar Region	
Tumors of the pituitary	8040, 8140, 8146, 8246, 8260, 8270, 8271, 8272, 8280, 8281, 8290, 8300, 8310, 8323, 9492 (Site C75.1 only), 9582
Craniopharyngioma	9350, 9351, 9352
Unclassified Tumors	
Hemangioma	9120, 9121, 9122, 9123, 9125, 9130, 9131, 9133, 9140
Neoplasm, unspecified	8000, 8001, 8002, 8003, 8004, 8005, 8010, 8021
All other	8320, 8452, 8710, 8711, 8713, 8811, 8840, 8896, 8980, 9173, 9503, 9580

[a]International Classification of Diseases for Oncology, 3rd Edition, 2000. World Health Organization, Geneva, Switzerland.
[b]See the CBTRUS website for additional information about the specific histology codes included in each group: http://www.cbtrus.org.
[c]Histology not currently used to US cancer registration, will be included starting with diagnosis year 2015. See NAACCR website: http://www.naaccr. org/LinkClick.aspx?fileticket1/44Hx-2XJJqFo%3d&tabid1/4161&mid1/4523.
[d]Morphology 9442/3 only.
[e]Morphology 9442/1 only.
*All or some of this histology is included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NOS, not otherwise specified.

Table 2b. Central Brain Tumor Registry of the United States (CBTRUS), Brain and Other Central Nervous System Tumor Malignant Histology Groupings[a]

Histology	ICD-O-3[b] Histology Code[c]
Tumors of Neuroepithelial Tissue	
Pilocytic astrocytoma*	9421/1 [Included with malignant tumors], 9425/3[d]
Diffuse astrocytoma*	9400/3, 9410/3, 9411/3, 9420/3
Anaplastic astrocytoma*	9401/3
Unique astrocytoma variants*	9381/3, 9424/3
Glioblastoma*	9440/3, 9441/3, 9442/3
Oligodendroglioma*	9450/3
Anaplastic oligodendroglioma*	9451/3, 9460/3
Oligoastrocytic tumors*	9382/3
Ependymal tumors*	9391/3, 9392/3, 9393/3
Glioma malignant, NOS*	9380/3, 9431/1[d], 9432/1[d] [Included with malignant tumors]
Choroid plexus tumors	9390/3
Other neuroepithelial tumors*	9423/3, 9430/3
Neuronal and mixed neuronal-glial tumors*	8680/3, 8693/3, 9505/3, 9522/3, 9523/3
Tumors of the pineal region	9362/3, 9395/3[d]
Embryonal tumors	8963/3, 9364/3, 9470/3, 9471/3, 9472/3,9473/3, 9474/3, 9480/3, 9490/3, 9500/3, 9501/3, 9502/3, 9508/3
Tumors of Cranial and Spinal Nerves	
Nerve sheath tumors	9540/3, 9560/3, 9561/3, 9571/3
Tumors of Meninges	
Meningioma	9530/3, 9538/3, 9539/3
Mesenchymal tumors	8800/3, 8801/3, 8802/3, 8803/3, 8804/3, 8805/3, 8806/3, 8810/3, 8815/3, 8830/3, 8850/3, 8851/3, 8852/3, 8853/3, 8854/3, 8857/3, 8890/3, 8900/3, 8901/3, 8902/3, 8910/3, 8912/3, 8920/3, 8921/3, 8990/3, 9040/3, 9150/3, 9170/3, 9180/3, 9260/3
Primary melanocytic lesions	8720/3, 8728/3, 8770/3, 8771/3
Other neoplasms related to the meninges	9220/3, 9231/3, 9240/3, 9243/3, 9370/3, 9371/3, 9372/3
Lymphomas and Hemopoietic Neoplasms	
Lymphoma	9590/3, 9591/3, 9596/3, 9650/3, 9651/3, 9652/3, 9653/3, 9654/3, 9655/3, 9659/3, 9661/3, 9662/3, 9663/3, 9664/3, 9665/3, 9667/3, 9670/3, 9671/3, 9673/3, 9675/3, 9680/3, 9684/3, 9687/3, 9690/3, 9691/3, 9695/3, 9698/3, 9699/3, 9701/3, 9702/3, 9705/3, 9714/3, 9719/3, 9728/3, 9729/3
Other hemopoietic neoplasms	9727/3, 9731/3, 9733/3, 9734/3, 9740/3, 9741/3, 9750/3, 9754/3, 9755/3, 9756/3,9757/3, 9758/3, 9760/3, 9823/3, 9826/3, 9827/3, 9832/3, 9837/3, 9860/3, 9861/3, 9866/3, 9930/3
Germ Cell Tumors and Cysts	
Germ cell tumors, cysts and heterotopias	8020/3, 8440/3, 9060/3, 9061/3, 9064/3, 9065/3, 9070/3, 9071/3, 9072/3, 9080/3, 9081/3, 9082/3, 9083/3, 9084/3, 9085/3, 9100/3, 9101/3
Tumors of Sellar Region	
Tumors of the pituitary	8140/3, 8246/3, 8260/3, 8270/3, 8272/3, 8280/3, 8281/3, 8290/3, 8300/3, 8310/3, 8323/3
Unclassified Tumors	
Hemangioma	9120/3, 9130/3, 9133/3, 9140/3
Neoplasm, unspecified	8000/3, 8001/3, 8002/3, 8003/3, 8004/3, 8005/3, 8010/3, 8021/3
All other	8320/3, 8710/3, 8711/3, 8811/3, 8840/3, 8896/3, 8980/3, 9503/3, 9580/3

[a]Includes all the histologies listed in the standard definition of reportable brain tumors from the Consensus Conference on Brain Tumor Definitions.
[b]International Classification of Diseases for Oncology, 3rd Edition, 2000. World Health Organization, Geneva, Switzerland.
[c]See the CBTRUS website for additional information about the specific histology codes included in each group. http://www.cbtrus.org.
[d]Histology not currently used to US cancer registration, will be included starting with diagnosis year 2015. See NAACCR website. http://www.naaccr. org/LinkClick.aspx?fileticket1/44Hx-2XJJqFo%3d&tabid1/4161&mid1/4523.
* All or some of this histology is included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460.
Abbreviations. CBTRUS, Central Brain Tumor Registry of the United States; NOS, not otherwise specified.

Table 2c. Central Brain Tumor Registry of the United States (CBTRUS), Brain and Other Central Nervous System Tumor Non-Malignant Histology Groupings[a]

Histology	ICD-O-3[b] Histology Code[c]
Tumors of Neuroepithelial Tissue	
Unique astrocytoma variants*	9384/1
Ependymal tumors*	9383/1, 9394/1
Choroid plexus	9390/0,1
Other neuroepithelial tumors	9363/0, 9444/1
Neuronal and mixed neuronal-glial tumors*	8680/0,1, 8681/1, 8690/1, 8693/1, 9412/1, 9413/0, 9442/1, 9492/0 (excluding site C75.1), 9493/0, 9505/1, 9506/1, 9509/1
Tumors of the pineal region	9360/1, 9361/1
Embryonal tumors	9490/0
Tumors of Cranial and Spinal Nerves	
Nerve sheath tumors	9540/0,1, 9541/0, 9550/0, 9560/0,1, 9570/0, 9571/0
Other tumors of cranial and spinal nerves	9562/0
Tumors of Meninges	
Meningioma	9530/0,1, 9531/0, 9532/0, 9533/0, 9534/0, 9537/0, 9538/1, 9539/1
Mesenchymal tumors	8324/0, 8800/0, 8810/0, 8815/0, 8824/0,1, 8830/0,1, 8831/0, 8835/1, 8836/1, 8850/0,1, 8851/0, 8852/0, 8854/0, 8857/0, 8861/0, 8870/0, 8880/0, 8890/0,1, 8897/1, 8900/0, 8920/1, 8935/0,1, 8990/0,1, 9040/0, 9136/1, 9150/0,1, 9170/0, 9180/0, 9210/0, 9241/0, 9373/0
Primary melanocytic lesions	8728/0,1, 8770/0, 8771/0
Other neoplasms related to the meninges	9161/1, 9220/0,1, 9535/0
Lymphomas and Hemopoietic Neoplasms	
Other hemopoietic neoplasms	9740/1, 9751/1, 9752/1, 9753/1, 9766/1, 9970/1
Germ Cell Tumors and Cysts	
Germ cell tumors, cysts and heterotopias	8440/0, 9080/0,1, 9084/0
Tumors of Sellar Region	
Tumors of the pituitary	8040/0,1, 8140/0,1, 8146/0, 8260/0, 8270/0, 8271/0, 8272/0, 8280/0, 8281/0, 8290/0, 8300/0, 8310/0, 8323/0, 9492/0 (site C75.1 only), 9582/0
Craniopharyngioma	9350/1, 9351/1, 9352/1
Unclassified Tumors	
Hemangioma	9120/0, 9121/0, 9122/0, 9123/0, 9125/0, 9130/0,1, 9131/0, 9133/1
Neoplasm, unspecified	8000/0,1, 8001/0,1, 8005/0, 8010/0
All other	8452/1, 8711/0, 8713/0, 8811/0, 8840/0, 9173/0, 9580/0

[a]Includes all the histologies listed in the standard definition of reportable brain tumors from the Consensus Conference on Brain Tumor Definition.
[b]International Classification of Diseases for Oncology, 3rd Edition, 2000. World Health Organization, Geneva, Switzerland.
[c]See the CBTRUS website for additional information about the specific histology codes included in each group: http://www.cbtrus.org.
* All or some of this histology is included in the CBTRUS definition of gliomas, including ICD-O-3 histology codes 9380-9384, 9391-9460.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NOS, not otherwise specified.

Table 3. Five-Year Total, Annual Average Total[a], and Average Annual Age-Adjusted Incidence Rates[b] for Brain and Other Central Nervous System Tumors by Major Histology Groupings, Histology, Behavior, and Sex, CBTRUS Statistical Report: NPCR and SEER, 2009-2013

Histology	Total				Male						Female					
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	% Malignant	% Non-Malignant	Rate	95% CI	5-year total	Annual average	% Malignant	% Non-Malignant	Rate	95% CI
Tumors of Neuroepithelial Tissue	**107,732**	**21,546**	**6.60**	**(6.56-6.64)**	**60,196**	**12,039**	**93.1%**	**6.9%**	**7.75**	**(7.69-7.81)**	**47,536**	**9,507**	**92.6%**	**7.4%**	**5.60**	**(5.55-5.65)**
Pilocytic astrocytoma	5,106	1,021	0.35	(0.34-0.36)	2,637	527	100.0%	0.0%	0.35	(0.34-0.37)	2,469	494	100.0%	0.0%	0.34	(0.33-0.36)
Diffuse astrocytoma	8,081	1,616	0.51	(0.50-0.52)	4,472	894	100.0%	0.0%	0.58	(0.57-0.60)	3,609	722	100.0%	0.0%	0.44	(0.43-0.46)
Anaplastic astrocytoma	6,245	1,249	0.39	(0.38-0.40)	3,452	690	100.0%	0.0%	0.45	(0.43-0.46)	2,793	559	100.0%	0.0%	0.33	(0.32-0.35)
Unique astrocytoma variants	1,070	214	0.07	(0.07-0.07)	581	116	67.3%	32.7%	0.08	(0.07-0.08)	489	98	65.8%	34.2%	0.06	(0.06-0.07)
Glioblastoma	54,980	10,996	3.20	(3.17-3.22)	31,545	6,309	100.0%	0.0%	3.98	(3.93-4.02)	23,435	4,687	100.0%	0.0%	2.53	(2.50-2.56)
Oligodendroglioma	3,852	770	0.25	(0.24-0.26)	2,159	432	100.0%	0.0%	0.29	(0.27-0.30)	1,693	339	100.0%	0.0%	0.21	(0.20-0.22)
Anaplastic oligodendroglioma	1,677	335	0.10	(0.10-0.11)	944	189	100.0%	0.0%	0.12	(0.11-0.13)	733	147	99.9%	0.1%	0.09	(0.08-0.10)
Oligoastrocytic tumors	3,179	636	0.20	(0.20-0.21)	1,824	365	100.0%	0.0%	0.24	(0.23-0.25)	1,355	271	99.9%	0.1%	0.17	(0.16-0.18)
Ependymal tumors	6,780	1,356	0.43	(0.42-0.44)	3,812	762	56.8%	43.2%	0.49	(0.48-0.51)	2,968	594	65.9%	34.1%	0.37	(0.36-0.39)
Glioma malignant, NOS	7,221	1,444	0.47	(0.46-0.48)	3,625	725	100.0%	0.0%	0.49	(0.47-0.51)	3,596	719	100.0%	0.0%	0.45	(0.44-0.47)
Choroid plexus tumors	784	157	0.05	(0.05-0.06)	382	76	14.1%	85.9%	0.05	(0.05-0.06)	402	80	14.4%	85.6%	0.05	(0.05-0.06)
Other neuroepithelial tumors	95	19	0.01	(0.01-0.01)	36	7	52.8%	47.2%	0.00	(0.00-0.01)	59	12	69.5%	30.5%	0.01	(0.01-0.01)
Neuronal and mixed neuronal-glial tumors	4,367	873	0.29	(0.28-0.29)	2,324	465	21.3%	78.7%	0.30	(0.29-0.32)	2,043	409	17.8%	82.2%	0.27	(0.26-0.28)
Tumors of the pineal region	686	137	0.04	(0.04-0.05)	273	55	68.1%	31.9%	0.04	(0.03-0.04)	413	83	47.2%	52.8%	0.05	(0.05-0.06)
Embryonal tumors	3,609	722	0.25	(0.24-0.25)	2,130	426	97.8%	2.2%	0.29	(0.28-0.30)	1,479	296	95.5%	4.5%	0.20	(0.19-0.21)
Tumors of Cranial and Spinal Nerves	**30,384**	**6,077**	**1.83**	**(1.80-1.85)**	**14,517**	**2,903**	**0.8%**	**99.2%**	**1.82**	**(1.79-1.85)**	**15,867**	**3,173**	**0.7%**	**99.3%**	**1.84**	**(1.81-1.87)**
Nerve sheath tumors	30,360	6,072	1.82	(1.80-1.85)	14,503	2,901	0.8%	99.2%	1.82	(1.79-1.85)	15,857	3,171	0.7%	99.3%	1.83	(1.81-1.86)
Other tumors of cranial and spinal nerves	24	5	0.00	(0.00-0.00)	--	--	--	--	--	--	--	--	--	--	--	--
Tumors of Meninges	**139,205**	**27,841**	**8.30**	**(8.26-8.35)**	**38,300**	**7,660**	**3.0%**	**97.0%**	**5.09**	**(5.04-5.14)**	**100,905**	**20,181**	**1.3%**	**98.7%**	**11.11**	**(11.04-11.18)**
Meningioma	134,835	26,967	8.03	(7.99-8.07)	35,985	7,197	2.0%	98.0%	4.79	(4.74-4.84)	98,850	19,770	1.0%	99.0%	10.86	(10.79-10.93)
Mesenchymal tumors	1,302	260	0.08	(0.08-0.09)	635	127	34.3%	65.7%	0.08	(0.08-0.09)	667	133	27.7%	72.3%	0.08	(0.08-0.09)

Table 3. *Continued*

Histology	Total				Male						Female					
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	% Malignant	% Non-Malignant	Rate	95% CI	5-year total	Annual average	% Malignant	% Non-Malignant	Rate	95% CI
Primary melanocytic lesions	136	27	0.01	(0.01-0.01)	86	17	75.6%	24.4%	0.01	(0.01-0.01)	50	10	50.0%	50.0%	0.01	(0.00-0.01)
Other neoplasms related to the meninges	2,932	586	0.18	(0.18-0.19)	1,594	319	9.1%	90.9%	0.21	(0.20-0.22)	1,338	268	8.6%	91.4%	0.16	(0.15-0.17)
Lymphomas and Hematopoietic Neoplasms	**7,415**	**1,483**	**0.44**	**(0.43-0.45)**	**3,832**	**766**	**99.6%**	**0.4%**	**0.50**	**(0.48-0.51)**	**3,583**	**717**	**99.7%**	0.3%	**0.40**	**(0.38-0.41)**
Lymphoma	7,160	1,432	0.43	(0.42-0.44)	3,697	739	100.0%	0.0%	0.48	(0.46-0.49)	3,463	693	100.0%	0.0%	0.38	(0.37-0.40)
Other hematopoietic neoplasms	255	51	0.02	(0.01-0.02)	135	27	88.9%	11.1%	0.02	(0.01-0.02)	120	24	91.7%	8.3%	0.01	(0.01-0.02)
Germ Cell Tumors and Cysts	**1,469**	**294**	**0.10**	**(0.09-0.10)**	**990**	**198**	**76.7%**	**23.3%**	**0.13**	**(0.12-0.14)**	**479**	**96**	**49.7%**	**50.3%**	**0.07**	**(0.06-0.07)**
Germ cell tumors, cysts and heterotopias	1,469	294	0.10	(0.09-0.10)	990	198	76.7%	23.3%	0.13	(0.12-0.14)	479	96	49.7%	50.3%	0.07	(0.06-0.07)
Tumors of Sellar Region	**61,597**	**12,319**	**3.85**	**(3.82-3.88)**	**27,798**	**5,560**	**0.3%**	**99.7%**	**3.57**	**(3.53-3.61)**	**33,799**	**6,760**	**0.2%**	**99.8%**	**4.21**	**(4.16-4.25)**
Tumors of the pituitary	58,666	11,733	3.66	(3.63-3.69)	26,404	5,281	0.3%	99.7%	3.39	(3.35-3.43)	32,262	6,452	0.2%	99.8%	4.01	(3.97-4.06)
Craniopharyngioma	2,931	586	0.19	(0.18-0.19)	1,394	279	0.3%	99.7%	0.18	(0.17-0.19)	1,537	307	0.2%	99.8%	0.19	(0.18-0.20)
Unclassified Tumors	**20,315**	**4,063**	**1.24**	**(1.22-1.26)**	**9,183**	**1,837**	**34.4%**	**65.6%**	**1.24**	**(1.21-1.26)**	**11,132**	**2,226**	**30.8%**	**69.2%**	**1.25**	**(1.23-1.28)**
Hemangioma	5,869	1,174	0.37	(0.36-0.38)	2,521	504	0.4%	99.6%	0.32	(0.31-0.34)	3,348	670	0.2%	99.8%	0.41	(0.39-0.42)
Neoplasm, unspecified	14,356	2,871	0.87	(0.85-0.88)	6,614	1,323	47.4%	52.6%	0.91	(0.89-0.93)	7,742	1,548	44.0%	56.0%	0.84	(0.82-0.86)
All other	90	18	0.01	(0.00-0.01)	48	10	29.2%	70.8%	0.01	(0.00-0.01)	42	8	31.0%	69.0%	0.01	(0.00-0.01)
TOTAL[c]	**368,117**	**73,623**	**22.36**	**(22.29-22.44)**	**154,816**	**30,963**	**42.1%**	**57.9%**	**20.10**	**(20.00-20.20)**	**213,301**	**42,660**	**24.7%**	**75.3%**	**24.46**	**(24.36-24.57)**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Rates are per 100,000 and are age-adjusted to the 2000 US standard population.
[c]Refers to all brain and other CNS tumors including histologies not presented in this table.
- Counts are not presented when fewer than 16 cases were reported in the five year period for the specific histology category.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 4. Five-Year Total, Annual Average Total[a], and Average Annual Age-Adjusted Incidence Rates[b] for Children and Adolescents (Age 0-19 Years), Brain and Other Central Nervous System Tumors by Major Histology Groupings, Histology, and Age Group at Diagnosis, CBTRUS Statistical Report: NPCR and SEER, 2009-2013

	Age At Diagnosis																							
	0-14 Years‡				0-19 Years‡				0-4 Years				5-9 Years				10-14 Years				15-19 Years			
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Tumors of Neuroepithelial Tissue	**12,303**	**2,461**	**4.04**	**(3.96-4.11)**	**15,363**	**3,073**	**3.74**	**(3.68-3.80)**	**4,880**	**976**	**4.88**	**(4.75-5.02)**	**3,914**	**783**	**3.85**	**(3.73-3.98)**	**3,509**	**702**	**3.41**	**(3.30-3.53)**	**3,060**	**612**	**2.85**	**(2.75-2.95)**
Pilocytic astrocytoma	2,999	600	0.98	(0.95-1.02)	3,645	729	0.89	(0.86-0.92)	1,065	213	1.06	(1.00-1.13)	1,017	203	1.00	(0.94-1.06)	917	183	0.89	(0.83-0.95)	646	129	0.60	(0.56-0.65)
Diffuse astrocytoma	792	158	0.26	(0.24-0.28)	1,083	217	0.26	(0.25-0.28)	308	62	0.31	(0.28-0.34)	227	45	0.22	(0.20-0.26)	257	51	0.25	(0.22-0.28)	291	58	0.27	(0.24-0.30)
Anaplastic astrocytoma	275	55	0.09	(0.08-0.10)	375	75	0.09	(0.08-0.10)	69	14	0.07	(0.05-0.09)	97	19	0.10	(0.08-0.12)	109	22	0.11	(0.09-0.13)	100	20	0.09	(0.08-0.11)
Unique astrocyto(ma variants	343	69	0.11	(0.10-0.13)	461	92	0.11	(0.10-0.12)	89	18	0.09	(0.07-0.11)	118	24	0.12	(0.10-0.14)	136	27	0.13	(0.11-0.16)	118	24	0.11	(0.09-0.13)
Glioblastoma	467	93	0.15	(0.14-0.17)	692	138	0.17	(0.16-0.18)	113	23	0.11	(0.09-0.14)	163	33	0.16	(0.14-0.19)	191	38	0.19	(0.16-0.21)	225	45	0.21	(0.18-0.24)
Oligodendroglioma	110	22	0.04	(0.03-0.04)	203	41	0.05	(0.04-0.06)	19	4	0.02	(0.01-0.03)	41	8	0.04	(0.03-0.05)	50	10	0.05	(0.04-0.06)	93	19	0.09	(0.07-0.11)
Anaplastic oligodendroglioma	--	--	--	--	28	6	0.01	(0.00-0.01)	--	--	--	--	--	--	--	--	--	--	--	--	18	4	0.02	(0.01-0.03)
Oligoastrocytic tumors	70	14	0.02	(0.02-0.03)	127	25	0.03	(0.03-0.04)	19	4	0.02	(0.01-0.03)	22	4	0.02	(0.01-0.03)	29	6	0.03	(0.02-0.04)	57	11	0.05	(0.04-0.07)
Ependymal tumors	961	192	0.31	(0.29-0.33)	1,230	246	0.30	(0.28-0.31)	496	99	0.50	(0.45-0.54)	229	46	0.23	(0.20-0.26)	236	47	0.23	(0.20-0.26)	269	54	0.25	(0.22-0.28)
Glioma malignant, NOS	2,385	477	0.78	(0.75-0.81)	2,737	547	0.67	(0.64-0.69)	931	186	0.93	(0.87-0.99)	893	179	0.88	(0.82-0.94)	561	112	0.55	(0.50-0.60)	352	70	0.33	(0.29-0.36)
Choroid plexus tumors	336	67	0.11	(0.10-0.12)	390	78	0.09	(0.09-0.10)	239	48	0.24	(0.21-0.27)	48	10	0.05	(0.03-0.06)	49	10	0.05	(0.04-0.06)	54	11	0.05	(0.04-0.07)
Other neuroepithelial tumors	30	6	0.01	(0.01-0.01)	34	7	0.01	(0.01-0.01)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Neuronal and mixed neuronal-glial tumors	1,091	218	0.36	(0.34-0.38)	1,631	326	0.40	(0.38-0.41)	276	55	0.28	(0.25-0.31)	313	63	0.31	(0.28-0.35)	502	100	0.49	(0.45-0.53)	540	108	0.50	(0.46-0.55)
Tumors of the pineal region	139	28	0.05	(0.04-0.05)	183	37	0.04	(0.04-0.05)	57	11	0.06	(0.04-0.07)	37	7	0.04	(0.03-0.05)	45	9	0.04	(0.03-0.06)	44	9	0.04	(0.03-0.06)
Embryonal tumors	2,295	459	0.75	(0.72-0.78)	2,544	509	0.62	(0.60-0.64)	1,188	238	1.19	(1.12-1.26)	699	140	0.69	(0.64-0.74)	408	82	0.40	(0.36-0.44)	249	50	0.23	(0.20-0.26)
Medulloblastoma[c]	*1,466*	*293*	*0.48*	*(0.46-0.51)*	*1,642*	*328*	*0.40*	*(0.38-0.42)*	*554*	*111*	*0.55*	*(0.51-0.60)*	*584*	*117*	*0.57*	*(0.53-0.62)*	*328*	*66*	*0.32*	*(0.29-0.36)*	*176*	*35*	*0.16*	*(0.14-0.19)*
Primitive neuroectodermal tumor[d]	*287*	*57*	*0.09*	*(0.08-0.10)*	*334*	*67*	*0.08*	*(0.07-0.09)*	*176*	*35*	*0.18*	*(0.15-0.20)*	*64*	*13*	*0.06*	*(0.05-0.08)*	*47*	*9*	*0.05*	*(0.03-0.06)*	*47*	*9*	*0.04*	*(0.03-0.06)*
Atypical teratoid/ rhabdoid tumor[e]	*353*	*71*	*0.11*	*(0.10-0.13)*	*359*	*72*	*0.09*	*(0.08-0.10)*	*316*	*63*	*0.32*	*(0.28-0.35)*	*25*	*5*	*0.02*	*(0.02-0.04)*	--	--	--	--	--	--	--	--
Other embryonal histologies[f]	*189*	*38*	*0.06*	*(0.05-0.07)*	*209*	*42*	*0.05*	*(0.04-0.06)*	*142*	*28*	*0.14*	*(0.12-0.17)*	*26*	*5*	*0.03*	*(0.02-0.04)*	*21*	4	*0.02*	*(0.01-0.03)*	*20*	4	*0.02*	*(0.01-0.03)*
Tumors of Cranial and Spinal Nerves	**809**	**162**	**0.27**	**(0.25-0.28)**	**1,218**	**244**	**0.29**	**(0.28-0.31)**	**277**	**55**	**0.28**	**(0.25-0.31)**	**259**	**52**	**0.26**	**(0.23-0.29)**	**273**	**55**	**0.27**	**(0.23-0.30)**	**409**	**82**	**0.38**	**(0.34-0.42)**
Nerve sheath tumors	809	162	0.27	(0.25-0.28)	1,216	243	0.29	(0.28-0.31)	277	55	0.28	(0.25-0.31)	259	52	0.26	(0.23-0.29)	273	55	0.27	(0.23-0.30)	407	81	0.38	(0.34-0.42)
Other tumors of cranial and spinal nerves	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tumors of Meninges	**500**	**100**	**0.16**	**(0.15-0.18)**	**1,012**	**202**	**0.24**	**(0.23-0.26)**	**151**	**30**	**0.15**	**(0.13-0.18)**	**112**	**22**	**0.11**	**(0.09-0.13)**	**237**	**47**	**0.23**	**(0.20-0.26)**	**512**	**102**	**0.47**	**(0.43-0.52)**
Meningioma	273	55	0.09	(0.08-0.10)	615	123	0.15	(0.14-0.16)	59	12	0.06	(0.05-0.08)	61	12	0.06	(0.05-0.08)	153	31	0.15	(0.13-0.17)	342	68	0.32	(0.28-0.35)
Mesenchymal tumors	162	32	0.05	(0.05-0.06)	210	42	0.05	(0.04-0.06)	80	16	0.08	(0.06-0.10)	43	9	0.04	(0.03-0.06)	39	8	0.04	(0.03-0.05)	48	10	0.04	(0.03-0.06)

Table 4. *Continued*

	Age At Diagnosis																							
	0-14 Years‡				0-19 Years‡				0-4 Years				5-9 Years				10-14 Years				15-19 Years			
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Primary melanocytic lesions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other neoplasms related to the meninges	58	12	0.02	(0.01-0.02)	177	35	0.04	(0.04-0.05)	--	--	--	--	--	--	--	--	44	9	0.04	(0.03-0.06)	119	24	0.11	(0.09-0.13)
Lymphomas and Hematopoietic Neoplasms	**79**	**16**	**0.03**	**(0.02-0.03)**	**120**	**24**	**0.03**	**(0.02-0.03)**	**17**	**3**	**0.02**	**(0.01-0.03)**	**34**	**7**	**0.03**	**(0.02-0.05)**	**28**	**6**	**0.03**	**(0.02-0.04)**	**41**	**8**	**0.04**	**(0.03-0.05)**
Lymphoma	29	6	0.01	(0.01-0.01)	58	12	0.01	(0.01-0.02)	--	--	--	--	--	--	--	--	--	--	--	--	29	6	0.03	(0.02-0.04)
Other hematopoietic neoplasms	50	10	0.02	(0.01-0.02)	62	12	0.02	(0.01-0.02)	--	--	--	--	23	5	0.02	(0.01-0.03)	--	--	--	--	--	--	--	--
Germ Cell Tumors and Cysts	**635**	**127**	**0.21**	**(0.19-0.23)**	**918**	**184**	**0.22**	**(0.21-0.24)**	**156**	**31**	**0.16**	**(0.13-0.18)**	**168**	**34**	**0.17**	**(0.14-0.20)**	**311**	**62**	**0.30**	**(0.27-0.34)**	**283**	**57**	**0.26**	**(0.23-0.30)**
Germ cell tumors, cysts and heterotopias	635	127	0.21	(0.19-0.23)	918	184	0.22	(0.21-0.24)	156	31	0.16	(0.13-0.18)	168	34	0.17	(0.14-0.20)	311	62	0.30	(0.27-0.34)	283	57	0.26	(0.23-0.30)
Tumors of Sellar Region	**1,415**	**283**	**0.47**	**(0.44-0.49)**	**3,472**	**694**	**0.83**	**(0.80-0.86)**	**169**	**34**	**0.17**	**(0.14-0.20)**	**483**	**97**	**0.48**	**(0.44-0.52)**	**763**	**153**	**0.74**	**(0.68-0.79)**	**2,057**	**411**	**1.91**	**(1.82-1.99)**
Tumors of the pituitary	743	149	0.24	(0.23-0.26)	2,655	531	0.63	(0.60-0.65)	30	6	0.03	(0.02-0.04)	175	35	0.17	(0.15-0.20)	538	108	0.52	(0.47-0.56)	1,912	382	1.77	(1.69-1.85)
Craniopharyngioma	672	134	0.22	(0.21-0.24)	817	163	0.20	(0.19-0.21)	139	28	0.14	(0.12-0.16)	308	62	0.30	(0.27-0.34)	225	45	0.22	(0.19-0.25)	145	29	0.13	(0.11-0.16)
Unclassified Tumors	**912**	**182**	**0.30**	**(0.28-0.32)**	**1,419**	**284**	**0.34**	**(0.33-0.36)**	**318**	**64**	**0.32**	**(0.29-0.36)**	**219**	**44**	**0.22**	**(0.19-0.25)**	**375**	**75**	**0.36**	**(0.33-0.40)**	**507**	**101**	**0.47**	**(0.43-0.51)**
Hemangioma	308	62	0.10	(0.09-0.11)	534	107	0.13	(0.12-0.14)	115	23	0.12	(0.10-0.14)	66	13	0.07	(0.05-0.08)	127	25	0.12	(0.10-0.15)	226	45	0.21	(0.18-0.24)
Neoplasm, unspecified	585	117	0.19	(0.18-0.21)	862	172	0.21	(0.19-0.22)	194	39	0.19	(0.17-0.22)	150	30	0.15	(0.13-0.17)	241	48	0.23	(0.20-0.26)	277	55	0.26	(0.23-0.29)
All other	19	4	0.01	(0.00-0.01)	23	5	0.01	(0.00-0.01)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL[9]	**16,653**	**3,331**	**5.47**	**(5.39-5.55)**	**23,522**	**4,704**	**5.70**	**(5.62-5.77)**	**5,968**	**1,194**	**5.98**	**(5.83-6.13)**	**5,189**	**1,038**	**5.12**	**(4.98-5.26)**	**5,496**	**1,099**	**5.34**	**(5.20-5.48)**	**6,869**	**1,374**	**6.38**	**(6.23-6.53)**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Rates are per 100,000 and are age-adjusted to the 2000 US standard population.
[c]ICD-O-3 histology codes: 9470/3, 9471/3, 9472/3, 9474/3.
[d]ICD-O-3 histology code: 9473/3.
[e]ICD-O-3 histology code: 9508/3.
[f]ICD-O-3 histology codes: 8963/3, 9364/3, 9480/3, 9490/0, 9490/3, 9500/3, 9501/3, 9502/3.
[g]Refers to all brain and other CNS tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported in the five year period for the specific histology category. The suppressed cases are included in the counts and rates for totals.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 5. Annual Age-Adjusted Incidence Rates[a] for Brain and Other Central Nervous System Tumors Average by Age, Behavior, and Central Cancer Registry, CBTRUS Statistical Report: NPCR and SEER, 2009-2013

State	0-19 Years						20+ Years						All Ages					
	Malignant		Non-Malignant		All Tumors		Malignant		Non-Malignant		All Tumors		Malignant		Non-Malignant		All Tumors	
	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
Alabama	2.98	(2.57-3.44)	1.07	(0.83-1.35)	4.05	(3.56-4.57)	9.13	(8.70-9.58)	13.27	(12.75-13.82)	22.40	(21.72-23.11)	7.37	(7.03-7.71)	9.77	(9.39-10.17)	17.14	(16.63-17.66)
Alaska	3.22	(2.23-4.51)	3.77	(2.69-5.14)	6.99	(5.49-8.79)	10.25	(8.86-11.80)	20.61	(18.63-22.74)	30.86	(28.42-33.46)	8.24	(7.19-9.38)	15.78	(14.33-17.33)	24.02	(22.22-25.92)
Arizona	3.13	(2.77-3.51)	2.32	(2.01-2.65)	5.44	(4.97-5.95)	8.94	(8.56-9.33)	20.07	(19.50-20.65)	29.01	(28.33-29.71)	7.27	(6.98-7.57)	14.98	(14.56-15.40)	22.25	(21.74-22.77)
Arkansas	3.26	(2.72-3.88)	2.84	(2.34-3.41)	6.10	(5.35-6.92)	8.57	(8.03-9.13)	16.54	(15.78-17.33)	25.11	(24.18-26.07)	7.04	(6.63-7.48)	12.61	(12.05-13.19)	19.66	(18.95-20.38)
California	2.93	(2.79-3.09)	1.81	(1.70-1.93)	4.75	(4.56-4.94)	8.25	(8.10-8.41)	19.11	(18.87-19.35)	27.36	(27.07-27.64)	6.73	(6.61-6.85)	14.14	(13.97-14.32)	20.87	(20.66-21.08)
Colorado	3.25	(2.84-3.71)	1.84	(1.53-2.19)	5.09	(4.57-5.66)	8.96	(8.52-9.42)	27.77	(26.98-28.57)	36.73	(35.83-37.65)	7.32	(6.99-7.67)	20.33	(19.76-20.91)	27.66	(26.99-28.33)
Connecticut	3.65	(3.11-4.25)	1.99	(1.60-2.43)	5.63	(4.96-6.37)	9.23	(8.73-9.76)	18.07	(17.36-18.80)	27.30	(26.43-28.19)	7.63	(7.24-8.04)	13.46	(12.94-13.99)	21.09	(20.44-21.75)
Delaware	4.46	(3.33-5.86)	3.56	(2.56-4.83)	8.03	(6.48-9.84)	8.58	(7.63-9.62)	16.57	(15.24-17.99)	25.15	(23.50-26.88)	7.40	(6.64-8.22)	12.84	(11.84-13.90)	20.24	(18.97-21.56)
District of Columbia	4.35	(2.81-6.41)	3.67	(2.28-5.60)	8.02	(5.88-10.68)	7.93	(6.76-9.24)	20.98	(19.05-23.05)	28.91	(26.64-31.32)	6.90	(5.94-7.97)	16.01	(14.57-17.56)	22.92	(21.17-24.77)
Florida	3.57	(3.33-3.83)	2.45	(2.25-2.66)	6.02	(5.70-6.35)	8.65	(8.44-8.86)	22.18	(21.85-22.52)	30.83	(30.44-31.22)	7.19	(7.03-7.36)	16.52	(16.28-16.77)	23.71	(23.42-24.01)
Georgia	3.38	(3.08-3.70)	1.99	(1.76-2.24)	5.37	(4.99-5.77)	8.24	(7.93-8.56)	21.99	(21.48-22.51)	30.23	(29.63-30.83)	6.84	(6.61-7.09)	16.25	(15.88-16.63)	23.10	(22.66-23.54)
Hawaii	2.75	(2.02-3.66)	1.42	(0.91-2.11)	4.17	(3.25-5.26)	5.71	(5.08-6.40)	18.28	(17.13-19.50)	24.00	(22.67-25.38)	4.86	(4.36-5.41)	13.45	(12.61-14.33)	18.31	(17.33-19.33)
Idaho	2.82	(2.19-3.59)	1.64	(1.16-2.25)	4.46	(3.65-5.40)	8.94	(8.17-9.77)	18.10	(16.98-19.27)	27.04	(25.67-28.46)	7.19	(6.60-7.81)	13.38	(12.56-14.23)	20.56	(19.56-21.61)
Illinois	3.02	(2.77-3.30)	2.42	(2.19-2.66)	5.44	(5.10-5.80)	8.92	(8.65-9.19)	21.42	(21.00-21.85)	30.34	(29.84-30.84)	7.23	(7.02-7.44)	15.97	(15.66-16.28)	23.20	(22.83-23.57)
Indiana	3.96	(3.56-4.39)	2.29	(1.99-2.62)	6.25	(5.74-6.78)	9.00	(8.62-9.39)	19.18	(18.63-19.75)	28.18	(27.51-28.87)	7.55	(7.26-7.86)	14.34	(13.93-14.75)	21.89	(21.39-22.40)
Iowa	3.72	(3.15-4.36)	3.00	(2.50-3.58)	6.72	(5.95-7.56)	9.92	(9.35-10.51)	22.25	(21.39-23.13)	32.17	(31.14-33.22)	8.14	(7.70-8.59)	16.73	(16.10-17.38)	24.87	(24.10-25.65)
Kansas	3.25	(2.72-3.85)	1.83	(1.44-2.30)	5.08	(4.41-5.82)	9.36	(8.78-9.96)	17.63	(16.83-18.47)	26.99	(25.99-28.01)	7.60	(7.16-8.07)	13.10	(12.52-13.71)	20.70	(19.97-21.46)
Kentucky	4.23	(3.71-4.80)	2.94	(2.51-3.42)	7.17	(6.49-7.90)	9.75	(9.27-10.24)	26.11	(25.33-26.91)	35.86	(34.94-36.79)	8.16	(7.79-8.55)	19.46	(18.89-20.05)	27.63	(26.94-28.32)
Louisiana	3.69	(3.23-4.19)	2.04	(1.70-2.43)	5.73	(5.15-6.36)	7.74	(7.32-8.18)	19.75	(19.07-20.45)	27.49	(26.69-28.31)	6.58	(6.25-6.92)	14.67	(14.17-15.18)	21.25	(20.65-21.86)
Maine	4.35	(3.36-5.53)	1.65	(1.08-2.41)	6.00	(4.84-7.35)	10.00	(9.17-10.88)	14.52	(13.50-15.60)	24.52	(23.20-25.89)	8.38	(7.72-9.08)	10.83	(10.08-11.62)	19.21	(18.20-20.25)
Maryland	3.48	(3.07-3.93)	1.90	(1.60-2.24)	5.38	(4.87-5.93)	8.54	(8.15-8.95)	18.47	(17.90-19.06)	27.02	(26.32-27.73)	7.09	(6.79-7.40)	13.72	(13.30-14.15)	20.81	(20.29-21.34)
Massachusetts	3.85	(3.43-4.31)	2.09	(1.79-2.43)	5.94	(5.42-6.50)	9.03	(8.66-9.41)	15.66	(15.18-16.16)	24.69	(24.08-25.31)	7.54	(7.26-7.84)	11.77	(11.41-12.13)	19.31	(18.85-19.78)
Michigan	3.71	(3.38-4.05)	1.90	(1.68-2.15)	5.61	(5.21-6.03)	8.94	(8.64-9.24)	19.62	(19.17-20.08)	28.56	(28.02-29.11)	7.44	(7.20-7.68)	14.54	(14.21-14.87)	21.97	(21.57-22.38)
Minnesota	3.52	(3.10-3.98)	1.60	(1.32-1.92)	5.12	(4.61-5.67)	8.98	(8.56-9.41)	12.71	(12.21-13.23)	21.69	(21.04-22.36)	7.41	(7.09-7.75)	9.52	(9.16-9.90)	16.94	(16.45-17.44)
Mississippi	3.11	(2.60-3.69)	2.39	(1.95-2.91)	5.51	(4.82-6.26)	8.13	(7.60-8.69)	18.18	(17.37-19.01)	26.31	(25.35-27.31)	6.69	(6.29-7.12)	13.65	(13.06-14.26)	20.35	(19.63-21.08)
Missouri	3.47	(3.08-3.91)	1.44	(1.19-1.73)	4.92	(4.44-5.43)	8.81	(8.43-9.20)	21.23	(20.63-21.85)	30.04	(29.33-30.76)	7.28	(6.98-7.58)	15.56	(15.12-16.00)	22.83	(22.31-23.37)
Montana	3.16	(2.25-4.32)	1.78	(1.13-2.67)	4.94	(3.78-6.33)	9.44	(8.49-10.47)	21.06	(19.62-22.58)	30.50	(28.77-32.32)	7.64	(6.91-8.43)	15.53	(14.48-16.63)	23.17	(21.88-24.51)
Nebraska	4.50	(3.72-5.40)	3.51	(2.82-4.32)	8.01	(6.95-9.18)	9.38	(8.65-10.14)	15.23	(14.31-16.20)	24.61	(23.43-25.83)	7.98	(7.41-8.57)	11.87	(11.18-12.59)	19.85	(18.95-20.78)
Nevada[b]	2.37	(1.77-3.11)	--	--	2.91	(2.24-3.72)	7.49	(6.80-8.25)	14.47	(13.48-15.51)	21.97	(20.75-23.24)	6.03	(5.49-6.59)	10.48	(9.76-11.22)	16.50	(15.61-17.43)
New Hampshire	4.81	(3.77-6.04)	2.59	(1.89-3.48)	7.40	(6.12-8.86)	10.06	(9.20-10.98)	17.33	(16.19-18.52)	27.39	(25.95-28.88)	8.55	(7.87-9.29)	13.10	(12.26-13.98)	21.65	(20.56-22.79)
New Jersey	4.02	(3.66-4.41)	2.39	(2.12-2.69)	6.41	(5.96-6.90)	9.21	(8.89-9.54)	18.99	(18.53-19.47)	28.20	(27.64-28.78)	7.72	(7.47-7.98)	14.23	(13.89-14.58)	21.95	(21.53-22.39)
New Mexico	2.54	(1.99-3.19)	1.85	(1.38-2.42)	4.39	(3.65-5.23)	7.46	(6.85-8.10)	17.21	(16.28-18.19)	24.67	(23.55-25.83)	6.05	(5.58-6.54)	12.81	(12.12-13.52)	18.85	(18.02-19.71)
New York	3.57	(3.34-3.82)	2.98	(2.77-3.20)	6.55	(6.23-6.88)	8.80	(8.59-9.02)	23.86	(23.51-24.22)	32.66	(32.25-33.08)	7.30	(7.14-7.47)	17.87	(17.61-18.13)	25.17	(24.86-25.48)
North Carolina	3.28	(2.98-3.61)	2.13	(1.88-2.40)	5.41	(5.02-5.83)	8.58	(8.28-8.89)	21.09	(20.61-21.58)	29.67	(29.11-30.25)	7.06	(6.83-7.30)	15.65	(15.30-16.01)	22.71	(22.29-23.14)
North Dakota	2.37	(1.44-3.66)	--	--	3.68	(2.49-5.22)	8.24	(7.19-9.41)	14.46	(12.99-16.04)	22.70	(20.88-24.64)	6.56	(5.75-7.45)	10.69	(9.62-11.84)	17.24	(15.89-18.68)
Ohio	3.50	(3.21-3.81)	2.30	(2.07-2.55)	5.80	(5.43-6.20)	9.14	(8.86-9.43)	16.03	(15.65-16.41)	25.17	(24.71-25.65)	7.53	(7.31-7.75)	12.09	(11.82-12.37)	19.62	(19.27-19.97)
Oklahoma	2.71	(2.28-3.19)	2.01	(1.65-2.44)	4.72	(4.15-5.35)	8.85	(8.36-9.36)	15.93	(15.26-16.61)	24.78	(23.95-25.62)	7.09	(6.72-7.47)	11.94	(11.45-12.44)	19.02	(18.41-19.65)
Oregon	3.72	(3.20-4.31)	2.05	(1.67-2.50)	5.77	(5.11-6.49)	9.75	(9.25-10.27)	15.96	(15.31-16.63)	25.71	(24.89-26.55)	8.02	(7.63-8.42)	11.97	(11.50-12.46)	19.99	(19.37-20.62)
Pennsylvania	3.96	(3.65-4.28)	2.34	(2.11-2.58)	6.29	(5.91-6.70)	9.38	(9.12-9.65)	22.86	(22.44-23.28)	32.24	(31.75-32.74)	7.83	(7.62-8.04)	16.97	(16.67-17.28)	24.80	(24.43-25.17)
Rhode Island	2.90	(2.03-4.01)	2.12	(1.40-3.08)	5.02	(3.86-6.42)	8.32	(7.46-9.26)	16.67	(15.44-17.98)	25.00	(23.48-26.58)	6.77	(6.09-7.49)	12.50	(11.59-13.46)	19.27	(18.13-20.46)

Table 5. *Continued*

State	0-19 Years						20+ Years						All Ages					
	Malignant		Non-Malignant		All Tumors		Malignant		Non-Malignant		All Tumors		Malignant		Non-Malignant		All Tumors	
	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
South Carolina	2.94	(2.53-3.41)	1.67	(1.36-2.02)	4.61	(4.09-5.18)	8.54	(8.12-8.99)	19.78	(19.11-20.46)	28.32	(27.53-29.13)	6.94	(6.61-7.28)	14.58	(14.10-15.07)	21.52	(20.93-22.11)
South Dakota	3.06	(2.13-4.26)	1.49	(0.87-2.39)	4.55	(3.40-5.97)	9.18	(8.13-10.32)	17.63	(16.15-19.21)	26.81	(24.98-28.73)	7.42	(6.62-8.29)	13.00	(11.93-14.15)	20.42	(19.08-21.84)
Tennessee	3.73	(3.33-4.17)	2.61	(2.28-2.98)	6.35	(5.82-6.91)	8.95	(8.58-9.34)	23.60	(22.98-24.23)	32.55	(31.83-33.29)	7.46	(7.16-7.76)	17.58	(17.13-18.04)	25.04	(24.50-25.58)
Texas	3.65	(3.47-3.85)	2.55	(2.39-2.71)	6.20	(5.95-6.46)	8.48	(8.29-8.69)	24.00	(23.67-24.34)	32.49	(32.10-32.88)	7.10	(6.95-7.25)	17.85	(17.60-18.09)	24.95	(24.66-25.24)
Utah	3.66	(3.14-4.24)	2.60	(2.15-3.11)	6.25	(5.56-7.01)	9.20	(8.54-9.89)	26.78	(25.65-27.94)	35.98	(34.67-37.32)	7.61	(7.12-8.13)	19.84	(19.03-20.68)	27.45	(26.49-28.43)
Vermont	2.27	(1.31-3.65)	3.33	(2.18-4.88)	5.60	(4.05-7.55)	10.28	(9.06-11.63)	24.31	(22.36-26.39)	34.59	(32.27-37.03)	7.98	(7.06-9.00)	18.29	(16.85-19.82)	26.27	(24.55-28.09)
Virginia	3.38	(3.04-3.75)	1.65	(1.42-1.92)	5.03	(4.61-5.48)	8.34	(8.01-8.68)	17.27	(16.79-17.75)	25.61	(25.03-26.20)	6.92	(6.66-7.18)	12.79	(12.44-13.14)	19.71	(19.28-20.14)
Washington	3.67	(3.29-4.10)	3.03	(2.68-3.42)	6.71	(6.18-7.27)	9.81	(9.42-10.21)	27.86	(27.20-28.53)	37.67	(36.90-38.45)	8.05	(7.75-8.36)	20.74	(20.26-21.23)	28.79	(28.22-29.37)
West Virginia	3.56	(2.81-4.45)	2.32	(1.73-3.05)	5.88	(4.91-6.99)	8.64	(7.99-9.33)	16.20	(15.29-17.14)	24.84	(23.72-26.00)	7.18	(6.67-7.73)	12.22	(11.55-12.92)	19.40	(18.55-20.28)
Wisconsin	3.83	(3.39-4.30)	2.44	(2.11-2.82)	6.27	(5.72-6.86)	9.99	(9.57-10.41)	22.09	(21.46-22.73)	32.07	(31.32-32.84)	8.22	(7.90-8.55)	16.45	(15.99-16.92)	24.67	(24.11-25.24)
Wyoming	3.24	(2.09-4.79)	--	--	5.10	(3.62-6.98)	10.15	(8.81-11.65)	18.04	(16.23-20.00)	28.20	(25.92-30.62)	8.17	(7.14-9.30)	13.40	(12.08-14.83)	21.57	(19.89-23.36)
TOTAL	**3.45**	**(3.39-3.51)**	**2.22**	**(2.17-2.26)**	**5.67**	**(5.59-5.74)**	**8.80**	**(8.75-8.86)**	**20.38**	**(20.30-20.46)**	**29.18**	**(29.08-29.28)**	**7.27**	**(7.23-7.31)**	**15.17**	**(15.11-15.23)**	**22.44**	**(22.36-22.51)**

[a]Rates are per 100,000 and are age-adjusted to the 2000 United States standard population.
[b]For Nevada only, rates are calculated using data from 2009-2010.
- Rates are not presented when fewer than 16 cases were reported in the five year period for the specific category. The suppressed cases are included in the counts and rates for totals.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval.

Table 6a. Characteristics of All Brain and Other Central Nervous System Tumors by Central Cancer Registry, CBTRUS Statistical Report: NPCR and SEER, 2009-2013

State	5-Year Total	Annual Average[a]	% Non-Malignant Tumors	Histologically Confirmed (%)[b]		Radiographically Confirmed (%)[b]		Average Annual 2009-2013 Population[c]
Alabama	4,428	886	57.7%	3,127	(70.6%)	1,103	(24.9%)	4,799,387
Alaska	781	156.2	67.6%	421	(53.9%)	338	(43.3%)	720,733
Arizona	7,461	1,492	67.3%	4,369	(58.6%)	2,647	(35.5%)	6,483,851
Arkansas	3,051	610	62.4%	1,874	(61.4%)	1,037	(34.0%)	2,933,127
California	39,196	7,839	67.7%	24,957	(63.7%)	12,728	(32.5%)	37,698,663
Colorado	6,997	1,399	73.9%	3,532	(50.5%)	3,250	(46.4%)	5,120,845
Connecticut	4,254	851	65.0%	2,850	(67.0%)	1,324	(31.1%)	3,585,078
Delaware	985	197	64.7%	660	(67.0%)	292	(29.6%)	908,282
District of Columbia	714	142.8	72.1%	436	(61.1%)	246	(34.5%)	19,113,666
Florida	26,687	5,337	70.2%	15,162	(56.8%)	10,720	(40.2%)	9,812,454
Georgia	11,303	2,261	71.2%	6,194	(54.8%)	4,657	(41.2%)	1,378,134
Hawaii	1,349	270	73.1%	763	(56.6%)	482	(35.7%)	1,583,458
Idaho	1,602	320	64.3%	1,047	(65.4%)	505	(31.5%)	12,851,983
Illinois	15,406	3,081	69.3%	9,020	(58.5%)	6,080	(39.5%)	6,514,908
Indiana	7,463	1,493	66.1%	4,177	(56.0%)	3,071	(41.1%)	3,063,269
Iowa	4,229	846	68.8%	2,400	(56.8%)	1,738	(41.1%)	2,868,677
Kansas	3,202	640	64.5%	1,892	(59.1%)	1,210	(37.8%)	4,364,000
Kentucky	6,523	1,305	70.3%	3,256	(49.9%)	2,983	(45.7%)	4,569,446
Louisiana	5,161	1,032	69.9%	3,213	(62.3%)	1,774	(34.4%)	1,328,435
Maine	1,480	296	56.2%	981	(66.3%)	458	(30.9%)	5,838,576
Maryland	6,338	1,268	66.4%	4,221	(66.6%)	1,814	(28.6%)	6,611,732
Massachusetts	7,128	1,426	62.1%	5,112	(71.7%)	1,829	(25.7%)	9,887,360
Michigan	11,640	2,328	66.9%	7,196	(61.8%)	4,091	(35.1%)	5,348,466
Minnesota	4,993	999	58.0%	4,275	(85.6%)	519	(10.4%)	2,977,278
Mississippi	3,139	628	66.9%	1,958	(62.4%)	1,071	(34.1%)	6,007,583
Missouri	7,313	1,463	67.9%	4,094	(56.0%)	2,908	(39.8%)	998,449
Montana	1,242	248	64.7%	703	(56.6%)	498	(40.1%)	1,841,847
Nebraska	1,915	383	60.4%	1,187	(62.0%)	664	(34.7%)	2,730,697
Nevada[d]	887	444	63.6%	618	(69.7%)	222	(25.0%)	1,318,928
New Hampshire	1,565	313	60.6%	1,127	(72.0%)	397	(25.4%)	8,837,860
New Jersey	10,739	2,148	66.1%	6,760	(62.9%)	3,451	(32.1%)	2,070,330
New Mexico	2,099	420	69.9%	1,358	(64.7%)	640	(30.5%)	19,506,500
New York	26,460	5,292	71.6%	14,947	(56.5%)	10,844	(41.0%)	9,651,531
North Carolina	11,709	2,342	69.0%	7,202	(61.5%)	4,080	(34.8%)	690,023
North Dakota	672	134.4	61.3%	397	(59.1%)	247	(36.8%)	11,547,326
Ohio	12,546	2,509	62.3%	8,152	(65.0%)	3,741	(29.8%)	3,786,751
Oklahoma	4,079	816	65.0%	2,145	(52.6%)	1,776	(43.5%)	3,868,016
Oregon	4,243	849	59.8%	3,004	(70.8%)	1,103	(26.0%)	12,734,654
Pennsylvania	17,965	3,593	68.6%	10,143	(56.5%)	7,089	(39.5%)	1,052,947
Rhode Island	1,113	223	66.7%	782	(70.3%)	310	(27.9%)	4,678,753
South Carolina	5,517	1,103	68.4%	3,086	(55.9%)	2,069	(37.5%)	825,489
South Dakota	921	184.2	64.2%	534	(58.0%)	351	(38.1%)	6,402,696
Tennessee	8,586	1,717	70.9%	4,719	(55.0%)	3,655	(42.6%)	25,661,003
Texas	29,828	5,966	70.7%	15,763	(52.8%)	12,184	(40.8%)	2,814,214
Utah	3,382	676	72.4%	2,093	(61.9%)	1,255	(37.1%)	626,010
Vermont	906	181.2	68.2%	524	(57.8%)	370	(40.8%)	8,105,054
Virginia	8,225	1,645	65.2%	5,433	(66.1%)	2,473	(30.1%)	6,820,303
Washington	10,344	2,069	72.2%	5,453	(52.7%)	4,601	(44.5%)	620,403
West Virginia	2,064	413	63.0%	1,265	(61.3%)	737	(35.7%)	1,853,368

Table 6a. *Continued*

State	5-Year Total	Annual Average[a]	% Non-Malignant Tumors	Histologically Confirmed (%)[b]		Radiographically Confirmed (%)[b]		Average Annual 2009-2013 Population[c]
Wisconsin	7,659	1,532	67.1%	4,386	(57.3%)	3,041	(39.7%)	5,707,032
Wyoming	628	125.6	61.5%	425	(67.7%)	198	(31.5%)	570,391
TOTAL	**368,117**	**73,890**	**68.0%**	**219,393**	**(59.6%)**	**134,871**	**(36.6%)**	**311,689,966**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Percentages may not add to zero due to a small proportion of cases that are diagnosed by alternate confirmation types, such as clinical (based on symptoms or other clinical factors) or unknown diagnostic confirmation type.
[c]Population estimates were obtained from the United States Bureau of the Census available on the SEER program website.
[d]Cases and estimated population is for 2008-2010 only.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; CNS, central nervous system; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program.

Table 6b. Characteristics of All Brain and Other Central Nervous System Tumors by Central Cancer Registry and Behavior, CBTRUS Statistical Report: NPCR and SEER, 2009-2013

State	Malignant						Non-Malignant					
	5-Year Total	Annual Average[a]	Histologically Confirmed (%)[b]		Radio-graphically Confirmed (%)[b]		5-Year Total	Annual Average[a]	Histologically Confirmed (%)[b]		Radiographically Confirmed (%)[b]	
Alabama	1,875	375	1,600	(85.3%)	120	(6.4%)	2,553	511	1,527	(59.8%)	983	(38.5%)
Alaska	253	50.6	213	(84.2%)	30	(11.9%)	528	106	208	(39.4%)	308	(58.3%)
Arizona	2,442	488	1,988	(81.4%)	217	(8.9%)	5,019	1,004	2,381	(47.4%)	2,430	(48.4%)
Arkansas	1,146	229	911	(79.5%)	141	(12.3%)	1,905	381	963	(50.6%)	896	(47.0%)
California	12,669	2,534	10,975	(86.6%)	1,133	(8.9%)	26,527	5,305	13,982	(52.7%)	11,595	(43.7%)
Colorado	1,827	365	1,507	(82.5%)	212	(11.6%)	5,170	1,034	2,025	(39.2%)	3,038	(58.8%)
Connecticut	1,488	298	1,279	(86.0%)	172	(11.6%)	2,766	553	1,571	(56.8%)	1,152	(41.6%)
Delaware	348	70	287	(82.5%)	42	(12.1%)	637	127	373	(58.6%)	250	(39.2%)
District of Columbia	199	40	171	(85.9%)	--	--	515	103	265	(51.5%)	236	(45.8%)
Florida	7,941	1,588	6,848	(86.2%)	785	(9.9%)	18,746	3,749	8,314	(44.4%)	9,935	(53.0%)
Georgia	3,259	652	2,762	(84.7%)	381	(11.7%)	8,044	1,609	3,432	(42.7%)	4,276	(53.2%)
Hawaii	363	73	309	(85.1%)	35	(9.6%)	986	197	454	(46.0%)	447	(45.3%)
Idaho	572	114	482	(84.3%)	65	(11.4%)	1,030	206	565	(54.9%)	440	(42.7%)
Illinois	4,730	946	4,171	(88.2%)	412	(8.7%)	10,676	2,135	4,849	(45.4%)	5,668	(53.1%)
Indiana	2,533	507	2,178	(86.0%)	276	(10.9%)	4,930	986	1,999	(40.5%)	2,795	(56.7%)
Iowa	1,320	264	1,113	(84.3%)	176	(13.3%)	2,909	582	1,287	(44.2%)	1,562	(53.7%)
Kansas	1,138	228	966	(84.9%)	123	(10.8%)	2,064	413	926	(44.9%)	1,087	(52.7%)
Kentucky	1,939	388	1,549	(79.9%)	270	(13.9%)	4,584	917	1,707	(37.2%)	2,713	(59.2%)
Louisiana	1,553	311	1,325	(85.3%)	171	(11.0%)	3,608	722	1,888	(52.3%)	1,603	(44.4%)
Maine	648	130	560	(86.4%)	64	(9.9%)	832	166	421	(50.6%)	394	(47.4%)
Maryland	2,130	426	1,857	(87.2%)	139	(6.5%)	4,208	842	2,364	(56.2%)	1,675	(39.8%)
Massachusetts	2,700	540	2,401	(88.9%)	194	(7.2%)	4,428	886	2,711	(61.2%)	1,635	(36.9%)
Michigan	3,850	770	3,325	(86.4%)	343	(8.9%)	7,790	1,558	3,871	(49.7%)	3,748	(48.1%)
Minnesota	2,095	419	1,956	(93.4%)	60	(2.9%)	2,898	580	2,319	(80.0%)	459	(15.8%)
Mississippi	1,039	208	888	(85.5%)	115	(11.1%)	2,100	420	1,070	(51.0%)	956	(45.5%)
Missouri	2,351	470	2,027	(86.2%)	198	(8.4%)	4,962	992	2,067	(41.7%)	2,710	(54.6%)
Montana	439	88	389	(88.6%)	36	(8.2%)	803	161	314	(39.1%)	462	(57.5%)
Nebraska	759	152	638	(84.1%)	79	(10.4%)	1,156	231	549	(47.5%)	585	(50.6%)
Nevada[c]	323	65	281	(87.0%)	--	--	564	113	337	(59.8%)	208	(36.9%)
New Hampshire	617	123	547	(88.7%)	45	(7.3%)	948	190	580	(61.2%)	352	(37.1%)
New Jersey	3,646	729	3,163	(86.8%)	367	(10.1%)	7,093	1,419	3,597	(50.7%)	3,084	(43.5%)
New Mexico	632	126	552	(87.3%)	54	(8.5%)	1,467	293	806	(54.9%)	586	(39.9%)
New York	7,504	1,501	6,456	(86.0%)	885	(11.8%)	18,956	3,791	8,491	(44.8%)	9,959	(52.5%)
North Carolina	3,627	725	3,114	(85.9%)	382	(10.5%)	8,082	1,616	4,088	(50.6%)	3,698	(45.8%)
North Dakota	260	52	217	(83.5%)	29	(11.2%)	412	82	180	(43.7%)	218	(52.9%)
Ohio	4,728	946	3,810	(80.6%)	412	(8.7%)	7,818	1,564	4,342	(55.5%)	3,329	(42.6%)
Oklahoma	1,428	286	1,139	(79.8%)	169	(11.8%)	2,651	530	1,006	(37.9%)	1,607	(60.6%)
Oregon	1,706	341	1,466	(85.9%)	136	(8.0%)	2,537	507	1,538	(60.6%)	967	(38.1%)

Table 6b. *Continued*

State	Malignant						Non-Malignant					
	5-Year Total	Annual Average[a]	Histologically Confirmed (%)[b]		Radio-graphically Confirmed (%)[b]		5-Year Total	Annual Average[a]	Histologically Confirmed (%)[b]		Radiographically Confirmed (%)[b]	
Pennsylvania	5,638	1,128	4,736	(84.0%)	570	(10.1%)	12,327	2,465	5,407	(43.9%)	6,519	(52.9%)
Rhode Island	371	74	338	(91.1%)	17	(4.6%)	742	148	444	(59.8%)	293	(39.5%)
South Carolina	1,746	349	1,480	(84.8%)	145	(8.3%)	3,771	754	1,606	(42.6%)	1,924	(51.0%)
South Dakota	330	66	279	(84.5%)	34	(10.3%)	591	118	255	(43.1%)	317	(53.6%)
Tennessee	2,498	500	2,150	(86.1%)	245	(9.8%)	6,088	1,218	2,569	(42.2%)	3,410	(56.0%)
Texas	8,753	1,751	7,119	(81.3%)	1,124	(12.8%)	21,075	4,215	8,644	(41.0%)	11,060	(52.5%)
Utah	935	187	804	(86.0%)	115	(12.3%)	2,447	489	1,289	(52.7%)	1,140	(46.6%)
Vermont	288	58	260	(90.3%)	23	(8.0%)	618	124	264	(42.7%)	347	(56.1%)
Virginia	2,863	573	2,440	(85.2%)	198	(6.9%)	5,362	1,072	2,993	(55.8%)	2,275	(42.4%)
Washington	2,878	576	2,450	(85.1%)	309	(10.7%)	7,466	1,493	3,003	(40.2%)	4,292	(57.5%)
West Virginia	763	153	675	(88.5%)	53	(6.9%)	1,301	260	590	(45.3%)	684	(52.6%)
Wisconsin	2,524	505	2,160	(85.6%)	255	(10.1%)	5,135	1,027	2,226	(43.3%)	2,786	(54.3%)
Wyoming	242	48	207	(85.5%)	32	(13.2%)	386	77	218	(56.5%)	166	(43.0%)
TOTAL	**117,906**	**23,581**	**100,518**	**(85.3%)**	**11,588**	**(9.8%)**	**250,211**	**50,042**	**118,875**	**(47.5%)**	**123,259**	**(49.3%)**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Percentages may not add to zero due to a small proportion of cases that are diagnosed by alternate confirmation types, such as clinical (based on symptoms or other clinical factors) or unknown diagnostic confirmation type.
[c]Cases and estimated population is for 2008-2010 only.
- Counts are not presented when fewer than 16 cases were reported in the five year period for the specific category. The suppressed cases are included in the counts and rates for totals.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; CNS, central nervous system; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program.

Table 7. Distribution and Five-Year Total, Annual Average Total[a], and Average Annual Age-Adjusted Incidence Rates[b] of Brain and Other Central Nervous System Tumors by Major Histology Groupings, Histology, and Behavior, CBTRUS Statistical Report: NPCR and SEER, 2009-2013

Histology	Total						Malignant				Non-Malignant			
	5-year total	Annual average	% of All Tumors	Median Age	Rate	(95% CI)	5-year total	Annual average	Rate	(95% CI)	5-year total	Annual average	Rate	(95% CI)
Tumors of Neuroepithelial Tissue	**107,732**	**21,546**	**29.3%**	**56.0**	**6.60**	**(6.56-6.64)**	**100,084**	**20,017**	**6.10**	**(6.07-6.14)**	**7,648**	**1,530**	**0.50**	**(0.49-0.51)**
Pilocytic astrocytoma	5,106	1,021	1.4%	12.0	0.35	(0.34-0.36)	5,106	1,021	0.35	(0.34-0.36)	--	--	--	--
Diffuse astrocytoma	8,081	1,616	2.2%	48.0	0.51	(0.50-0.52)	8,080	1,616	0.51	(0.50-0.52)	--	--	--	--
Anaplastic astrocytoma	6,245	1,249	1.7%	53.0	0.39	(0.38-0.40)	6,245	1,249	0.39	(0.38-0.40)	--	--	--	--
Unique astrocytoma variants	1,070	214	0.3%	23.0	0.07	(0.07-0.07)	713	143	0.05	(0.04-0.05)	357	71	0.02	(0.02-0.03)
Glioblastoma	54,980	10,996	14.9%	64.0	3.20	(3.17-3.22)	54,980	10,996	3.20	(3.17-3.22)	--	--	--	--
Oligodendroglioma	3,852	770	1.0%	43.0	0.25	(0.24-0.26)	3,852	770	0.25	(0.24-0.26)	--	--	--	--
Anaplastic oligodendroglioma	1,677	335	0.5%	50.0	0.10	(0.10-0.11)	1,676	335	0.10	(0.10-0.11)	--	--	--	--
Oligoastrocytic tumors	3,179	636	0.9%	41.0	0.20	(0.20-0.21)	3,178	636	0.20	(0.20-0.21)	--	--	--	--
Ependymal tumors	6,780	1,356	1.8%	44.0	0.43	(0.42-0.44)	4,124	825	0.26	(0.26-0.27)	2,656	531	0.17	(0.16-0.17)
Glioma malignant, NOS	7,221	1,444	2.0%	36.0	0.47	(0.46-0.48)	7,221	1,444	0.47	(0.46-0.48)	--	--	--	--
Choroid plexus tumors	784	157	0.2%	20.0	0.05	(0.05-0.06)	112	22	0.01	(0.01-0.01)	672	134	0.04	(0.04-0.05)
Other neuroepithelial tumors	95	19	0.0%	32.0	0.01	(0.01-0.01)	60	12	0.00	(0.00-0.01)	35	7	0.00	(0.00-0.00)
Neuronal and mixed neuronal-glial tumors	4,367	873	1.2%	27.0	0.29	(0.28-0.29)	860	172	0.05	(0.05-0.06)	3,507	701	0.23	(0.23-0.24)
Tumors of the pineal region	686	137	0.2%	34.0	0.04	(0.04-0.05)	381	76	0.03	(0.02-0.03)	305	61	0.02	(0.02-0.02)
Embryonal tumors	3,609	722	1.0%	9.0	0.25	(0.24-0.25)	3,496	699	0.24	(0.23-0.25)	113	23	0.01	(0.01-0.01)
Tumors of Cranial and Spinal Nerves	**30,384**	**6,077**	**8.3%**	**56.0**	**1.83**	**(1.80-1.85)**	**226**	**45**	**0.01**	**(0.01-0.02)**	**30,158**	**6,032**	**1.81**	**(1.79-1.83)**
Nerve sheath tumors	30,360	6,072	8.2%	56.0	1.82	(1.80-1.85)	226	45	0.01	(0.01-0.02)	30,134	6,027	1.81	(1.79-1.83)
Other tumors of cranial and spinal nerves	24	5	0.0%	54.5	0.00	(0.00-0.00)	--	--	--	--	24	5	0.00	(0.00-0.00)
Tumors of Meninges	**139,205**	**27,841**	**37.8%**	**65.0**	**8.30**	**(8.26-8.35)**	**2,464**	**493**	**0.15**	**(0.14-0.15)**	**136,741**	**27,348**	**8.16**	**(8.11-8.20)**
Meningioma	134,835	26,967	36.6%	66.0	8.03	(7.99-8.07)	1,711	342	0.10	(0.10-0.11)	133,124	26,625	7.93	(7.89-7.97)
Mesenchymal tumors	1,302	260	0.4%	48.0	0.08	(0.08-0.09)	403	81	0.03	(0.02-0.03)	899	180	0.06	(0.05-0.06)
Primary melanocytic lesions	136	27	0.0%	58.0	0.01	(0.01-0.01)	90	18	0.01	(0.00-0.01)	46	9	0.00	(0.00-0.00)
Other neoplasms related to the meninges	2,932	586	0.8%	49.0	0.18	(0.18-0.19)	260	52	0.02	(0.01-0.02)	2,672	534	0.17	(0.16-0.17)
Lymphomas and Hematopoietic Neoplasms	**7,415**	**1,483**	**2.0%**	**65.0**	**0.44**	**(0.43-0.45)**	**7,390**	**1,478**	**0.44**	**(0.43-0.45)**	**25**	**5**	**0.00**	**(0.00-0.00)**
Lymphoma	7,160	1,432	1.9%	66.0	0.43	(0.42-0.44)	7,160	1,432	0.43	(0.42-0.44)	--	--	--	--
Other hematopoietic neoplasms	255	51	0.1%	50.0	0.02	(0.01-0.02)	230	46	0.01	(0.01-0.02)	25	5	0.00	(0.00-0.00)
Germ Cell Tumors and Cysts	**1,469**	**294**	**0.4%**	**16.0**	**0.10**	**(0.09-0.10)**	**997**	**199**	**0.07**	**(0.06-0.07)**	**472**	**94**	**0.03**	**(0.03-0.03)**
Germ cell tumors, cysts and heterotopias	1,469	294	0.4%	16.0	0.10	(0.09-0.10)	997	199	0.07	(0.06-0.07)	472	94	0.03	(0.03-0.03)

Table 7. *Continued*

Histology	Total						Malignant				Non-Malignant			
	5-year total	Annual average	% of All Tumors	Median Age	Rate	(95% CI)	5-year total	Annual average	Rate	(95% CI)	5-year total	Annual average	Rate	(95% CI)
Tumors of Sellar Region	**61,597**	**12,319**	**16.7%**	**51.0**	**3.85**	**(3.82-3.88)**	**158**	**32**	**0.01**	**(0.01-0.01)**	**61,439**	**12,288**	**3.84**	**(3.81-3.87)**
Tumors of the pituitary	58,666	11,733	15.9%	51.0	3.66	(3.63-3.69)	151	30	0.01	(0.01-0.01)	58,515	11,703	3.65	(3.62-3.68)
Craniopharyngioma	2,931	586	0.8%	43.0	0.19	(0.18-0.19)	--	--	--	--	2,924	585	0.19	(0.18-0.19)
Unclassified Tumors	**20,315**	**4,063**	**5.5%**	**62.0**	**1.24**	**(1.22-1.26)**	**6,587**	**1,317**	**0.39**	**(0.38-0.40)**	**13,728**	**2,746**	**0.85**	**(0.83-0.86)**
Hemangioma	5,869	1,174	1.6%	50.0	0.37	(0.36-0.38)	18	4	0.00	(0.00-0.00)	5,851	1,170	0.37	(0.36-0.37)
Neoplasm, unspecified	14,356	2,871	3.9%	69.0	0.87	(0.85-0.88)	6,542	1,308	0.39	(0.38-0.40)	7,814	1,563	0.48	(0.47-0.49)
All other	90	18	0.0%	58.0	0.01	(0.00-0.01)	27	5	0.00	(0.00-0.00)	63	13	0.00	(0.00-0.00)
TOTAL[c]	**368,117**	**73,623**	**100.0%**	**59.0**	**22.36**	**(22.29-22.44)**	**117,906**	**23,581**	**7.18**	**(7.14-7.22)**	**250,211**	**50,042**	**15.18**	**(15.12-15.25)**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Rates are per 100,000 and are age-adjusted to the 2000 US standard population.
[c]Refers to all brain and other CNS tumors including histologies not presented in this table.
- Counts are not presented when fewer than 16 cases were reported in the five year period for the specific histology category. The suppressed cases are included in the counts for totals.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 8. Distribution of Histologically Confirmed Brain and Other Central Nervous System Tumors by WHO Grade and Major Histology Groupings, CBTRUS Statistical Report: NPCR and SEER, 2011-2013

Histology	Number of newly diagnosed tumors	Histologically Confirmed	Complete WHO grade Information[a]	Assigned Grade			
				Grade I	Grade II	Grade III	Grade IV
Tumors of Neuroepithelial Tissue	**64,808**	**74.9%**	**83.6%**	**11.0%**	**14.8%**	**14.0%**	**60.2%**
Pilocytic astrocytoma	3,078	79.1%	84.5%	92.6%	6.2%	0.8%	0.5%
Diffuse astrocytoma	4,523	79.2%	86.0%	4.2%	58.1%	22.7%	15.0%
Anaplastic astrocytoma	3,867	92.8%	93.3%	0.1%	0.9%	90.2%	8.7%
Unique astrocytoma variants	653	62.8%	78.2%	26.1%	54.4%	15.4%	4.2%
Glioblastoma	33,631	79.1%	84.9%	0.2%	0.2%	1.0%	98.7%
Oligodendroglioma	2,176	88.7%	92.4%	1.6%	84.5%	6.9%	6.9%
Anaplastic oligodendroglioma	1,023	94.0%	94.8%	0.2%	3.0%	87.5%	9.3%
Oligoastrocytic tumors	1,851	94.7%	95.2%	0.9%	51.6%	39.3%	8.3%
Ependymal tumors	4,027	76.0%	83.5%	35.0%	50.7%	13.7%	0.5%
Glioma malignant, NOS	4,320	16.0%	49.5%	24.2%	26.8%	22.1%	26.8%
Choroid plexus tumors	469	63.8%	72.6%	67.6%	17.7%	14.1%	0.7%
Other neuroepithelial tumors	57	40.4%	41.8%	87.0%	60.9%	17.4%	13.0%
Neuronal and mixed neuronal-glial tumors	2,613	57.8%	61.6%	79.3%	15.8%	4.1%	0.8%
Tumors of the pineal region	440	51.4%	68.5%	23.5%	22.6%	16.8%	37.2%
Embryonal tumors	2,080	71.2%	72.5%	1.4%	0.1%	1.0%	97.5%
Tumors of Cranial and Spinal Nerves	**18,512**	**16.1%**	**30.6%**	**98.9%**	**0.5%**	**0.3%**	**0.3%**
Nerve sheath tumors	18,498	16.1%	30.7%	98.9%	0.5%	0.3%	0.3%
Other tumors of cranial and spinal nerves	--	--	--	--	--	--	--
Tumors of Meninges	**83,598**	**33.6%**	**75.9%**	**81.1%**	**16.7%**	**2.0%**	**0.2%**
Meningioma	80,984	33.3%	77.6%	81.3%	16.9%	1.7%	0.1%
Mesenchymal tumors	788	34.6%	48.7%	8.8%	49.1%	37.4%	4.8%
Primary melanocytic lesions	75	10.7%	11.6%	62.5%	12.5%	12.5%	12.5%
Other neoplasms related to the meninges	1,751	45.5%	49.5%	99.1%	0.6%	0.1%	0.1%
Lymphomas and Hematopoietic Neoplasms	**4,428**	**3.8%**	**4.0%**	**100.0%**	**0.0%**	**0.0%**	**0.0%**
Lymphoma	4,279	3.9%	4.1%	100.0%	0.0%	0.0%	0.0%
Other hemopoietic neoplasms	149	0.7%	0.7%	100.0%	0.0%	0.0%	0.0%
Germ Cell Tumors and Cysts	**846**	**2.7%**	**3.2%**	**21.7%**	**13.0%**	**17.4%**	**47.8%**
Germ cell tumors, cysts and heterotopias	846	2.7%	3.2%	21.7%	13.0%	17.4%	47.8%
Tumors of Sellar Region	**37,374**	**3.7%**	**7.1%**	**95.9%**	**2.5%**	**0.4%**	**1.3%**
Tumors of the pituitary	35,639	2.3%	4.6%	94.1%	3.2%	0.5%	2.2%
Craniopharyngioma	1,735	31.6%	37.5%	98.5%	1.3%	0.2%	0.0%
Unclassified Tumors	**12,195**	**1.1%**	**6.3%**	**66.7%**	**7.4%**	**12.6%**	**13.3%**
Hemangioma	3,737	0.9%	3.1%	93.9%	0.0%	3.0%	3.0%
Neoplasm, unspecified	8,393	1.1%	8.9%	57.3%	10.4%	15.6%	16.7%
All other	65	9.2%	19.4%	66.7%	0.0%	16.7%	16.7%
TOTAL	**221,761**	**36.7%**	**61.9%**	**40.1%**	**14.7%**	**9.1%**	**36.1%**

[a]Completeness is defined as having an assigned code that corresponds with a WHO grade as defined by the American Joint Commission on Cancer's Collaborative Staging schema, Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; CNS, central nervous system; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; WHO, World Health Organization.

Table 9. Five-Year Total, Annual Average Total[a], and Average Annual Age-Adjusted Incidence Rates[b] for Brain and Other Central Nervous System Tumor by Site[c] and Sex, CBTRUS Statistical Report: NPCR and SEER, 2009-2013

		Total				Male				Female			
ICD-O-3 Code	Site	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
C71.0	Cerebrum	6,453	1,291	0.40	(0.39-0.41)	3,397	679	0.44	(0.42-0.45)	3,056	611	0.36	(0.35-0.38)
C71.1-C71.4	Frontal, temporal, parietal, and occipital lobes of the brain	71,451	14,290	4.31	(4.28-4.34)	39,610	7,922	5.09	(5.04-5.14)	31,841	6,368	3.63	(3.59-3.68)
	C71.1 - Frontal lobe	*30,848*	*6,170*	*1.88*	*(1.86-1.90)*	*16,338*	*3,268*	*2.11*	*(2.07-2.14)*	*14,510*	*2,902*	*1.67*	*(1.65-1.70)*
	C71.2 - Temporal lobe	*22,974*	*4,595*	*1.38*	*(1.36-1.40)*	*13,600*	*2,720*	*1.74*	*(1.71-1.77)*	*9,374*	*1,875*	*1.07*	*(1.05-1.09)*
	C71.3 - Parietal lobe	*13,803*	*2,761*	*0.82*	*(0.81-0.84)*	*7,543*	*1,509*	*0.97*	*(0.94-0.99)*	*6,260*	*1,252*	*0.70*	*(0.68-0.72)*
	C71.4 - Occipital lobe	*3,826*	*765*	*0.23*	*(0.22-0.24)*	*2,129*	*426*	*0.27*	*(0.26-0.29)*	*1,697*	*339*	*0.19*	*(0.18-0.20)*
C71.5	Ventricle	4,027	805	0.26	(0.25-0.27)	2,215	443	0.29	(0.28-0.30)	1,812	362	0.23	(0.22-0.24)
C71.6	Cerebellum	9,075	1,815	0.59	(0.58-0.60)	4,874	975	0.65	(0.63-0.67)	4,201	840	0.54	(0.52-0.56)
C71.7	Brain stem	5,572	1,114	0.37	(0.36-0.38	3,003	601	0.40	(0.38-0.41)	2,569	514	0.34	(0.32-0.35)
C71.8-C71.9	Other brain	32,956	6,591	1.99	(1.97-2.01)	17,209	3,442	2.25	(2.21-2.28)	15,747	3,149	1.77	(1.74-1.80)
C72.0-C72.1	Spinal cord and cauda equina	11,104	2,221	0.69	(0.68-0.70)	5,697	1,139	0.73	(0.71-0.75)	5,407	1,081	0.65	(0.63-0.67)
C72.2-C72.5	Cranial nerves	25,421	5,084	1.53	(1.51-1.55)	11,930	2,386	1.49	(1.47-1.52)	13,491	2,698	1.56	(1.54-1.59)
C72.8-C72.9	Other nervous system	2,292	458	0.14	(0.14-0.15)	1,180	236	0.15	(0.14-0.16)	1,112	222	0.13	(0.12-0.14)
C70.0-C70.9	Meninges (cerebral & spinal)	134,786	26,957	8.03	(7.98-8.07)	36,172	7,234	4.82	(4.77-4.87)	98,614	19,723	10.83	(10.76-10.90)
C75.1-C75.2	Pituitary and craniopharyngeal duct	62,696	12,539	3.92	(3.89-3.95)	28,237	5,647	3.63	(3.58-3.67)	34,459	6,892	4.29	(4.24-4.33)
C75.3	Pineal	1,614	323	0.11	(0.10-0.11)	899	180	0.12	(0.11-0.13)	715	143	0.09	(0.08-0.10)
C30.0[d]	Olfactory tumors of the nasal cavity	670	134	0.04	(0.04-0.04)	393	79	0.05	(0.04-0.05)	277	55	0.03	(0.03-0.04)
TOTAL		**368,117**	**73,623**	**22.36**	**(22.29-22.44)**	**154,816**	**30,963**	**20.10**	**(20.00-20.20)**	**213,301**	**42,660**	**24.46**	**(24.36-24.57)**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Rates are per 100,000 and are age adjusted to the 2000 US standard population.
[c]The sites referred to in this table are loosely based on the categories and site codes defined in the SEER site/histology validation list.
[d]ICD-O-3 histology codes 9522-9523 only.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval.

Table 10. Five-Year Total, Annual Average Total[a], and Average Annual Age-Adjusted Incidence Rates[b] for Brain and Other Central Nervous System Tumors by Major Histology Groupings, Histology, and Race[c], CBTRUS Statistical Report: NPCR and SEER, 2009-2013

Histology	White				Black				AIAN				API			
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Tumors of Neuroepithelial Tissue	**94,661**	**18,932**	**7.13**	**(7.08-7.17)**	**7,972**	**1,594**	**4.01**	**(3.92-4.10)**	**561**	**112**	**3.30**	**(3.01-3.61)**	**3,355**	**671**	**4.10**	**(3.96-4.25)**
Pilocytic astrocytoma	4,168	834	0.37	(0.36-0.39)	589	118	0.26	(0.24-0.28)	35	7	0.15	(0.10-0.21)	232	46	0.28	(0.24-0.32)
Diffuse astrocytoma	7,079	1,416	0.56	(0.54-0.57)	599	120	0.29	(0.27-0.32)	60	12	0.32	(0.24-0.42)	257	51	0.31	(0.27-0.35)
Anaplastic astrocytoma	5,537	1,107	0.42	(0.41-0.44)	403	81	0.21	(0.19-0.23)	37	7	0.20	(0.14-0.28)	199	40	0.24	(0.21-0.28)
Unique astrocytoma variants	825	165	0.07	(0.06-0.07)	154	31	0.07	(0.06-0.08)	--	--	--	--	59	12	0.07	(0.05-0.09)
Glioblastoma	49,749	9,950	3.45	(3.42-3.48)	3,306	661	1.79	(1.73-1.86)	201	40	1.48	(1.27-1.72)	1,259	252	1.62	(1.53-1.72)
Oligodendroglioma	3,425	685	0.28	(0.27-0.29)	224	45	0.11	(0.10-0.13)	26	5	0.14	(0.09-0.20)	131	26	0.15	(0.12-0.18)
Anaplastic oligodendroglioma	1,481	296	0.12	(0.11-0.12)	87	17	0.04	(0.03-0.05)	--	--	--	--	77	15	0.09	(0.07-0.11)
Oligoastrocytic tumors	2,812	562	0.23	(0.22-0.24)	185	37	0.09	(0.08-0.11)	17	3	0.09	(0.05-0.14)	113	23	0.13	(0.10-0.15)
Ependymal tumors	5,803	1,161	0.47	(0.45-0.48)	560	112	0.27	(0.25-0.29)	52	10	0.27	(0.20-0.36)	271	54	0.31	(0.27-0.35)
Glioma malignant, NOS	5,999	1,200	0.49	(0.48-0.50)	788	158	0.38	(0.36-0.41)	45	10	0.24	(0.17-0.33)	298	60	0.37	(0.33-0.42)
Choroid plexus tumors	661	132	0.06	(0.05-0.06)	67	13	0.03	(0.02-0.04)	--	--	--	--	31	6	0.04	(0.02-0.05)
Other neuroepithelial tumors	78	16	0.01	(0.01-0.01)	--	--	--	--	--	--	0.00	(0.00-0.03)	--	--	--	--
Neuronal and mixed neuronal-glial tumors	3,619	724	0.31	(0.30-0.32)	454	91	0.21	(0.19-0.23)	27	5	0.14	(0.09-0.21)	206	41	0.24	(0.21-0.27)
Tumors of the pineal region	525	105	0.04	(0.04-0.05)	123	25	0.06	(0.05-0.07)	--	--	--	--	25	5	0.03	(0.02-0.04)
Embryonal tumors	2,900	580	0.26	(0.25-0.27)	423	85	0.19	(0.17-0.20)	29	6	0.12	(0.08-0.18)	192	38	0.23	(0.20-0.26)
Tumors of Cranial and Spinal Nerves	**26,000**	**5,200**	**1.92**	**(1.89-1.94)**	**1,825**	**365**	**0.93**	**(0.89-0.98)**	**187**	**37**	**1.14**	**(0.97-1.33)**	**1,991**	**398**	**2.35**	**(2.25-2.46)**
Nerve sheath tumors	25,982	5,196	1.92	(1.89-1.94)	1,824	365	0.93	(0.89-0.97)	186	37	1.13	(0.97-1.32)	1,988	398	2.35	(2.24-2.46)
Other tumors of cranial and spinal nerves	18	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tumors of Meninges	**113,793**	**22,759**	**8.11**	**(8.06-8.16)**	**17,251**	**3,450**	**9.81**	**(9.66-9.96)**	**738**	**148**	**5.47**	**(5.05-5.91)**	**6,215**	**1,243**	**8.22**	**(8.01-8.43)**
Meningioma	110,168	22,034	7.82	(7.78-7.87)	16,820	3,364	9.60	(9.45-9.75)	706	141	5.29	(4.87-5.73)	5,976	1,195	7.94	(7.74-8.15)
Mesenchymal tumors	1,081	216	0.08	(0.08-0.09)	118	24	0.06	(0.05-0.07)	--	--	--	--	77	15	0.09	(0.07-0.11)
Primary melanocytic lesions	121	24	0.01	(0.01-0.01)	--	--	--	--	--	--	--	--	--	--	--	--
Other neoplasms related to the meninges	2,423	485	0.19	(0.18-0.20)	306	61	0.15	(0.14-0.17)	20	4	0.11	(0.07-0.17)	158	32	0.18	(0.15-0.21)

Table 10. *Continued*

Histology	White				Black				AIAN				API			
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Lymphomas and Hematopoietic Neoplasms	**6,275**	**1,255**	**0.45**	**(0.44-0.46)**	**645**	**129**	**0.34**	**(0.31-0.36)**	**45**	**9**	**0.30**	**(0.22-0.41)**	**370**	**74**	**0.48**	**(0.43-0.54)**
Lymphoma	6,061	1,212	0.43	(0.42-0.44)	617	123	0.32	(0.30-0.35)	43	9	0.30	(0.21-0.41)	361	72	0.47	(0.42-0.53)
Other hematopoietic neoplasms	214	43	0.02	(0.01-0.02)	28	6	0.01	(0.01-0.02)	--	--	--	--	--	--	--	--
Germ Cell Tumors and Cysts	**1,163**	**233**	**0.10**	**(0.10-0.11)**	**151**	**30**	**0.07**	**(0.06-0.08)**	**--**	**--**	**--**	**--**	**126**	**25**	**0.15**	**(0.13-0.18)**
Germ cell tumors, cysts and heterotopias	1,163	233	0.10	(0.10-0.11)	151	30	0.07	(0.06-0.08)	--	--	--	--	126	25	0.15	(0.13-0.18)
Tumors of Sellar Region	**45,019**	**9,004**	**3.50**	**(3.47-3.53)**	**11,832**	**2366**	**6.21**	**(6.10-6.33)**	**518**	**104**	**3.12**	**(2.84-3.42)**	**3,478**	**696**	**4.11**	**(3.97-4.25)**
Tumors of the pituitary	42,883	8,577	3.33	(3.30-3.36)	11,257	2251	5.93	(5.82-6.05)	496	99	2.99	(2.72-3.29)	3,320	664	3.92	(3.79-4.06)
Craniopharyngioma	2,136	427	0.17	(0.17-0.18)	575	115	0.28	(0.26-0.31)	22	4	0.13	(0.08-0.20)	158	32	0.19	(0.16-0.22)
Unclassified Tumors	**17,126**	**3,425**	**1.26**	**(1.24-1.28)**	**2,096**	**419**	**1.16**	**(1.11-1.21)**	**151**	**30**	**1.08**	**(0.89-1.28)**	**788**	**158**	**1.02**	**(0.95-1.10)**
Hemangioma	4,948	990	0.39	(0.38-0.40)	519	104	0.26	(0.24-0.28)	59	12	0.35	(0.26-0.46)	289	58	0.34	(0.30-0.38)
Neoplasm, unspecified	12,108	2,422	0.87	(0.86-0.89)	1,562	312	0.90	(0.85-0.94)	91	18	0.71	(0.55-0.88)	496	99	0.68	(0.62-0.74)
All other	70	14	0.01	(0.00-0.01)	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL[d]	**304,037**	**60,807**	**22.46**	**(22.38-22.55)**	**41,772**	**8,354**	**22.52**	**(22.30-22.75)**	**2,207**	**441**	**14.44**	**(13.79-15.11)**	**16,323**	**3,265**	**20.44**	**(20.12-20.76)**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Rates are per 100,000 and are age-adjusted to the 2000 US standard population.
[c]Individuals with unknown race were excluded (N = 2,176).
[d]Refers to all brain and other CNS tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported in the five year period for the specific histology category. The suppressed cases are included in the counts and rates for totals.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified; AIAN, American Indian/Alaskan Native; API, Asian/Pacific Islander.

Table 11. Five-Year Total, Annual Average Total[a,] and Average Annual Age-Adjusted Incidence Rates[b] for Brain and Other Central Nervous System Tumor by Major Histology Groupings, Histology, and Hispanic Ethnicity[c], CBTRUS Statistical Report: NPCR and SEER, 2009-2013

Histology	Hispanic				Non-Hispanic			
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Tumors of Neuroepithelial Tissue	**10,068**	**2,014**	**5.05**	**(4.94-5.16)**	**96,554**	**19,311**	**6.82**	**(6.77-6.86)**
Pilocytic astrocytoma	705	141	0.23	(0.22-0.25)	4,331	866	0.38	(0.37-0.39)
Diffuse astrocytoma	851	170	0.41	(0.38-0.44)	7,148	1,430	0.53	(0.52-0.54)
Anaplastic astrocytoma	539	108	0.27	(0.24-0.29)	5,649	1,130	0.40	(0.39-0.41)
Unique astrocytoma variants	145	29	0.05	(0.00-0.04)	910	182	0.07	(0.07-0.08)
Glioblastoma	3,784	757	2.42	(2.33-2.50)	50,709	10,142	3.26	(3.23-3.28)
Oligodendroglioma	376	75	0.17	(0.16-0.19)	3,434	687	0.26	(0.26-0.27)
Anaplastic oligodendroglioma	170	34	0.08	(0.07-0.10)	1,482	296	0.11	(0.10-0.11)
Oligoastrocytic tumors	289	58	0.13	(0.11-0.15)	2,853	571	0.22	(0.21-0.23)
Ependymal tumors	874	175	0.38	(0.35-0.40)	5,815	1,163	0.44	(0.43-0.45)
Glioma malignant, NOS	843	169	0.37	(0.34-0.40)	6,297	1,259	0.49	(0.48-0.50)
Choroid plexus tumors	127	25	0.05	(0..04-0.06)	644	129	0.05	(0.05-0.06)
Other neuroepithelial tumors	--	--	--	--	81	16	0.01	(0.01-0.01)
Neuronal and mixed neuronal-glial tumors	522	104	0.20	(0.18-0.22)	3,793	759	0.30	(0.29-0.31)
Tumors of the pineal region	91	18	0.04	(0.03-0.04)	586	117	0.05	(0.04-0.05)
Embryonal tumors	738	148	0.24	(0.23-0.36)	2,822	564	0.25	(0.24-0.26)
Tumors of Cranial and Spinal Nerves	**2,415**	**483**	**1.26**	**(1.21-1.32)**	**27,652**	**5,530**	**1.90**	**(1.87-1.92)**
Nerve sheath tumors	2,411	482	1.26	(1.21-1.32)	27,632	5,526	1.89	(1.87-1.92)
Other tumors of cranial and spinal nerves	--	--	--	--	20	4	0.00	(0.00-0.00)
Tumors of Meninges	**12,231**	**2,446**	**8.05**	**(7.90-8.21)**	**125,722**	**25,144**	**8.32**	**(8.27-8.37)**
Meningioma	11,676	2,335	7.79	(7.64-7.94)	121,954	24,391	8.05	(8.00-8.09)
Mesenchymal tumors	169	34	0.08	(0.07-0.09)	1,118	224	0.08	(0.08-0.09)
Primary melanocytic lesions	--	--	--	--	120	24	0.01	(0.01-0.01)
Other neoplasms related to the meninges	372	74	0.18	(0.16-0.20)	2,530	506	0.18	(0.18-0.19)
Lymphomas and Hematopoietic Neoplasms	**773**	**155**	**0.48**	**(0.44-0.51)**	**6,582**	**1,316**	**0.44**	**(0.43-0.45)**
Lymphoma	728	146	0.46	(0.42-0.49)	6,377	1,275	0.42	(0.41-0.43)
Other hemopoietic neoplasms	45	7	0.02	(0.02-0.03)	205	41	0.01	(0.01-0.02)
Germ Cell Tumors and Cysts	**260**	**52**	**0.09**	**(0.08-0.10)**	**1184**	**237**	**0.10**	**(0.10-0.11)**
Germ cell tumors, cysts and heterotopias	260	52	0.09	(0.08-0.10)	1184	237	0.10	(0.10-0.11)
Tumors of Sellar Region	**8,813**	**1,763**	**4.41**	**(4.31-4.51)**	**52043**	**10,409**	**3.76**	**(3.73-3.79)**
Tumors of the pituitary	8,371	1,674	4.22	(4.12-4.32)	49597	9,919	3.58	(3.54-3.61)
Craniopharyngioma	442	88	0.19	(0.17-0.20)	2446	489	0.19	(0.18-0.19)
Unclassified Tumors	**2,192**	**438**	**1.29**	**(1.23-1.35)**	**17857**	**3,571**	**1.23**	**(1.21-1.25)**
Hemangioma	716	143	0.35	(0.33-0.38)	5104	1,021	0.37	(0.36-0.38)
Neoplasm, unspecified	1,461	292	0.93	(0.87-0.98)	12679	2,536	0.85	(0.84-0.87)
All other	--	--	--	--	74	15	0.01	(0.00-0.01)
TOTAL[d]	**36,752**	**7,350**	**20.62**	**(20.39-20.85)**	**327,594**	**65,519**	**22.56**	**(22.48-22.64)**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Rates are per 100,000 and age-adjusted to the 2000 US standard population.
[c]Hispanic ethnicity is not mutually exclusive of race; Classified using the North American Association of Central Cancer Registries Hispanic Identification Algorithm, version 2 (NHIA v2).
[d]Refers to all brain and other CNS tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported in the five year period for the specific histology category. The suppressed cases are included in the counts and rates for totals.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 12. Average Annual Age-Adjusted and Age-Specific Incidence Rates[a] for Brain and Other Central Nervous System Tumors by Major Histology Groupings, Histology, and Age Group at Diagnosis, CBTRUS Statistical Report: NPCR and SEER, 2009-2013

	Age At Diagnosis															
	0-19 Years		20-34 Years		35-44 Years		45-54 Years		55-64 Years		65-74 Years		75-84 Years		85+ Years	
Histology	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)
Tumors of Neuroepithelial Tissue	**3.74**	**(3.68-3.80)**	**3.43**	**(3.36-3.50)**	**4.49**	**(4.40-4.59)**	**6.90**	**(6.79-7.01)**	**11.71**	**(11.56-11.87)**	**17.19**	**(16.94-17.44)**	**19.66**	**(19.32-20.00)**	**12.47**	**(12.05-12.89)**
Pilocytic astrocytoma	0.88	(0.85-0.91)	0.24	(0.22-0.25)	0.12	(0.11-0.14)	0.09	(0.08-0.10)	0.08	(0.07-0.10)	0.06	(0.04-0.07)	0.07	(0.05-0.09)	--	--
Diffuse astrocytoma	0.27	(0.25-0.29)	0.50	(0.48-0.53)	0.56	(0.53-0.60)	0.58	(0.55-0.61)	0.77	(0.73-0.81)	0.97	(0.91-1.03)	1.08	(1.00-1.16)	0.60	(0.52-0.70)
Anaplastic astrocytoma	0.09	(0.08-0.10)	0.30	(0.28-0.31)	0.41	(0.38-0.44)	0.46	(0.44-0.49)	0.65	(0.61-0.68)	0.92	(0.86-9.98)	0.91	(0.84-0.99)	0.42	(0.34-0.50)
Unique astrocytoma variants	0.11	(0.10-0.12)	0.07	(0.06-0.08)	0.04	(0.03-0.05)	0.04	(0.03-0.05)	0.04	(0.03-0.05)	0.05	(0.04-0.07)	0.07	(0.05-0.10)	0.07	(0.04-0.11)
Glioblastoma	0.16	(0.15-0.17)	0.42	(0.40-0.45)	1.21	(1.16-1.26)	3.55	(3.47-3.63)	8.11	(7.98-8.24)	13.09	(12.87-13.31)	15.27	(14.97-15.57)	9.16	(8.81-9.52)
Oligodendroglioma	0.05	(0.05-0.06)	0.31	(0.29-0.33)	0.45	(0.42-0.48)	0.40	(0.37-0.43)	0.31	(0.28-0.33)	0.21	(0.19-0.24)	0.19	(0.16-0.23)	0.10	(0.07-0.15)
Anaplastic oligodendroglioma	0.01	(0.00-0.01)	0.08	(0.07-0.09)	0.17	(0.15-0.19)	0.18	(0.17-0.20)	0.21	(0.19-0.23)	0.17	(0.14-0.19)	0.11	(0.09-0.14)	--	--
Oligoastrocytic tumors	0.03	(0.03-0.04)	0.30	(0.28-0.32)	0.33	(0.31-0.36)	0.28	(0.26-0.30)	0.26	(0.24-0.29)	0.21	(0.18-0.24)	0.15	(0.12-0.18)	--	--
Ependymal tumors	0.29	(0.27-0.30)	0.38	(0.35-0.40)	0.49	(0.46-0.52)	0.62	(0.59-0.66)	0.57	(0.54-0.61)	0.59	(0.55-0.64)	0.44	(0.39-0.49)	0.19	(0.14-0.25)
Glioma malignant, NOS	0.67	(0.65-0.70)	0.26	(0.24-0.28)	0.27	(0.25-0.29)	0.29	(0.27-0.32)	0.36	(0.34-0.39)	0.60	(0.56-0.65)	1.09	(1.01-1.17)	1.69	(1.54-1.85)
Choroid plexus tumors	0.10	(0.09-0.11)	0.03	(0.03-0.04)	0.03	(0.02-0.04)	0.04	(0.03-0.05)	0.04	(0.03-0.05)	0.04	(0.03-0.05)	0.05	(0.03-0.07)	--	--
Other neuroepithelial tumors	0.01	(0.01-0.01)	0.01	(0.00-0.01)	0.01	(0.00-0.01)	--	--	--	--	--	--	--	--	--	--
Neuronal and mixed neuronal-glial tumors	0.39	(0.37-0.41)	0.32	(0.30-0.34)	0.25	(0.22-0.27)	0.23	(0.21-0.25)	0.22	(0.19-0.24)	0.20	(0.17-0.23)	0.17	(0.14-0.20)	0.06	(0.04-0.10)
Tumors of the pineal region	0.05	(0.04-0.05)	0.05	(0.04-0.06)	0.05	(0.04-0.06)	0.04	(0.04-0.05)	0.04	(0.03-0.05)	0.04	(0.02-0.05)	0.03	(0.02-0.04)	--	--
Embryonal tumors	0.64	(0.62-0.67)	0.17	(0.15-0.18)	0.11	(0.10-0.13)	0.08	(0.07-0.09)	0.05	(0.04-0.06)	0.04	(0.03-0.05)	0.03	(0.02-0.05)	--	--
Tumors of Cranial and Spinal Nerves	**0.30**	**(0.28-0.32)**	**0.85**	**(0.81-0.88)**	**1.86**	**(1.80-1.92)**	**2.95**	**(2.88-3.02)**	**4.16**	**(4.06-4.25)**	**4.75**	**(4.62-4.88)**	**3.65**	**(3.50-3.80)**	**1.78**	**(1.62-1.94)**
Nerve sheath tumors	0.30	(0.28-0.32)	0.85	(0.81-0.88)	1.86	(1.80-1.92)	2.94	(2.87-3.02)	4.15	(4.06-4.25)	4.75	(4.62-4.88)	3.65	(3.50-3.80)	1.78	(1.62-1.94)
Other tumors of cranial and spinal nerves	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tumors of Meninges	**0.23**	**(0.22-0.25)**	**1.67**	**(1.62-1.72)**	**5.29**	**(5.19-5.39)**	**9.60**	**(9.48-9.73)**	**15.60**	**(15.42-15.79)**	**27.24**	**(26.92-27.55)**	**40.18**	**(39.70-40.67)**	**52.48**	**(51.63-53.34)**
Meningioma	0.14	(0.13-0.16)	1.42	(1.38-1.46)	4.94	(4.84-5.03)	9.22	(9.10-0.35)	15.13	(14.95-15.31)	26.74	(26.43-27.05)	39.75	(39.27-40.24)	52.28	(51.43-53.14)
Mesenchymal tumors	0.05	(0.04-0.06)	0.06	(0.05-0.07)	0.10	(0.09-0.11)	0.10	(0.09-0.12)	0.15	(0.13-0.17)	0.14	(0.12-0.16)	0.11	(0.09-0.14)	0.07	(0.04-0.10)
Primary melanocytic lesions	--	--	--	--	--	--	0.01	(0.01-0.02)	0.02	(0.01-0.02)	0.02	(0.01-0.03)	0.03	(0.02-0.05)	--	--
Other neoplasms related to the meninges	0.04	(0.03-0.05)	0.18	(0.17-0.20)	0.24	(0.22-0.26)	0.27	(0.25-0.29)	0.31	(0.28-0.33)	0.34	(0.30-0.37)	0.28	(0.24-0.32)	0.12	(0.08-0.17)
Lymphomas and Hematopoietic Neoplasms	**0.03**	**(0.02-0.03)**	**0.11**	**(0.10-0.12)**	**0.27**	**(0.25-0.29)**	**0.43**	**(0.40-0.46)**	**0.89**	**(0.84-0.93)**	**1.83**	**(1.75-1.91)**	**2.40**	**(2.28-2.53)**	**1.20**	**(1.07-1.33)**
Lymphoma	0.01	(0.01-0.02)	0.10	(0.09-0.12)	0.26	(0.24-0.28)	0.42	(0.39-0.44)	0.86	(0.82-0.91)	1.79	(1.71-1.87)	2.38	(2.27-2.51)	1.18	(1.06-1.32)
Other hematopoietic neoplasms	0.01	(0.01-0.02)	0.01	(0.00-0.01)	0.01	(0.01-0.02)	0.01	(0.01-0.02)	0.02	(0.02-0.03)	0.04	(0.03-0.05)	--	--	--	--
Germ Cell Tumors and Cysts	**0.22**	**(0.21-0.23)**	**0.10**	**(0.09-0.11)**	**0.05**	**(0.04-0.06)**	**0.03**	**(0.02-0.04)**	**0.02**	**(0.01-0.03)**	**0.03**	**(0.02-0.04)**	**0.03**	**(0.02-0.05)**	**--**	**--**
Germ cell tumors, cysts and heterotopias	0.22	(0.21-0.23)	0.10	(0.09-0.11)	0.05	(0.04-0.06)	0.03	(0.02-0.04)	0.02	(0.01-0.03)	0.03	(0.02-0.04)	0.03	(0.02-0.05)	--	--
Tumors of Sellar Region	**0.81**	**(0.78-0.84)**	**3.45**	**(3.39-3.52)**	**4.71**	**(4.62-4.81)**	**5.02**	**(4.93-5.11)**	**5.77**	**(5.66-5.89)**	**7.78**	**(7.61-7.95)**	**7.74**	**(7.53-7.96)**	**4.93**	**(4.67-5.19)**
Tumors of the pituitary	0.61	(0.59-0.61)	3.33	(3.27-3.40)	4.55	(4.46-4.65)	4.80	(4.71-4.9)	5.54	(5.43-5.64)	7.52	(7.35-7.68)	7.52	(7.31-7.73)	4.82	(4.56-5.08)
Craniopharyngioma	0.20	(0.18-0.21)	0.12	(0.11-0.13)	0.16	(0.15-0.18)	0.22	(0.20-0.24)	0.24	(0.22-0.26)	0.26	(0.23-0.29)	0.22	(0.19-0.26)	0.11	(0.07-0.15)

Table 12. *Continued*

	Age At Diagnosis															
	0-19 Years		20-34 Years		35-44 Years		45-54 Years		55-64 Years		65-74 Years		75-84 Years		85+ Years	
Histology	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)
Unclassified Tumors	**0.33**	**(0.31-0.35)**	**0.62**	**(0.60-0.65)**	**0.90**	**(0.86-0.94)**	**1.13**	**(1.09-1.18)**	**1.60**	**(1.55-1.66)**	**2.60**	**(2.51-2.70)**	**5.21**	**(5.04-5.39)**	**11.64**	**(10.67-11.46)**
Hemangioma	0.12	(0.11-0.13)	0.30	(0.28-0.32)	0.42	(0.39-0.45)	0.48	(0.45-0.51)	0.54	(0.50-0.57)	0.57	(0.52-0.61)	0.57	(0.51-0.63)	0.53	(0.45-0.63)
Neoplasm, unspecified	0.20	(0.19-0.22)	0.32	(0.30-0.34)	0.48	(0.45-0.51)	0.65	(0.62-0.68)	1.06	(1.01-1.11)	2.02	(1.94-2.11)	4.62	(4.46-4.79)	11.06	(10.67-11.46)
All other	0.01	(0.00-0.01)	--	--	--	--	--	--	--	--	0.01	(0.01-0.02)	--	--	--	--
TOTAL[b]	**5.67**	**(5.59-5.74)**	**10.23**	**(10.12-10.35)**	**17.57**	**(17.39-17.75)**	**26.06**	**(25.85-26.28)**	**39.76**	**(39.47-40.05)**	**61.41**	**(60.95-61.89)**	**78.87**	**(78.18-79.55)**	**84.52**	**(83.44-85.61)**

[a]Rates are per 100,000 and age-adjusted to the 2000 US. standard population.
[b]Refers to all brain and other CNS tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported in the five year period for the specific histology category. The suppressed cases are included in the counts and rates for totals.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 13. Most Common Primary Brain and Other Central Nervous System Tumors[a] by Age Group, CBTRUS Statistical Report: NPCR and SEER, 2009-2013

Age (years)	Most Common Histology			Second Most Common Histology			Third Most Common Histology			Fourth Most Common Histology		
	Histology	Rate[b]	(95% CI)	Histology	Rate	(95% CI)	Histology	Rate	(95% CI)	Histology	Rate	(95% CI)
0-4	Embryonal Tumors	1.24	(1.17-1.31)	Pilocytic Astrocytoma	1.03	(0.96-1.09)	Glioma Malignant, NOS	0.93	(0.87-0.99)	Ependymal Tumors	0.48	(0.44-0.53)
5-9	Pilocytic Astrocytoma	1.01	(0.95-1.07)	Glioma Malignant, NOS	0.88	(0.82-0.94)	Embryonal Tumors	0.72	(0.67-0.77)	Neuronal and Mixed Neuronal Glial Tumors	0.31	(0.27-0.34)
10-14	Pilocytic Astrocytoma	0.86	(0.81-0.92)	Glioma Malignant, NOS	0.51	(0.47-0.56)	Tumors of the Pituitary	0.49	(0.45-0.54)	Neuronal and Mixed Neuronal Glial Tumors	0.47	(0.43-0.51)
15-19	Tumors of the Pituitary	1.66	(1.58-1.73)	Pilocytic Astrocytoma	0.60	(0.55-0.65)	Neuronal and Mixed Neuronal Glial Tumors	0.48	(0.44-0.53)	Nerve Sheath Tumors	0.35	(0.32-0.39)
20-34	Tumors of the Pituitary	3.11	(3.1-3.23)	Meningioma	1.39	(1.35-1.44)	Nerve Sheath Tumors	0.83	(0.80-0.86)	Diffuse Astrocytoma	0.49	(0.47-0.52)
35-44	Meningioma	4.82	(4.72-4.91)	Tumors of the Pituitary	4.36	(4.27-4.45)	Nerve Sheath Tumors	1.81	(1.75-1.87)	Glioblastoma	1.21	(1.16-1.25)
45-54	Meningioma	9.02	(8.89-9.14)	Tumors of the Pituitary	4.64	(4.55-4.73)	Glioblastoma	3.54	(3.47-3.62)	Nerve Sheath Tumors	2.85	(2.78-2.92)
55-64	Meningioma	14.77	(14.59-14.95)	Glioblastoma	8.08	(7.95-8.21)	Tumors of the Pituitary	5.37	(5.27-5.48)	Nerve Sheath Tumors	4.01	(3.92-4.1)
65-74	Meningioma	25.96	(25.66-26.27)	Glioblastoma	13.05	(12.84-13.27)	Tumors of the Pituitary	7.30	(7.14-7.46)	Nerve Sheath Tumors	4.55	(4.43-4.68)
75-84	Meningioma	38.70	(38.22-39.18)	Glioblastoma	15.24	(14.94-15.54)	Tumors of the Pituitary	7.32	(7.11-7.53)	Neoplasm Unspecified	4.58	(4.42-4.75)
85+	Meningioma	51.31	(50.47-52.16)	Neoplasm Unspecified	10.91	(10.53-11.31)	Glioblastoma	9.12	(8.77-9.48)	Tumors of the Pituitary	4.69	(4.44-4.95)
OVERALL	**Meningioma**	**7.86**	**(7.81-7.90)**	**Tumors of the Pituitary**	**3.49**	**(3.46-3.52)**	**Glioblastoma**	**3.20**	**(3.17-3.22)**	**Nerve Sheath Tumors**	**1.76**	**(1.74-1.78)**

[a]Excludes tumors in the histologic grouping Neoplasm, unspecified (ICD-0-3 Codes 8000-8005, 8010 and 8021).
[b]Rates are per 100,000 and age-adjusted to the 2000 US. standard population.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 14. Five-Year Total, Annual Average Total[a]. and Average Annual Age-Adjusted Incidence Rates[b] for Children and Adolescents (Age 0-19 Years), Brain and Other Central Nervous System Tumors by Major Histology Groupings, Histology. and Sex, CBTRUS Statistical Report: NPCR and SEER, 2009-2013

Histology	Total				Male (Age 0-19 Years)				Female (Age 0-19 Years)			
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Tumors of Neuroepithelial Tissue	**15,363**	**3,073**	**3.74**	**(3.68-3.80)**	**8,335**	**1,667**	**3.96**	**(3.88-4.05)**	**7,028**	**1,406**	**3.50**	**(3.42-3.58)**
Pilocytic astrocytoma	3,645	729	0.89	(0.86-0.92)	1,899	380	0.90	(0.86-0.95)	1,746	349	0.87	(0.83-0.91)
Diffuse astrocytoma	1,083	217	0.26	(0.25-0.28)	575	115	0.27	(0.25-0.30)	508	102	0.25	(0.23-0.28)
Anaplastic astrocytoma	375	75	0.09	(0.08-0.10)	196	39	0.09	(0.08-0.11)	179	36	0.09	(0.08-0.10)
Unique astrocytoma variants	461	92	0.11	(0.10-0.12)	262	52	0.12	(0.11-0.14)	199	40	0.10	(0.09-0.11)
Glioblastoma	692	138	0.17	(0.16-0.18)	394	79	0.19	(0.17-0.21)	298	60	0.15	(0.13-0.17)
Oligodendroglioma	203	41	0.05	(0.04-0.06)	107	21	0.05	(0.04-0.06)	96	19	0.05	(0.04-0.06)
Anaplastic oligodendroglioma	28	6	0.01	(0.00-0.01)	--	--	--	--	--	--	--	--
Oligoastrocytic tumors	127	25	0.03	(0.03-0.04)	63	13	0.03	(0.02-0.04)	64	13	0.03	(0.02-0.04)
Ependymal tumors	1,230	246	0.30	(0.28-0.31)	701	140	0.33	(0.31-0.36)	529	106	0.26	(0.24-0.29)
Glioma malignant, NOS	2,737	547	0.67	(0.64-0.69)	1,365	273	0.65	(0.62-0.69)	1,372	274	0.69	(0.65-0.72)
Choroid plexus tumors	390	78	0.09	(0.09-0.10)	220	44	0.10	(0.09-0.12)	170	34	0.08	(0.07-0.10)
Other neuroepithelial tumors	34	7	0.01	(0.01-0.01)	--	--	--	--	25	5	0.01	(0.01-0.02)
Neuronal and mixed neuronal-glial tumors	1,631	326	0.40	(0.38-0.41)	909	182	0.43	(0.40-0.46)	722	144	0.36	(0.33-0.39)
Tumors of the pineal region	183	37	0.04	(0.04-0.05)	88	18	0.04	(0.03-0.05)	95	19	0.05	(0.04-0.06)
Embryonal tumors	2,544	509	0.62	(0.60-0.64)	1,534	307	0.73	(0.70-0.77)	1,010	202	0.50	(0.47-0.54)
Medulloblastoma[c]	*1,642*	*328*	*0.40*	*(0.38-0.42)*	*1,040*	*208*	*0.50*	*(0.47-0.53)*	*602*	*120*	*0.30*	*(0.28-0.33)*
Primitive neuroectodermal tumor[d]	*334*	*67*	*0.08*	*(0.07-0.09)*	*194*	*39*	*0.09*	*(0.08-0.11)*	*140*	*28*	*0.07*	*(0.06-0.08)*
Atypical teratoid/rhabdoid tumor[e]	*359*	*72*	*0.09*	*(0.08-0.10)*	*194*	*39*	*0.09*	*(0.08-0.11)*	*165*	*33*	*0.08*	*(0.07-0.10)*
Other embryonal histologies[f]	*209*	*42*	*0.05*	*(0.04-0.06)*	*106*	*21*	*0.05*	*(0.04-0.06)*	*103*	*21*	*0.05*	*(0.04-0.06)*
Tumors of Cranial and Spinal Nerves	**1,218**	**244**	**0.29**	**(0.28-0.31)**	**624**	**125**	**0.29**	**(0.27-0.32)**	**594**	**119**	**0.29**	**(0.27-0.32)**
Nerve sheath tumors	1,216	243	0.29	(0.28-0.31)	623	125	0.29	(0.27-0.32)	593	119	0.29	(0.27-0.32)
Other tumors of cranial and spinal nerves	--	--	--	--	--	--	--	--	--	--	--	--
Tumors of Meninges	**1,012**	**202**	**0.24**	**(0.23-0.36)**	**508**	**102**	**0.24**	**(0.22-0.26)**	**504**	**101**	**0.25**	**(0.23-0.27)**
Meningioma	615	123	0.15	(0.14-0.16)	296	59	0.14	(0.12-0.15)	319	64	0.16	(0.14-0.17)
Mesenchymal tumors	210	42	0.05	(0.04-0.06)	108	22	0.05	(0.04-0.06)	102	20	0.05	(0.04-0.06)
Primary melanocytic lesions	--	--	--	--	--	--	0.00	(0.00-0.01)	--	--	--	--
Other neoplasms related to the meninges	177	35	0.04	(0.04-0.05)	97	19	0.04	(0.04-0.05)	80	16	0.04	(0.03-0.05)

Table 14. *Continued*

Histology	Total				Male (Age 0-19 Years)				Female (Age 0-19 Years)			
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Lymphomas and Hematopoietic Neoplasms	**120**	**24**	**0.03**	**(0.02-0.03)**	**76**	**15**	**0.04**	**(0.03-0.05)**	**44**	**9**	**0.02**	**(0.02-0.03)**
Lymphoma	58	12	0.01	(0.01-0.02)	34	7	0.02	(0.01-0.02)	24	5	0.01	(0.01-0.02)
Other hematopoietic neoplasms	62	12	0.02	(0.01-0.02)	42	8	0.02	(0.01-0.03)	20	4	0.01	(0.01-0.02)
Germ Cell Tumors and Cysts	**918**	**184**	**0.22**	**(0.21-0.24)**	**628**	**126**	**0.30**	**(0.27-0.32)**	**290**	**58**	**0.15**	**(0.13-0.16)**
Germ cell tumors, cysts and heterotopias	918	184	0.22	(0.21-0.24)	628	126	0.30	(0.27-0.32)	290	58	0.15	(0.13-0.16)
Tumors of Sellar Region	**3,472**	**694**	**0.83**	**(0.80-0.86)**	**1,101**	**220**	**0.52**	**(0.49-0.55)**	**2,371**	**474**	**1.16**	**(1.11-1.20)**
Tumors of the pituitary	2,655	531	0.63	(0.60-0.65)	708	142	0.33	(0.31-0.35)	1,947	389	0.94	(0.90-0.99)
Craniopharyngioma	**817**	163	**0.20**	**(0.19-0.21)**	**393**	79	**0.19**	**(0.17-0.21)**	**424**	85	**0.21**	**(0.19-0.23)**
Unclassified Tumors	1,419	**284**	0.34	(0.33-0.36)	722	**144**	0.34	(0.32-0.37)	697	**139**	0.34	(0.32-0.37)
Hemangioma	534	107	0.13	(0.12-0.14)	274	55	0.13	(0.11-0.15)	260	52	0.13	(0.11-0.14)
Neoplasm, unspecified	862	172	0.21	(0.19-0.22)	436	87	0.21	(0.19-0.23)	426	85	0.21	(0.19-0.23)
All other	23	5	0.01	(0.00-0.01)	--	--	--	--	--	--	--	--
TOTAL[g]	**23,522**	**4,704**	**5.70**	**(5.62-5.77)**	**11,994**	**2,399**	**5.69**	**(5.59-5.79)**	**11,528**	**2,306**	**5.71**	**(5.60-5.81)**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Rates are per 100,000 and are age-adjusted to the 2000 US standard population.
[c]ICD-O-3 histology codes: 9470/3, 9471/3, 9472/3, 9474/3.
[d]ICD-O-3 histology code: 9473/3.
[e]ICD-O-3 histology code: 9508/3.
[f]ICD-O-3 histology codes: 8963/3, 9364/3, 9480/3, 9490/0, 9490/3, 9500/3, 9501/3, 9502/3.
[g]Refers to all brain and other CNS tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported in the five year period for the specific histology category. Suppressed cases are included in the total counts and rates.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 15. Five-Year Total, Annual Average Total[a]. and Average Annual Age-Adjusted Incidence Rates[b] for Children and Adolescents (Age 0-19 Years), Brain and Other Central Nervous System Tumors by Major Histology Groupings and Race[c], CBTRUS Statistical Report: NPCR and SEER, 2009-2013

	White (Age 0-19 Years)				Black (Age 0-19 Years)				American Indian/Alaska Native (Age 0-19 Years)				Asian/Pacific Islander (Age 0-19 Years)			
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Tumors of Neuroepithelial Tissue	**12,258**	**2,452**	**3.93**	**(3.86-4.00)**	**1,982**	**396**	**2.90**	**(2.77-3.03)**	**143**	**29**	**1.89**	**(1.59-2.22)**	**829**	**166**	**3.52**	**(3.29-3.77)**
Pilocytic astrocytoma	2,944	589	0.95	(0.91-0.98)	456	91	0.67	(0.61-0.73)	27	5	0.35	(0.23-0.51)	183	37	0.77	(0.67-0.90)
Diffuse astrocytoma	858	172	0.27	(0.26-0.29)	146	29	0.21	(0.18-0.25)	--	--	--	--	59	12	0.25	(0.19-0.33)
Anaplastic astrocytoma	303	61	0.10	(0.09-0.11)	46	9	0.07	(0.05-0.09)	--	--	--	--	22	4	0.10	(0.06-0.14)
Unique astrocytoma variants	337	67	0.11	(0.10-0.12)	84	17	0.12	(0.10-0.15)	--	--	--	--	27	5	0.12	(0.08-0.17)
Glioblastoma	532	106	0.17	(0.16-0.18)	92	18	0.13	(0.11-0.16)	--	--	--	--	48	10	0.21	(0.15-0.27)
Oligodendroglioma	166	33	0.05	(0.04-0.06)	21	4	0.03	(0.02-0.05)	--	--	--	--	--	--	--	---
Anaplastic oligodendroglioma	20	4	0.01	(0.00-0.01)	--	--	--	--	--	--	--	--	--	--	--	--
Oligoastrocytic tumors	99	20	0.03	(0.03-0.04)	20	4	0.03	(0.02-0.04)	--	--	--	--	--	--	--	--
Ependymal tumors	1,011	202	0.32	(0.30-0.34)	134	27	0.19	(0.16-0.23)	17	3	0.22	(0.13-0.36)	59	12	0.25	(0.19-0.32)
Glioma malignant, NOS	2,184	437	0.70	(0.67-0.73)	374	75	0.55	(0.50-0.61)	24	5	0.32	(0.20-0.47)	133	27	0.56	(0.47-0.67)
Choroid plexus tumors	317	63	0.10	(0.09-0.11)	40	8	0.06	(0.04-0.08)	--	--	--	--	23	5	0.09	(0.06-0.14)
Other neuroepithelial tumors	25	5	0.01	(0.01-0.01)	--	--	--	--	--	--	--	--	--	--	--	--
Neuronal and mixed neuronal-glial tumors	1,330	266	0.42	(0.40-0.45)	194	39	0.28	(0.24-0.32)	--	--	--	--	86	17	0.37	(0.30-0.46)
Tumors of the pineal region	118	24	0.04	(0.03-0.05)	52	10	0.08	(0.06-0.10)	--	--	--	--	--	--	--	--
Embryonal tumors	2,014	403	0.65	(0.62-0.68)	313	63	0.46	(0.41-0.51)	26	5	0.34	(0.22-0.50)	159	32	0.67	(0.57-0.78)
Medulloblastoma[e]	*1,313*	*263*	*0.42*	*(0.40-0.45)*	*190*	*38*	*0.28*	*(0.24-0.32)*	*18*	*4*	*0.24*	*(0.14-0.38)*	*100*	*20*	*0.42*	*(0.34-0.51)*
PNET[e]	*258*	*52*	*0.08*	*(0.07-0.09)*	*52*	*10*	*0.07*	*(0.06-0.10)*	--	--	--	--	*16*	*3*	*0.07*	*(0.04-0.11)*
ATRT[f]	*280*	*56*	*0.09*	*(0.08-0.10)*	*44*	*9*	*0.06*	*(0.05-0.08)*	--	--	--	--	*28*	*6*	*0.12*	*(0.08-0.17)*
Other embryonal histologies[g]	*163*	*33*	*0.05*	*(0.04-0.06)*	*27*	*5*	*0.04*	*(0.03-0.06)*	--	--	--	--	--	--	--	--
Tumors of Cranial and Spinal Nerves	**929**	**186**	**0.30**	**(0.28-0.32)**	**162**	**32**	**0.24**	**(0.20-0.27)**	**--**	**--**	**--**	**--**	**98**	**20**	**0.42**	**(0.34-0.51)**
Nerve sheath tumors	927	185	0.30	(0.28-0.32)	162	32	0.24	(0.20-0.27)	--	--	--	--	98	20	0.42	(0.34-0.51)
Other tumors of cranial and spinal nerves	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tumors of Meninges	**791**	**158**	**0.25**	**(0.23-0.27)**	**144**	**29**	**0.21**	**(0.17-0.24)**	**--**	**--**	**--**	**--**	**64**	**13**	**0.27**	**(0.21-0.35)**

Table 15. *Continued*

	White (Age 0-19 Years)				Black (Age 0-19 Years)				American Indian/Alaska Native (Age 0-19 Years)				Asian/Pacific Islander (Age 0-19 Years)			
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Meningioma	470	94	0.15	(0.13-0.16)	98	20	0.14	(0.11-0.17)	--	--	--	--	38	8	0.16	(0.12-0.22)
Mesenchymal tumors	173	35	0.06	(0.05-0.06)	18	4	0.03	(0.02-0.04)	--	--	--	--	17	3	0.07	(0.04-0.12)
Primary melanocytic lesions	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other neoplasms related to the meninges	139	28	0.04	(0.04-0.05)	27	5	0.04	(0.02-0.06)	--	--	--	--	--	--	--	--
Lymphomas and Hematopoietic Neoplasms	**99**	**20**	**0.03**	**(0.03-0.04)**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**
Lymphoma	45	9	0.01	(0.01-0.02)	--	--	--	--	--	--	--	--	--	--	--	--
Other hematopoietic neoplasms	54	11	0.02	(0.01-0.02)	--	--	--	--	--	--	--	--	--	--	--	--
Germ Cell Tumors and Cysts	**717**	**143**	**0.23**	**(0.21-0.25)**	**95**	**19**	**0.14**	**(0.11-0.17)**	**--**	**--**	**--**	**--**	**96**	**19**	**0.42**	**(0.34-0.51)**
Germ cell tumors, cysts and heterotopias	717	143	0.23	(0.21-0.25)	95	19	0.14	(0.11-0.17)	--	--	--	--	96	19	0.42	(0.34-0.51)
Tumors of Sellar Region	**2,602**	**520**	**0.82**	**(0.79-0.85)**	**537**	**107**	**0.77**	**(0.70-0.83)**	**46**	**9**	**0.61**	**(0.45-0.82)**	**253**	**51**	**1.10**	**(0.97-1.24)**
Tumors of the pituitary	1,991	398	0.62	(0.59-0.65)	398	80	0.56	(0.51-0.62)	38	8	0.50	(0.36-0.69)	202	40	0.88	(0.76-1.01)
Craniopharyngioma	611	122	0.20	(0.18-0.21)	139	28	0.21	(0.17-0.24)	--	--	--	--	51	10	0.22	(0.16-0.29)
Unclassified Tumors	**1,126**	**225**	**0.36**	**(0.34-0.38)**	**159**	**32**	**0.23**	**(0.20-0.27)**	**21**	**4**	**0.28**	**(0.17-0.43)**	**104**	**21**	**0.45**	**(0.36-0.54)**
Hemangioma	436	87	0.14	(0.13-0.15)	47	9	0.07	(0.05-0.09)	--	--	--	--	41	8	0.18	(0.13-0.24)
Neoplasm, unspecified	669	134	0.21	(0.20-0.23)	111	22	0.16	(0.13-0.20)	--	--	--	--	62	12	0.27	(0.20-0.34)
All other	21	4	0.01	(0.00-0.01)	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL[h]	**18,522**	**3,704**	**5.92**	**(5.83-6.00)**	**3,088**	**618**	**4.48**	**(4.33-4.65)**	**239**	**48**	**3.16**	**(2.77-3.59)**	**1,453**	**291**	**6.21**	**(5.90-6.54)**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Rates are per 100,000 and are age-adjusted to the 2000 US standard population.
[c]Individuals with unknown race were excluded (N = 188).
[d]ICD-O-3 histology codes: 9470/3, 9471/3, 9472/3, 9474/3.
[e]ICD-O-3 histology code: 9473/3.
[f]ICD-O-3 histology code: 9508/3.
[g]ICD-O-3 histology codes: 8963/3, 9364/3, 9480/3, 9490/0, 9490/3, 9500/3, 9501/3, 9502/3.
[h]Refers to all brain and other CNS tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported in the five year period for the specific histology category. Suppressed cases are included in the total counts and rates.
Abbreviations: ATRT, Atypical Teratoid/Rhabdoid tumor; CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; PNET, Primitive Neuroectodermal Tumor; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 16. Five-Year Total, Annual Average Total[a], and Average Annual Age-Adjusted Incidence Rates[b] for Children and Adolescents (Age 0-19 Years), Brain and Other Central Nervous System Tumors by Major Histology Groupings, Histology, and Hispanic Ethnicity[c], CBTRUS Statistical Report: NPCR and SEER, 2009-2013

	Hispanic (Age 0-19 Years)				Non-Hispanic (Age 0-19 Years)			
Histology	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Tumors of Neuroepithelial Tissue	**2,782**	**556**	**2.88**	**(2.77-2.98)**	**12,475**	**2,495**	**3.96**	**(3.89-4.03)**
Pilocytic astrocytoma	588	118	0.61	(0.56-0.66)	3034	607	0.96	(0.93-1.00)
Diffuse astrocytoma	159	32	0.17	(0.14-0.20)	914	183	0.29	(0.27-0.31)
Anaplastic astrocytoma	77	15	0.08	(0.07-0.10)	297	59	0.09	(0.08-0.11)
Unique astrocytoma variants	96	19	0.10	(0.08-0.12)	362	72	0.11	(0.10-0.13)
Glioblastoma	156	31	0.17	(0.14-0.19)	531	106	0.17	(0.15-0.18)
Oligodendroglioma	24	5	0.03	(0.02-0.04)	177	35	0.05	(0.05-0.06)
Anaplastic oligodendroglioma	--	--	--	--	24	5	0.01	(0.00-0.01)
Oligoastrocytic tumors	17	3	0.02	(0.01-0.03)	110	22	0.03	(0.03-0.04)
Ependymal tumors	286	57	0.29	(0.26-0.33)	933	187	0.29	(0.28-0.31)
Glioma malignant, NOS	462	92	0.47	(0.43-0.52)	2259	452	0.72	(0.69-0.75)
Choroid plexus tumors	82	16	0.08	(0.07-0.10)	304	61	0.10	(0.09-0.11)
Other neuroepithelial tumors	--	--	--	--	28	6	0.01	(0.01-0.01)
Neuronal and mixed neuronal-glial tumors	259	52	0.28	(0.24-0.31)	1363	273	0.43	(0.40-0.45)
Tumors of the pineal region	34	7	0.03	(0.02-0.05)	148	30	0.05	(0.04-0.06)
Embryonal tumors	532	106	0.54	(0.49-0.58)	1991	398	0.64	(0.61-0.67)
Medulloblastoma[d]	*330*	*66*	*0.34*	*(0.30-0.38)*	*1,298*	*260*	*0.42*	*(0.39-0.44)*
Primitive neuroectodermal tumor[e]	*60*	*12*	*0.06*	*(0.05-0.08)*	*273*	*55*	*0.09*	*(0.08-0.10)*
Atypical teratoid/rhabdoid tumor[f]	*101*	*20*	*0.10*	*(0.08-0.12)*	*254*	*51*	*0.08*	*(0.07-0.09)*
Other embryonal histologies[g]	*41*	*8*	*0.04*	*(0.03-0.06)*	*166*	*33*	*0.05*	*(0.05-0.06)*
Tumors of Cranial and Spinal Nerves	**195**	**39**	**0.21**	**(0.18-0.24)**	**1018**	**204**	**0.32**	**(0.30-0.34)**
Nerve sheath tumors	195	39	0.21	(0.18-0.24)	1016	203	0.32	(0.30-0.34)
Other tumors of cranial and spinal nerves	--	--	--	--	--	--	--	--
Tumors of Meninges	**171**	**34**	**0.18**	**(0.16-0.21)**	**839**	**168**	**0.26**	**(0.24-0.28)**
Meningioma	93	19	0.10	(0.08-0.12)	520	104	0.16	(0.15-0.17)
Mesenchymal tumors	37	7	0.04	(0.03-0.05)	173	35	0.05	(0.05-0.06)
Primary melanocytic lesions	--	--	--	--	--	--	--	--
Other neoplasms related to the meninges	37	7	0.04	(0.03-0.06)	140	28	0.04	(0.04-0.05)
Lymphomas and Hematopoietic Neoplasms	**29**	**6**	**0.03**	**(0.02-0.04)**	**88**	**18**	**0.03**	**(0.02-0.03)**
Lymphoma	--	--	--	-	43	9	0.01	(0.01-0.02)
Other hematopoietic neoplasms	--	--	--	--	45	9	0.01	(0.01-0.02)
Germ Cell Tumors and Cysts	**191**	**38**	**0.21**	**(0.18-0.24)**	**718**	**144**	**0.23**	**(0.21-0.24)**
Germ cell tumors, cysts and heterotopias	191	38	0.21	(0.18-0.24)	718	144	0.23	(0.21-0.24)
Tumors of Sellar Region	**829**	**166**	**0.91**	**(0.85-0.98)**	**2619**	**524**	**0.80**	**(0.77-0.83)**

Table 16. *Continued*

	Hispanic (Age 0-19 Years)				Non-Hispanic (Age 0-19 Years)			
Histology	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Tumors of the pituitary	634	127	0.70	(0.65-0.76)	2003	401	0.60	(0.58-0.63)
Craniopharyngioma	195	39	0.21	(0.18-0.24)	616	123	0.20	(0.18-0.21)
Unclassified Tumors	**277**	**55**	**0.29**	**(0.26-0.33)**	**1125**	**225**	**0.35**	**(0.33-0.37)**
Hemangioma	106	21	0.11	(0.09-0.14)	427	85	0.13	(0.12-0.15)
Neoplasm, unspecified	164	33	0.18	(0.15-0.20)	682	136	0.21	(0.20-0.23)
All other	--	--	--	--	--	--	--	--
TOTAL[h]	**4,474**	**895**	**4.71**	**(4.57-4.85)**	**18,882**	**3,776**	**5.94**	**(5.86-6.03)**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Rates are per 100,000 and are age-adjusted to the 2000 US standard population.
[c]Hispanic ethnicity is not mutually exclusive of race; Classified using the North American Association of Central Cancer Registries Hispanic Identification Algorithm, version 2 (NHIA v2).
[d]ICD-O-3 histology codes: 9470/3, 9471/3, 9472/3, 9474/3.
[e]ICD-O-3 histology code: 9473/3.
[f]ICD-O-3 histology code: 9508/3.
[g]ICD-O-3 histology codes: 8963/3, 9364/3, 9480/3, 9490/0, 9490/3, 9500/3, 9501/3, 9502/3.
[h]Refers to all brain and other CNS tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported in the five year period for the specific histology category. The suppressed cases are included in the counts and rates for totals.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 17. Five-Year Total, Annual Average Total[a]. and Age-Adjusted and Age-Specific Incidence Rates[b] for Children and Adolescents, (Age 0-19 Years), Brain and Other Central Nervous System Tumors: Malignant and Non-Malignant by International Classification of Childhood Cancer (ICCC),[c] CBTRUS Statistical Report: NPCR and SEER, 2009-2013

	0-14[d] years				0-19[d] years				< 1 year		1-4 years		5-9 years		10-14 years		15-19 years	
ICCC Category	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
II Lymphomas and reticuloendothelial neoplasms	68	14	0.02	(0.02-0.03)	106	21	0.03	(0.02-0.03)	--	--	--	--	0.03	(0.02-0.04)	0.03	(0.02-0.04)	0.04	(0.02-0.05)
III CNS and misc. intracranial and intraspinal neoplasms	14,289	2,858	4.69	(4.61-4.77)	19,775	3,955	4.79	(4.72-4.86)	4.79	(4.49-5.11)	5.26	(5.1-5.42)	4.48	(4.35-4.61)	4.45	(4.32-4.58)	5.09	(4.96-5.23)
III(a) Ependymomas and choroid plexus tumor	1,297	259	0.42	(0.40-0.45)	1,620	324	0.39	(0.37-0.41)	0.92	(0.79-1.07)	0.69	(0.63-0.75)	0.27	(0.24-0.31)	0.28	(0.24-0.31)	0.30	(0.27-0.33)
III(b) Astrocytomas	5,627	1,125	1.85	(1.80-1.90)	7,044	1,409	1.71	(1.67-1.75)	1.44	(1.28-1.62)	2.25	(2.14-2.35)	1.83	(1.75-1.91)	1.64	(1.56-1.72)	1.32	(1.25-1.39)
III(c) Intracranial and intraspinal embryonal tumors	2,129	426	0.70	(0.67-0.73)	2,362	472	0.58	(0.55-0.60)	1.12	(0.98-1.28)	1.04	(0.97-1.11)	0.67	(0.62-0.72)	0.39	(0.35-0.43)	0.22	(0.19-0.25)
III(d) Other gliomas	1,855	371	0.61	(0.58-0.64)	2,343	469	0.57	(0.55-0.59)	0.28	(0.21-0.37)	0.60	(0.55-0.66)	0.72	(0.67-0.77)	0.57	(0.52-0.62)	0.45	(0.41-0.50)
III(e) Other specified intracranial and intraspinal neoplasms	2,796	559	0.92	(0.89-0.96)	5,545	1,109	1.33	(1.30-1.37)	0.66	(0.55-0.78)	0.53	(0.48-0.58)	0.85	(0.79-0.90)	1.34	(1.27-1.42)	2.55	(2.45-2.64)
III(f) Unspecified intracranial and intraspinal neoplasms	585	117	0.19	(0.18-0.21)	861	172	0.21	(0.19-0.22)	0.36	(0.28-0.45)	0.15	(0.13-0.18)	0.15	(0.13-0.17)	0.23	(0.20-0.26)	0.26	(0.23-0.29)
IV Neuroblastoma and other peripheral nervous cell tumors	134	27	0.04	(0.04-0.05)	146	29	0.04	(0.03-0.04)	0.25	(0.19-0.33)	0.07	(0.05-0.09)	--	--	--	--	--	--
IX Soft tissue and other extraosseous sarcomas	67	13	0.02	(0.02-0.03)	95	19	0.02	(0.02-0.03)	--	--	0.02	(0.01-0.04)	0.02	(0.01-0.03)	0.02	(0.01-0.03)	0.03	(0.02-0.04)
X(a) Intracranial & intraspinal germ cell tumors	635	127	0.21	(0.19-0.23)	918	184	0.22	(0.21-0.24)	0.41	(0.32-0.51)	0.09	(0.07-0.12)	0.17	(0.14-0.20)	0.30	(0.27-0.34)	0.26	(0.23-0.30)
All other categories	17	3	0.01	(0.00-0.01)	23	5	0.01	(0.00-0.01)	--	--	--	--	--	--	--	--	--	--
Not classified by ICCC	1,441	288	0.47	(0.45-0.50)	2,457	491	0.59	(0.57-0.62)	0.72	(0.60-0.84)	0.44	(0.39-0.48)	0.40	(0.36-0.44)	0.53	(0.48-0.57)	0.94	(0.89-1.00)
TOTAL[d,e]	**16,653**	**3,331**	**5.47**	**(5.39-5.55)**	**23,522**	**4,704**	**5.70**	**(5.62-5.77)**	**6.23**	**(5.89-6.59)**	**5.91**	**(5.75-6.08)**	**5.12**	**(4.98-5.26)**	**5.34**	**(5.20-5.48)**	**6.38**	**(6.23-6.53)**

[a]Annual average cases are calculated by dividing the five-year total by five.
[b]Rates are per 100,000.
[c]See the CBTRUS website for additional information on this classification scheme: http://www.cbtrus.org.
[d]Rates are age adjusted to the 2000 U.S. standard population.
[e]Refers to all brain and other CNS tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported in the five year period for the specific ICCC category. The suppressed cases are included in the counts and rates for totals.
Abbreviations: ICCC, International Classification of Childhood Cancer; CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval.

Table 18. Estimated Number of Cases[a,b] of Brain and Other Central Nervous System Tumors Overall and by Behavior by State, 2016, 2017

STATE	2016 Estimated New Cases			2017 Estimated New Cases		
	All	Malignant	Non-Malignant	All	Malignant	Non-Malignant
Alabama	950	410	540	960	420	540
Alaska	180	60	120	190	60	130
Arizona	1,660	570	1,090	1,700	590	1,110
Arkansas	630	270	360	640	280	360
California	8,460	2,690	5,770	8,610	2,720	5,890
Colorado	1,540	400	1,140	1,560	400	1,160
Connecticut	970	300	670	1000	300	700
Delaware	220	80	140	220	80	140
District of Columbia	140	--	100	130	--	90
Florida	5,660	1,650	4,010	5,750	1,670	4,080
Georgia	2,900	730	2,170	3,060	750	2,310
Hawaii	270	80	190	270	80	190
Idaho	360	130	230	370	130	240
Illinois	3,320	1,000	2,320	3,380	1,010	2,370
Indiana	1,630	550	1,080	1,660	560	1,100
Iowa	1,020	270	750	1,070	280	790
Kansas	740	240	500	770	250	520
Kentucky	1,480	440	1,040	1,520	450	1,070
Louisiana	1,230	330	900	1,280	330	950
Maine	300	130	170	300	130	170
Maryland	1,470	450	1,020	1,520	460	1,060
Massachusetts	1,600	560	1,040	1,640	560	1,080
Michigan	2,380	790	1,590	2,390	790	1,600
Minnesota	1,290	460	830	1,360	470	890
Mississippi	690	230	460	700	230	470
Missouri	1,540	490	1,050	1,560	500	1,060
Montana	250	90	160	250	90	160
Nebraska	400	160	240	400	160	240
Nevada	480	170	310	490	170	320
New Hampshire	330	130	200	340	140	200
New Jersey	2,570	760	1,810	2,660	760	1,900
New Mexico	520	140	380	540	140	400
New York	5,660	1,480	4,180	5,730	1,470	4,260
North Carolina	2,720	810	1,910	2,810	830	1,980
North Dakota	150	50	100	160	60	100
Ohio	2,890	1,000	1,890	2,980	1,010	1,970
Oklahoma	1100	290	810	1180	300	880
Oregon	910	380	530	920	390	530
Pennsylvania	3,890	1,210	2,680	3,950	1,220	2,730
Rhode Island	200	70	130	190	70	120
South Carolina	1,320	400	920	1,370	410	960
South Dakota	230	70	160	230	70	160
Tennessee	1,910	530	1,380	1,960	540	1,420
Texas	6,530	1,900	4,630	6,650	1,930	4,720
Utah	860	210	650	910	220	690
Vermont	180	60	120	180	60	120
Virginia	1,720	600	1,120	1,750	610	1,140
Washington	2,440	630	1,810	2,530	640	1,890
West Virginia	400	150	250	400	150	250
Wisconsin	1,730	550	1,180	1,770	550	1,220
Wyoming	140	50	90	150	50	100
United States	**78,450**	**25,850**	**52,600**	**79,270**	**26,070**	**53,200**

[a]Source: Estimation based on CBTRUS NPCR and SEER 2000-2012 data for malignant tumors, and NPCR and SEER 2006-2012 data for non-malignant tumors.
[b]Rounded to the nearest 10.
- Estimated number is less than 50 and may affect totals.

Table 19. Estimated Number of Cases[a,b] of Brain and Other Central Nervous System Tumors Overall and by Behavior by Major Histology Groupings and Histology, 2016, 2017

Histology	2016 Estimated New Cases			2017 Estimated New Cases		
	All	Malignant	Non-Malignant	All	Malignant	Non-Malignant
Tumors of Neuroepithelial Tissue	**22,650**	**21,020**	**1,630**	**22,900**	**21,250**	**1,650**
Pilocytic astrocytoma	1,100	1,100	--	1,120	1,120	--
Diffuse astrocytoma	1,180	1,180	--	1,110	1,110	--
Anaplastic astrocytoma	1,330	1,330	--	1,340	1,340	--
Unique astrocytoma variants	240	180	70	250	180	70
Glioblastoma	12,150	12,150	--	12,390	12,390	--
Oligodendroglioma	690	690	--	680	680	--
Anaplastic oligodendroglioma	390	390	--	410	410	--
Oligoastrocytic tumors	610	610	--	610	600	--
Ependymal tumors	1,410	820	590	1,420	820	600
Glioma malignant, NOS	1,650	1,650	--	1,690	1,690	--
Choroid plexus tumors	150	--	130	150	--	130
Other neuroepithelial tumors	--	--	--	--	--	--
Neuronal and mixed neuronal-glial tumors	940	210	740	960	210	750
Tumors of the pineal region	170	100	70	180	100	80
Embryonal tumors	600	580	--	580	560	20
Tumors of Cranial and Spinal Nerves	**6,490**	**--**	**6,450**	**6,580**	**--**	**6,530**
Nerve sheath tumors	6,480	--	6,440	6,570	--	6,530
Other tumors of cranial and spinal nerves	--	--	--	--	--	--
Tumors of Meninges	**27,990**	**470**	**27,520**	**28,030**	**460**	**27,570**
Meningioma	27,080	300	26,780	27,110	290	26,810
Mesenchymal tumors	280	90	190	280	90	190
Primary melanocytic lesions	--	--	--	--	--	--
Other neoplasms related to the meninges	600	50	550	600	50	550
Lymphomas and Hematopoietic Neoplasms	**1,630**	**1,630**	**--**	**1,660**	**1,650**	**--**
Lymphoma	1,560	1,560	--	1,590	1,590	--
Other hematopoietic neoplasms	70	60	--	70	70	--
Germ Cell Tumors and Cysts	**290**	**210**	**80**	**290**	**210**	**80**
Germ cell tumors, cysts and heterotopias	290	210	80	290	210	80
Tumors of Sellar Region	**14,370**	**--**	**14,330**	**14,850**	**--**	**14,820**
Tumors of the pituitary	13,760	--	13,730	14,230	--	14,200
Craniopharyngioma	610	--	610	610	--	610
Unclassified Tumors	**5,330**	**2,660**	**2,660**	**5,260**	**2,630**	**2,630**
Hemangioma	1,090	--	1,080	1,050	--	1,040
Neoplasm, unspecified	2,970	1,400	1,570	2,980	1,410	1,580
All other	--	--	--	--	--	--
TOTAL	**78,450**	**25,850**	**52,600**	**79,270**	**26,070**	**53,200**

[a]Source: Estimation based on CBTRUS NPCR and SEER 2000-2012 data for malignant tumors, and NPCR and SEER 2006-2012 data for non-malignant tumors.
[b]Rounded to the nearest 10. Numbers may not add up due to rounding.
–Estimated number is less than 50 and may affect totals.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 20. Estimated Number of Cases[a,b] of Brain and Other Central Nervous System Tumors by Age, Major Histology Groupings, and Histology, 2016, 2017

	2016 Estimated New Cases				2017 Estimated New Cases			
Histology	0-14	15-39	40-64	65+	0-14	15-39	40-64	65+
Tumors of Neuroepithelial Tissue	**3,140**	**3,480**	**8,690**	**8,040**	**3,160**	**3,480**	**8,760**	**8,260**
Pilocytic astrocytoma	790	300	90	--	810	300	90	--
Diffuse astrocytoma	190	390	490	320	180	380	470	310
Anaplastic astrocytoma	90	340	620	590	90	350	630	660
Unique astrocytoma variants	90	80	--	--	90	80	--	--
Glioblastoma	170	510	5,390	6,120	180	520	5,470	6,270
Oligodendroglioma	--	250	320	70	--	240	310	70
Anaplastic oligodendroglioma	--	80	200	60	--	70	200	60
Oligoastrocytic tumors	--	280	250	70	--	290	250	70
Ependymal tumors	250	360	590	240	250	360	590	250
Glioma malignant, NOS	570	300	320	370	570	310	330	370
Choroid plexus tumors	70	70	--	--	70	80	--	--
Other neuroepithelial tumors	--	--	--	--	--	--	--	--
Neuronal and mixed neuronal-glial tumors	360	300	240	80	360	290	240	80
Tumors of the pineal region	--	60	60	--	--	60	60	--
Embryonal tumors	460	160	--	--	450	160	--	--
Tumors of Cranial and Spinal Nerves	**210**	**960**	**3,470**	**1,950**	**200**	**970**	**3,510**	**2,010**
Nerve sheath tumors	210	960	3,470	1,940	200	960	3,500	2,000
Other tumors of cranial and spinal nerves	--	--	--	--	--	--	--	--
Tumors of Meninges	**240**	**2,030**	**11,240**	**16,240**	**250**	**2,050**	**11,200**	**16,680**
Meningioma	140	1,770	10,830	16,070	150	1,790	10,790	16,500
Mesenchymal tumors	60	70	110	50	60	70	110	50
Primary melanocytic lesions	--	--	--	--	--	--	--	--
Other neoplasms related to the meninges	--	190	270	120	50	190	270	120
Lymphomas and Hematopoietic Neoplasms	**--**	**100**	**560**	**840**	**--**	**90**	**560**	**850**
Lymphoma	--	80	540	820	--	80	540	830
Other hematopoietic neoplasms	--	--	--	--	--	--	--	--
Germ Cell Tumors and Cysts	**190**	**110**	**--**	**--**	**190**	**100**	**--**	**--**
Germ cell tumors, cysts and heterotopias	190	110	--	--	190	100	--	--
Tumors of Sellar Region	**800**	**3,930**	**6,390**	**3,750**	**820**	**4,030**	**6,610**	**3,910**
Tumors of the pituitary	640	3,800	6,170	3,630	660	3,900	6,390	3,780
Craniopharyngioma	160	130	220	120	160	130	220	120
Unclassified Tumors	**350**	**600**	**1,230**	**2,060**	**370**	**580**	**1,210**	**2,120**
Hemangioma	150	280	430	490	170	270	400	560
Neoplasm, unspecified	180	310	790	1,560	190	310	800	1,550
All other	--	--	--	--	--	--	--	--
TOTAL‡	**4,770**	**11,110**	**31,590**	**32,870**	**4,830**	**11,200**	**31,850**	**33,820**

[a]Source: Estimation based on CBTRUS NPCR and SEER 2006-2013 data.
[b]Rounded to the nearest 10. Numbers may not add up due to rounding.
– Estimated number is less than 50 and may affect totals.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 21. Five-Year Total, Average Annual Total[a] and Average Annual Age-Adjusted Mortality Rates[b] for Malignant Brain and Other Central Nervous System Cancer Overall and by State and Sex, United States, 2009-2013[bc]

State	Total Deaths				Total Male Deaths				Total Female Deaths			
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Alabama	1,369	274	5.01	(4.74-5.28)	763	153	6.15	(5.71-6.61)	606	121	4.05	(3.73-4.39)
Alaska	145	29	4.79	(3.98-5.71)	93	19	6.44	(5.03-8.09)	52	10	3.36	(2.47-4.46)
Arizona	1,500	300	4.22	(4.00-4.44)	826	165	4.95	(4.61-5.30)	674	135	3.57	(3.30-3.85)
Arkansas	821	164	4.87	(4.54-5.22)	463	93	6.06	(5.51-6.65)	358	72	3.93	(3.53-4.37)
California	8,139	1,628	4.29	(4.20-4.38)	4,575	915	5.23	(5.07-5.38)	3,564	713	3.49	(3.37-3.61)
Colorado	1,155	231	4.50	(4.24-4.78)	654	131	5.47	(5.05-5.93)	501	100	3.68	(3.36-4.02)
Connecticut	875	175	4.20	(3.92-4.49)	474	95	5.04	(4.59-5.53)	401	80	3.47	(3.13-3.84)
Delaware	217	43	4.18	(3.63-4.79)	112	22	4.84	(3.97-5.85)	105	21	3.72	(3.02-4.54)
District of Columbia	97	19	3.28	(2.65-4.01)	53	11	4.21	(3.13-5.55)	44	9	2.63	(1.90-3.55)
Florida	5,005	1,001	4.11	(3.99-4.23)	2,823	565	5.05	(4.86-5.24)	2,182	436	3.28	(3.14-3.43)
Georgia	1,942	388	4.07	(3.89-4.26)	1,103	221	5.12	(4.80-5.44)	839	168	3.23	(3.01-3.46)
Hawaii	211	42	2.59	(2.24-2.97)	118	24	3.01	(2.48-3.62)	93	19	2.21	(1.77-2.73)
Idaho	394	79	4.76	(4.30-5.27)	263	53	6.70	(5.90-7.58)	131	26	2.97	(2.48-3.54)
Illinois	2,842	568	4.13	(3.98-4.29)	1,592	318	5.09	(4.84-5.35)	1,250	250	3.34	(3.16-3.54)
Indiana	1,594	319	4.51	(4.29-4.74)	907	181	5.56	(5.20-5.95)	687	137	3.62	(3.35-3.91)
Iowa	902	180	5.13	(4.79-5.48)	517	103	6.35	(5.80-6.93)	385	77	4.04	(3.64-4.49)
Kansas	802	160	5.13	(4.78-5.51)	460	92	6.39	(5.81-7.01)	342	68	4.05	(3.62-4.52)
Kentucky	1,149	230	4.71	(4.43-4.99)	618	124	5.45	(5.02-5.91)	531	106	4.06	(3.71-4.43)
Louisiana	1,034	207	4.28	(4.02-4.55)	572	114	5.26	(4.83-5.73)	462	92	3.46	(3.15-3.80)
Maine	420	84	4.87	(4.40-5.38)	257	51	6.46	(5.67-7.33)	163	33	3.50	(2.96-4.12)
Maryland	1,267	253	4.06	(3.84-4.30)	712	142	5.10	(4.72-5.50)	555	111	3.24	(2.97-3.53)
Massachusetts	1,611	322	4.28	(4.07-4.50)	884	177	5.23	(4.88-5.59)	727	145	3.50	(3.24-3.77)
Michigan	2,651	530	4.69	(4.51-4.88)	1,485	297	5.69	(5.39-5.99)	1,166	233	3.85	(3.62-4.08)
Minnesota	1,312	262	4.49	(4.25-4.75)	776	155	5.64	(5.24-6.06)	536	107	3.46	(3.17-3.77)
Mississippi	766	153	4.78	(4.44-5.14)	398	80	5.64	(5.08-6.24)	368	74	4.15	(3.73-4.60)
Missouri	1,514	303	4.45	(4.22-4.68)	832	166	5.32	(4.96-5.70)	682	136	3.69	(3.41-3.98)
Montana	273	55	4.53	(3.99-5.12)	147	29	5.05	(4.24-5.98)	126	25	4.02	(3.32-4.82)
Nebraska	508	102	5.08	(4.64-5.55)	283	57	6.21	(5.50-6.99)	225	45	4.07	(3.54-4.66)
Nevada	570	114	4.03	(3.70-4.39)	340	68	4.99	(4.45-5.57)	230	46	3.16	(2.76-3.61)
New Hampshire	363	73	4.70	(4.22-5.23)	217	43	6.09	(5.28-6.99)	146	29	3.51	(2.95-4.15)
New Jersey	1,855	371	3.75	(3.57-3.92)	1,040	208	4.71	(4.42-5.01)	815	163	2.96	(2.76-3.18)
New Mexico	402	80	3.55	(3.20-3.92)	220	44	4.08	(3.55-4.67)	182	36	3.06	(2.62-3.55)
New York	4,113	823	3.79	(3.67-3.91)	2,213	443	4.58	(4.38-4.78)	1,900	380	3.16	(3.02-3.31)
North Carolina	2,301	460	4.39	(4.21-4.57)	1,281	256	5.46	(5.16-5.78)	1,020	204	3.52	(3.31-3.75)
North Dakota	164	33	4.28	(3.64-5.01)	94	19	5.19	(4.18-6.38)	70	14	3.49	(2.70-4.45)
Ohio	2,953	591	4.46	(4.29-4.62)	1,651	330	5.44	(5.17-5.71)	1,302	260	3.60	(3.41-3.81)
Oklahoma	942	188	4.53	(4.24-4.83)	528	106	5.46	(5.00-5.96)	414	83	3.67	(3.32-4.05)
Oregon	1,130	226	5.11	(4.81-5.43)	664	133	6.29	(5.81-6.80)	466	93	4.06	(3.69-4.46)

Table 21. *Continued*

State	Total Deaths				Total Male Deaths				Total Female Deaths			
	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI	5-year total	Annual average	Rate	95% CI
Pennsylvania	3,291	658	4.26	(4.11-4.41)	1,799	360	5.13	(4.89-5.37)	1,492	298	3.53	(3.35-3.72)
Rhode Island	249	50	4.02	(3.53-4.57)	139	28	5.05	(4.22-5.99)	110	22	3.14	(2.57-3.82)
South Carolina	1,134	227	4.32	(4.06-4.58)	663	133	5.57	(5.14-6.03)	471	94	3.25	(2.96-3.56)
South Dakota	265	53	5.59	(4.92-6.32)	153	31	6.72	(5.68-7.90)	112	22	4.57	(3.73-5.54)
Tennessee	1,730	346	4.86	(4.63-5.10)	929	186	5.72	(5.34-6.11)	801	160	4.11	(3.83-4.41)
Texas	4,931	986	4.07	(3.96-4.19)	2,760	552	4.93	(4.74-5.12)	2,171	434	3.35	(3.21-3.50)
Utah	517	103	4.34	(3.97-4.74)	299	60	5.27	(4.67-5.91)	218	44	3.51	(3.05-4.01)
Vermont	207	41	5.38	(4.65-6.19)	122	24	6.66	(5.49-8.02)	85	17	4.22	(3.35-5.28)
Virginia	1,726	345	3.97	(3.78-4.17)	944	189	4.71	(4.41-5.03)	782	156	3.35	(3.12-3.60)
Washington	1,866	373	5.05	(4.82-5.29)	1,068	214	6.14	(5.77-6.53)	798	160	4.07	(3.79-4.37)
West Virginia	504	101	4.22	(3.85-4.62)	281	56	5.00	(4.41-5.64)	223	45	3.54	(3.07-4.06)
Wisconsin	1,575	315	4.85	(4.61-5.10)	877	175	5.82	(5.43-6.23)	698	140	4.05	(3.75-4.38)
Wyoming	147	29	4.80	(4.03-5.67)	78	16	5.23	(4.09-6.57)	69	14	4.39	(3.39-5.60)
United States	**73,450**	**14,690**	**4.32**	**(4.28-4.35)**	**41,120**	**8,224**	**5.27**	**(5.22-5.32)**	**32,330**	**6,466**	**3.51**	**(3.47-3.55)**

[a]Annual average deaths are calculated by dividing the five-year total by five.
[b]Rates are per 100,000 and are age-adjusted to the 2000 US standard population.
[c]Estimated by CBTRUS using Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated With State, Total U.S. (1990-2013) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2016. Underlying mortality data provided by NCHS (www.cdc.gov/nchs).
- Counts and rates are not presented when fewer than 20 cases were reported for the specific category. The suppressed cases are included in the counts and rates for totals.
Abbreviations: NCHS, National Center for Health Statistics; CI, confidence interval.

Table 22. One-, Two-, Five-. and Ten-Year Relative Survival Rates[a] for Malignant Brain and Other Central Nervous System Tumors by Site[b], SEER 18 Registries, 2000-2013[c]

			1-Year		2-Year		5-Year		10-Year	
ICD-O-3 CODE	SITE[b]	N[d]	%	95% CI	%	95% CI	%	95% CI	%	95% CI
C71.0	Cerebrum	3,429	51.6	(49.8-53.3)	37.6	(35.9-39.3)	28.8	(27.1-30.5)	24.5	(22.7-26.3)
C71.1	Frontal lobe of the brain	16,739	61.2	(60.5-62.0)	46.4	(45.6-47.2)	34.5	(33.7-35.4)	26.0	(25.1-26.9)
C71.2	Temporal lobe of the brain	11,906	57.2	(56.3-58.1)	36.0	(35.1-37.0)	23.1	(22.2-23.9)	17.4	(16.5-18.3)
C71.3	Parietal lobe of the brain	7,726	50.0	(48.8-51.1)	31.1	(30.0-32.2)	19.8	(18.8-20.9)	15.0	(13.9-16.1)
C71.4	Occipital lobe of the brain	1,947	52.7	(50.4-55.0)	32.1	(29.9-34.3)	21.4	(19.4-23.5)	17.5	(15.4-19.7)
C71.5	Ventricle	1,287	75.6	(73.1-78.0)	69.3	(66.5-71.8)	62.7	(59.7-65.5)	59.1	(55.8-62.3)
C71.6	Cerebellum	3,896	85.0	(83.8-86.1)	79.2	(77.8-80.5)	71.3	(69.6-72.8)	66.6	(64.8-68.4)
C71.7	Brain stem	3,194	70.3	(68.6-71.9)	57.8	(55.9-59.5)	49.6	(47.7-51.5)	44.7	(42.6-46.8)
C71.8-C71.9	Other brain	15,144	44.2	(43.4-45.1)	31.7	(30.9-32.5)	22.7	(21.9-23.4)	18.3	(17.5-19.1)
C72.0-C72.1	Spinal cord and cauda equina	2,424	89.8	(88.5-91.0)	85.2	(83.6-86.7)	81.0	(79.1-82.8)	76.9	(74.3-79.2)
C72.2-C72.5	Cranial nerves	831	96.6	(95.1-97.7)	95.1	(93.3-96.5)	93.4	(91.2-95.1)	91.4	(88.5-93.6)
C72.8-C72.9	Other nervous system	610	63.0	(58.8-66.8)	54.7	(50.4-58.8)	47.2	(42.6-51.7)	44.8	(39.8-49.8)
C70.0-C70.9	Meninges (cerebral and spinal)	1,260	81.7	(79.2-83.9)	75.4	(72.6-77.9)	65.2	(61.8-68.4)	58.5	(54.5-62.4)
C75.1-C75.2	Pituitary and craniopharyngeal duct	278	86.0	(81.0-89.7)	83.9	(78.5-88.1)	74.2	(67.5-79.8)	69.3	(61.5-75.9)
C75.3	Pineal	749	88.7	(86.2-90.9)	83.0	(79.9-85.6)	77.3	(73.8-80.4)	72.6	(68.2-76.5)
C30.0[e]	Olfactory tumors of the nasal cavity	410	90.9	(87.3-93.5)	84.6	(80.2-88.2)	78.2	(72.7-82.7)	63.7	(55.0-71.1)
All Codes	**All Sites (Malignant only)**	**71,830**	**59.3**	**(59.0-59.7)**	**45.1**	**(44.7-45.5)**	**34.9**	**(34.6-35.3)**	**29.4**	**(28.9-29.8)**

[a]The cohort analysis of survival rates was utilized for calculating the survival estimates presented in this table. Long-term cohort-based survival estimates reflect the survival experience of individuals diagnosed over the time period, and they may not necessarily reflect the long-term survival outlook of newly diagnosed cases.
[b]The sites referred to in this table are loosely based on the categories and site codes defined in the SEER Site/Histology Validation List.
[c]Estimated by CBTRUS using Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 18 Regs Research Data + Hurricane Katrina Impacted Louisiana Cases, Nov 2015 Sub (2000-2013) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total U.S., 1969-2014 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2016, based on the November 2015 submission.
[d]Total number of case that occurred within the SEER registries between 2000 and 2013.
[e]ICD-O-3 histology codes 9522-9523 only.
Abbreviation: SEER, Survival, Epidemiology and End Results; CI, confidence interval.

Table 23. One-, Two-, Three-, Four-, Five-. and Ten-Year Relative Survival Rates[a,b] for Selected Malignant Brain and Other Central Nervous System Tumors by Histology, SEER 18 Registries, 2000-2013[c]

		1-Year		2-Year		3-Year		4-Year		5-Year		10-Year	
Histology	N[d]	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Pilocytic astrocytoma	3,629	98.0	(97.4-98.4)	96.6	(95.9-97.2)	95.5	(94.6-96.2)	94.6	(93.7-95.4)	94.2	(93.2-95.0)	92.0	(90.6-93.1)
Diffuse astrocytoma	5,781	74.4	(73.2-75.6)	63.6	(62.3-64.9)	57.3	(55.9-58.7)	53.0	(51.6-54.4)	49.7	(48.3-51.2)	39.3	(37.6-40.9)
Anaplastic astrocytoma	3,791	64.4	(62.8-66.0)	45.9	(44.2-47.6)	37.4	(35.7-39.1)	32.8	(31.1-34.5)	29.7	(28.1-31.5)	20.9	(19.1-22.8)
Glioblastoma	31,367	39.3	(38.7-39.8)	16.9	(16.4-17.3)	9.9	(9.5-10.2)	7.0	(6.7-7.3)	5.5	(5.2-5.8)	2.9	(2.6-3.2)
Oligodendroglioma	3,081	94.3	(93.4-95.1)	90.1	(88.8-91.2)	86.8	(85.4-88.1)	83.8	(82.3-85.2)	80.9	(79.2-82.5)	65.0	(62.5-67.4)
Anaplastic oligodendroglioma	1,300	83.7	(81.4-85.6)	71.5	(68.8-74.0)	65.1	(62.2-67.8)	60.7	(57.7-63.5)	56.7	(53.5-59.6)	42.5	(38.9-46.2)
Ependymal tumors	2,733	94.3	(93.3-95.2)	90.3	(89.0-91.4)	87.6	(86.2-89.0)	85.6	(84.0-87.1)	84.2	(82.5-85.8)	80.0	(77.7-82.2)
Oligoastrocytic tumors	2,035	88.8	(87.3-90.2)	79.0	(77.0-80.9)	73.1	(70.9-75.1)	67.8	(65.5-70.0)	63.6	(61.2-66.0)	48.4	(45.2-51.6)
Glioma malignant, NOS	4,462	65.1	(63.6-66.5)	55.0	(53.4-56.5)	51.6	(50.0-53.2)	49.9	(48.3-51.5)	48.5	(46.9-50.1)	43.5	(41.7-45.4)
Neuronal and mixed neuronal-glial tumors	526	91.4	(88.4-93.6)	84.8	(81.0-87.9)	80.1	(75.8-83.7)	77.3	(72.8-81.3)	76.7	(72.0-80.8)	63.0	(55.8-69.4)
Embryonal tumors	2,735	81.4	(79.9-82.9)	71.5	(69.7-73.2)	66.6	(64.7-68.5)	64.0	(62.1-65.9)	61.4	(59.4-63.4)	54.3	(52.0-56.5)
Medulloblastoma[e]	*1,645*	*89.1*	*(87.5-90.6)*	*82.9*	*(80.8-84.7)*	*78.2*	*(76.0-80.3)*	*75.6*	*(73.3-77.8)*	*73.0*	*(70.6-75.3)*	*64.7*	*(61.7-67.5)*
Primitive neuroectodermal tumor[f]	*579*	*74.6*	*(70.8-78.0)*	*57.6*	*(53.3-61.7)*	*51.6*	*(47.3-55.8)*	*48.3*	*(43.9-52.5)*	*46.3*	*(41.9-50.5)*	*39.7*	*(35.1-44.2)*
Atypical teratoid/rhabdoid tumor[g]	*239*	*50.1*	*(43.5-56.4)*	*35.5*	*(29.2-41.8)*	*31.6*	*(25.4-37.9)*	*30.9*	*(24.7-37.3)*	*29.3*	*(23.2-35.8)*	*25.8*	*(19.3-32.8)*
Other embryonal histologies[h]	*272*	*77.2*	*(71.6-81.8)*	*65.4*	*(59.1-71.0)*	*60.8*	*(54.3-66.6)*	*58.2*	*(51.6-64.3)*	*53.5*	*(46.7-59.9)*	*49.9*	*(42.5-56.8)*
Meningioma	1,110	81.7	(79.0-84.0)	75.2	(72.2-77.9)	70.6	(67.3-73.6)	67.6	(64.2-70.8)	64.9	(61.2-68.3)	57.1	(52.7-61.2)
Lymphoma	4,449	52.2	(50.7-53.8)	43.8	(42.2-45.4)	38.6	(37.0-40.1)	35.1	(33.5-36.6)	33.0	(31.4-34.6)	25.6	(23.8-27.5)
TOTAL: All Malignant Brain and Other Nervous System[i]	**66,442**	**59.2**	**(58.8-59.6)**	**45.0**	**(44.6-45.3)**	**39.6**	**(39.2-39.9)**	**36.7**	**(36.3-37.1)**	**34.9**	**(34.5-35.2)**	**29.3**	**(28.9-29.7)**

[a]The cohort analysis of survival rates was utilized for calculating the survival estimates presented in this table. Long-term cohort-based survival estimates reflect the survival experience of individuals diagnosed over the time period, and they may not necessarily reflect the long-term survival outlook of newly diagnosed cases.
[b]Rates are an estimate of the percentage of patients alive at one, two, five, and ten year, respectively. Rates were not presented for categories with 50 or less cases and were suppressed for rates where less than 16 cases were surviving within a category.
[c]Estimated by CBTRUS using Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 18 Regs Research Data + Hurricane Katrina Impacted Louisiana Cases, Nov 2015 Sub (2000-2013) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total U.S., 1969-2014 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2016, based on the November 2015 submission.
[d]Total number of case that occurred within the SEER registries between 2000 and 2013.
[e]ICD-O-3 histology codes: 9470/3, 9471/3, 9472/3, 9474/3.
[f]ICD-O-3 histology code: 9473/3.
[g]ICD-O-3 histology code: 9508/3.
[h]ICD-O-3 histology codes: 8963/3, 9364/3, 9480/3, 9490/0, 9490/3, 9500/3, 9501/3, 9502/3.
[i]Includes histologies not listed in this table.
Abbreviation: SEER, Survival, Epidemiology and End Results; CI, confidence interval; NOS, not otherwise specified.

Table 24. One-, Two-, Five-. and Ten-Year Relative Survival Rates[a,b] for Selected Malignant Brain and Other Central Nervous System Tumors by Age Groups, SEER 18 Registries, 2000-2013[c]

Histology	Age Group (years)	N[d]	1-Year		2-Year		5-Year		10-Year	
			%	95% CI	%	95% CI	%	95% CI	%	95% CI
Pilocytic astrocytoma	0-19	2,627	98.8	(98.2-99.1)	98.4	(97.8-98.8)	96.7	(95.8-97.4)	95.8	(94.6-96.7)
	20-44	723	96.6	(95.0-97.8)	94.9	(92.9-96.3)	91.8	(89.2-93.8)	85.6	(81.6-88.8)
	45-54	136	95.8	(90.2-98.2)	86.1	(78.3-91.2)	78.5	(69.1-85.3)	75.1	(64.7-82.8)
	55-64	84	97.1	(88.0-99.3)	90.8	(80.4-95.9)	82.3	(70.0-89.9)	74.6	(57.6-85.5)
	65-74	--	--	--	--	--	--	--	--	--
	75+	--	--	--	--	--	--	--	--	--
Diffuse astrocytoma	0-19	856	93.2	(91.3-94.7)	87.6	(85.1-89.7)	83.9	(81.0-86.3)	82.1	(78.9-84.8)
	20-44	2,067	93.1	(91.9-94.2)	86.7	(85.1-88.2)	67.8	(65.5-70.0)	49.5	(46.6-52.4)
	45-54	938	76.9	(73.9-79.5)	62.1	(58.8-65.3)	44.1	(40.5-47.6)	32.0	(27.9-36.1)
	55-64	812	57.1	(53.6-60.6)	37.4	(33.8-40.9)	22.3	(19.1-25.8)	14.6	(11.1-18.7)
	65-74	600	42.0	(37.9-46.1)	26.4	(22.7-30.2)	15.0	(11.7-18.6)	10.5	(7.1-14.5)
	75+	508	24.9	(21.0-28.9)	12.5	(9.5-16.0)	6.7	(4.1-10.1)	--	--
Anaplastic astrocytoma	0-19	292	67.5	(61.7-72.7)	41.4	(35.4-47.4)	28.3	(22.6-34.3)	19.3	(13.6-25.9)
	20-44	1,250	88.9	(87.0-90.6)	74.7	(72.0-77.2)	54.4	(51.1-57.6)	39.6	(35.8-43.3)
	45-54	675	73.4	(69.8-76.7)	50.7	(46.6-54.7)	31.5	(27.4-35.6)	22.6	(18.1-27.3)
	55-64	678	53.7	(49.8-57.5)	30.0	(26.3-33.8)	13.5	(10.6-16.9)	6.6	(3.8-10.4)
	65-74	518	38.2	(33.8-42.5)	18.7	(15.2-22.5)	8.2	(5.6-11.5)	4.8	(2.6-8.0)
	75+	378	18.9	(15.0-23.3)	8.9	(6.0-12.5)	--	--	--	--
Glioblastoma	0-19	444	59.0	(54.1-63.5)	33.3	(28.6-38.0)	16.8	(13.0-21.1)	12.5	(8.7-17.1)
	20-44	2,852	69.7	(67.9-71.4)	40.4	(38.5-42.3)	19.1	(17.4-20.7)	10.9	(9.4-12.5)
	45-54	5,524	56.8	(55.4-58.1)	25.2	(24.0-26.4)	7.6	(6.7-8.4)	3.8	(3.1-4.7)
	55-64	8,531	45.6	(44.5-46.7)	17.6	(16.7-18.5)	4.6	(4.1-5.2)	2.0	(1.5-2.6)
	65-74	7,632	28.7	(27.7-29.8)	10.3	(9.6-11.1)	2.4	(2.0-2.9)	1.0	(0.6-1.6)
	75+	6,384	12.1	(11.3-13.0)	3.8	(3.3-4.3)	1.1	(0.8-1.5)	--	--
Oligodendroglioma	0-19	216	96.2	(92.6-98.1)	94.3	(90.0-96.7)	91.1	(86.0-94.4)	89.0	(83.2-92.8)
	20-44	1,539	98.6	(97.8-99.1)	96.2	(95.0-97.1)	87.5	(85.5-89.3)	70.2	(66.8-73.3)
	45-54	703	94.6	(92.5-96.1)	90.0	(87.3-92.2)	80.5	(76.8-83.7)	64.3	(58.9-69.3)
	55-64	377	88.7	(84.8-91.6)	78.3	(73.3-82.4)	68.1	(62.1-73.4)	50.3	(41.9-58.1)
	65-74	160	79.6	(72.0-85.3)	72.5	(64.0-79.3)	52.3	(42.4-61.3)	33.5	(21.6-45.8)
	75+	86	61.2	(49.0-71.3)	52.2	(39.4-63.5)	41.9	(27.3-55.7)	--	--
Anaplastic oligodendroglioma	0-19	--	--	--	--	--	--	--	--	--
	20-44	510	94.1	(91.6-95.9)	85.3	(81.8-88.3)	71.2	(66.6-75.4)	54.2	(48.3-59.8)
	45-54	324	88.4	(84.2-91.6)	77.0	(71.7-81.5)	61.2	(54.8-67.0)	44.5	(36.9-51.8)
	55-64	268	78.0	(72.3-82.6)	62.5	(56.0-68.3)	46.1	(39.1-52.8)	34.1	(25.9-42.5)
	65-74	121	54.3	(44.6-62.9)	34.6	(25.6-43.8)	18.3	(10.7-27.5)	--	--
	75+	--	--	--	--	--	--	--	--	--

Table 24. *Continued*

Histology	Age Group (years)	N[d]	1-Year		2-Year		5-Year		10-Year	
			%	95% CI	%	95% CI	%	95% CI	%	95% CI
Ependymal tumors	0-19	772	94.7	(92.8-96.1)	87.7	(85.0-89.9)	75.6	(71.9-78.8)	67.0	(62.4-71.1)
	20-44	846	97.3	(95.9-98.2)	95.3	(93.5-96.6)	91.6	(89.1-93.5)	89.4	(86.1-91.9)
	45-54	507	95.2	(92.8-96.9)	93.0	(90.1-95.0)	89.2	(85.5-92.1)	88.0	(83.7-91.3)
	55-64	356	92.6	(89.0-95.0)	88.9	(84.7-92.1)	86.2	(80.9-90.1)	85.1	(76.9-90.6)
	65-74	166	89.4	(82.8-93.5)	82.7	(74.9-88.3)	80.5	(71.9-86.8)	73.5	(55.5-85.1)
	75+	86	70.8	(58.5-80.0)	66.6	(53.1-77.0)	53.7	(36.9-67.9)	33.7	(11.5-57.9)
Oligoastrocytic tumors	0-19	116	94.8	(88.6-97.7)	89.3	(81.8-93.8)	83.7	(74.8-89.7)	77.4	(66.6-85.1)
	20-44	1,090	96.8	(95.5-97.8)	90.6	(88.6-92.3)	72.8	(69.5-75.7)	54.6	(50.1-58.8)
	45-54	411	89.4	(85.8-92.1)	78.8	(74.2-82.7)	66.2	(60.6-71.2)	47.1	(39.0-54.7)
	55-64	229	74.1	(67.7-79.4)	51.1	(44.0-57.7)	35.4	(28.0-42.9)	30.5	(21.8-39.7)
	65-74	131	67.2	(57.8-74.9)	48.0	(38.2-57.1)	29.2	(19.9-39.1)	15.9	(7.0-28.1)
	75+	--	--	--	--	--	--	--	--	--
Glioma malignant, NOS	0-19	1,690	77.5	(75.4-79.4)	66.7	(64.2-68.9)	63.2	(60.7-65.6)	61.6	(58.9-64.1)
	20-44	883	88.2	(85.8-90.2)	79.5	(76.5-82.2)	68.3	(64.7-71.7)	54.2	(49.3-58.9)
	45-54	452	74.5	(70.1-78.4)	60.4	(55.4-65.0)	49.8	(44.5-54.9)	40.9	(34.9-46.9)
	55-64	372	55.4	(50.1-60.5)	42.5	(37.1-47.8)	32.6	(27.1-38.2)	26.9	(20.5-33.6)
	65-74	365	38.0	(32.9-43.1)	24.2	(19.7-29.1)	16.5	(12.2-21.3)	13.2	(8.7-18.6)
	75+	700	16.9	(14.0-19.9)	12.9	(10.2-15.8)	9.4	(6.7-12.6)	8.5	(4.7-13.7)
Neuronal and mixed neuronal-glial tumors	0-19	66	93.6	(83.8-97.6)	88.6	(77.4-94.4)	84.9	(72.8-91.9)	84.9	(72.8-91.9)
	20-44	145	96.4	(91.3-98.6)	90.7	(84.0-94.7)	78.8	(69.7-85.4)	64.7	(51.6-75.1)
	45-54	125	93.7	(87.2-96.9)	89.4	(81.7-94.0)	82.9	(73.6-89.1)	72.2	(56.4-83.1)
	55-64	97	90.7	(82.0-95.4)	79.6	(68.5-87.1)	67.1	(54.3-77.1)	51.5	(33.9-66.6)
	65-74	57	83.6	(70.0-91.4)	80.9	(65.8-89.9)	77.1	(60.1-87.6)	38.8	(9.8-68.0)
	75+	--	--	--	--	--	--	--	--	--
Embryonal tumors	0-19	2,018	80.9	(79.1-82.6)	70.9	(68.8-72.9)	61.8	(59.5-64.1)	55.4	(52.8-58.0)
	20-44	552	86.4	(83.1-89.1)	79.2	(75.4-82.6)	66.5	(61.9-70.7)	58.4	(53.1-63.3)
	45-54	84	82.7	(72.3-89.5)	68.6	(56.6-78.0)	56.7	(43.4-68.0)	36.6	(20.0-53.4)
	55-64	--	--	--	--	--	--	--	--	--
	65-74	--	--	--	--	--	--	--	--	--
	75+	--	--	--	--	--	--	--	--	--
Meningioma	0-19	--	--	--	--	--	--	--	--	--
	20-44	139	95.0	(89.5-97.6)	94.4	(88.7-97.3)	87.0	(79.3-92.0)	77.7	(67.9-84.9)
	45-54	181	92.4	(87.2-95.6)	86.1	(79.7-90.6)	77.4	(69.5-83.4)	69.4	(60.0-77.0)
	55-64	255	88.3	(83.3-91.8)	81.7	(75.9-86.2)	70.5	(63.4-76.5)	60.2	(51.6-67.8)
	65-74	238	80.7	(74.6-85.5)	70.2	(63.1-76.1)	53.7	(45.4-61.4)	47.9	(37.2-57.9)
	75+	282	61.6	(55.0-67.6)	54.8	(47.6-61.5)	47.3	(38.4-55.7)	37.1	(24.9-49.3)
Lymphoma	0-19	66	84.5	(73.1-91.4)	78.0	(65.6-86.4)	72.6	(59.5-82.1)	67.4	(53.0-78.3)
	20-44	755	55.7	(52.0-59.2)	49.5	(45.8-53.1)	43.1	(39.3-46.8)	37.8	(33.6-42.0)
	45-54	694	61.3	(57.5-64.9)	52.6	(48.6-56.3)	41.2	(37.1-45.2)	31.0	(26.5-35.7)

Table 24. *Continued*

Histology	Age Group (years)	N[d]	1-Year %	1-Year 95% CI	2-Year %	2-Year 95% CI	5-Year %	5-Year 95% CI	10-Year %	10-Year 95% CI
	55-64	951	61.3	(58.1-64.4)	52.5	(49.1-55.8)	38.1	(34.5-41.7)	29.7	(25.6-33.9)
	65-74	1,063	49.8	(46.7-52.9)	40.9	(37.7-44.1)	26.9	(23.7-30.2)	16.9	(13.2-21.1)
	75+	920	32.8	(29.6-36.0)	23.2	(20.3-26.3)	15.3	(12.3-18.6)	10.8	(6.7-16.1)
TOTAL: All Malignant Brain and Other Nervous System Tumors[e]	**0-19**	**10,406**	**87.1**	**(86.4-87.7)**	**79.9**	**(79.1-80.7)**	**73.8**	**(72.9-74.7)**	**70.2**	**(69.1-71.2)**
	20-44	**14,250**	**86.3**	**(85.7-86.9)**	**75.6**	**(74.8-76.3)**	**61.5**	**(60.6-62.4)**	**49.5**	**(48.4-50.6)**
	45-54	**11,178**	**68.9**	**(68.0-69.8)**	**48.0**	**(47.0-49.0)**	**33.5**	**(32.5-34.5)**	**26.3**	**(25.2-27.4)**
	55-64	**13,481**	**53.5**	**(52.6-54.4)**	**31.0**	**(30.2-31.8)**	**18.5**	**(17.7-19.2)**	**14.1**	**(13.2-14.9)**
	65-74	**11,598**	**36.2**	**(35.3-37.1)**	**20.2**	**(19.4-21.0)**	**11.2**	**(10.5-11.9)**	**8.0**	**(7.2-8.8)**
	75+	**10,917**	**17.7**	**(17.0-18.5)**	**10.2**	**(9.6-10.8)**	**6.3**	**(5.7-7.0)**	**4.2**	**(3.5-5.1)**

[a]The cohort analysis of survival rates was utilized for calculating the survival estimates presented in this table. Long-term cohort-based survival estimates reflect the survival experience of individuals diagnosed over the time period, and they may not necessarily reflect the long-term survival outlook of newly diagnosed cases.
[b]Rates are an estimate of the percentage of patients alive at one, two, five, and ten year, respectively. Rates were not presented for categories with 50 or less cases and were suppressed for rates where less than 16 cases were surviving within a category.
[c]Estimated by CBTRUS using Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 18 Regs Research Data + Hurricane Katrina Impacted Louisiana Cases, Nov 2015 Sub (2000-2013) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total U.S., 1969-2014 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2016, based on the November 2015 submission.
[d]Total number of case that occurred within the SEER registries between 2000 and 2013.
[e]Includes histologies not listed in this table.

Table 25. Average Annual Age-Adjusted Incidence Rates[a,b] of Brain and Other Central Nervous System Tumors by Major Histology Groupings, Histology, and NCI Age Groups, CBTRUS Statistical Report: NPCR and SEER, 2009-2013

	Age at Diagnosis					
	Childrenc (0-14 Years)		AYAd (15-39 Years)		Adults (40+ Years)	
Histology	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)
Tumors of Neuroepithelial Tissue	**4.04**	**(3.96-4.11)**	**3.45**	**(3.40-3.50)**	**10.49**	**(10.41-10.56)**
Pilocytic astrocytoma	0.98	(0.95-1.02)	0.28	(0.27-0.30)	0.08	(0.08-0.09)
Diffuse astrocytoma	0.26	(0.24-0.28)	0.45	(0.43-0.47)	0.68	(0.66-0.70)
Anaplastic astrocytoma	0.09	(0.08-0.10)	0.29	(0.27-0.30)	0.62	(0.60-0.64)
Unique astrocytoma variants	0.11	(0.10-0.13)	0.07	(0.07-0.08)	0.05	(0.04-0.05)
Glioblastoma	0.15	(0.14-0.17)	0.48	(0.46-0.50)	6.95	(6.89-7.01)
Oligodendroglioma	0.04	(0.03-0.04)	0.29	(0.27-0.30)	0.32	(0.31-0.34)
Anaplastic oligodendroglioma	--	--	0.09	(0.08-0.09)	0.17	(0.16-0.18)
Oligoastrocytic tumors	0.02	(0.02-0.03)	0.27	(0.25-0.28)	0.24	(0.23-0.25)
Ependymal tumors	0.31	(0.29-0.33)	0.37	(0.35-0.38)	0.54	(0.53-0.56)
Glioma malignant, NOS	0.78	(0.75-0.81)	0.27	(0.26-0.28)	0.47	(0.46-0.49)
Choroid plexus tumors	0.11	(0.10-0.12)	0.04	(0.03-0.04)	0.03	(0.03-0.04)
Other neuroepithelial tumors	0.01	(0.01-0.01)	0.01	(0.00-0.01)	0.01	(0.00-0.01)
Neuronal and mixed neuronal-glial tumors	0.36	(0.34-0.38)	0.33	(0.32-0.35)	0.21	(0.20-0.22)
Tumors of the pineal region	0.05	(0.04-0.05)	0.05	(0.04-0.06)	0.04	(0.04-0.05)
Embryonal tumors	0.75	(0.72-0.78)	0.17	(0.16-0.18)	0.06	(0.05-0.07)
Tumors of Cranial and Spinal Nerves	**0.27**	**(0.25-0.28)**	**0.94**	**(0.91-0.97)**	**3.33**	**(3.29-3.38)**
Nerve sheath tumors	0.27	(0.25-0.28)	0.94	(0.91-0.97)	3.33	(3.29-3.37)
Other tumors of cranial and spinal nerves	--	--	--	--	0.00	(0.00-0.00)
Tumors of Meninges	**0.16**	**(0.15-0.18)**	**2.03**	**(1.99-2.08)**	**17.53**	**(17.44-17.63)**
Meningioma	0.09	(0.08-0.10)	1.79	(1.75-1.83)	17.14	(17.04-17.24)
Mesenchymal tumors	0.05	(0.05-0.06)	0.06	(0.06-0.07)	0.11	(0.10-0.12)
Primary melanocytic lesions	--	--	0.00	(0.00-0.01)	0.01	(0.01-0.02)
Other neoplasms related to the meninges	0.02	(0.01-0.02)	0.18	(0.17-0.19)	0.27	(0.26-0.28)
Lymphomas and Hematopoietic Neoplasms	**0.03**	**(0.02-0.03)**	**0.11**	**(0.10-0.12)**	**0.93**	**(0.90-0.95)**
Lymphoma	0.01	(0.01-0.01)	0.10	(0.09-0.11)	0.91	(0.88-0.93)
Other hematopoietic neoplasms	0.02	(0.01-0.02)	0.01	(0.01-0.01)	0.02	(0.02-0.02)
Germ Cell Tumors and Cysts	**0.21**	**(0.19-0.23)**	**0.12**	**(0.11-0.13)**	**0.03**	**(0.03-0.03)**
Germ cell tumors, cysts and heterotopias	0.21	(0.19-0.23)	0.12	(0.11-0.13)	0.03	(0.03-0.03)
Tumors of Sellar Region	**0.47**	**(0.44-0.49)**	**3.42**	**(3.36-3.47)**	**5.89**	**(5.84-5.95)**
Tumors of the pituitary	0.24	(0.23-0.26)	3.29	(3.24-3.34)	5.68	(5.62-5.73)
Craniopharyngioma	0.22	(0.21-0.24)	0.13	(0.12-0.14)	0.22	(0.21-0.23)
Unclassified Tumors	**0.30**	**(0.28-0.32)**	**0.64**	**(0.62-0.66)**	**2.20**	**(2.17-2.24)**
Hemangioma	0.10	(0.09-0.11)	0.32	(0.30-0.33)	0.54	(0.52-0.56)
Neoplasm, unspecified	0.19	(0.18-0.21)	0.32	(0.31-0.34)	1.65	(1.62-1.68)
All other	0.01	(0.00-0.01)	--	--	0.01	(0.01-0.01)
TOTAL[d]	**5.47**	**(5.39-5.55)**	**10.71**	**(10.62-10.80)**	**40.41**	**(40.26-40.55)**

[a]Rates are per 100,000 and age-adjusted to the 2000 US. standard population.
[b]Children as defined by the National Cancer Institute, see: http://www.cancer.gov/researchandfunding/snapshots/pediatric.
[c]Adolescents and Young Adults (AYA), as defined by the National Cancer Institute, see: http://www.cancer.gov/researchandfunding/snapshots/adolescent-young-adult.
[d]Refers to all brain and other CNS tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported in the five year period for the specific histology category. The suppressed cases are included in the counts and rates for totals.
Abbreviations: AYA, Adolescents and Young Adults, CBTRUS, Central Brain Tumor Registry of the United States; NPCR, National Program of Cancer Registries; SEER, Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 26. One-, Two-, Five-. and Ten-Year Relative Survival Rates[a,b] for Selected Malignant Brain and Other Central Nervous System Tumors by NCI Age Groups, SEER 18 Registries, 2000-2013[c]

			1-Year		2-Year		5-Year		10-Year	
Histology	Age Group (years)	N[d]	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Pilocytic astrocytoma	Children[e] (0-14)	2,173	98.8	(98.3-99.2)	98.5	(97.8-98.9)	97.0	(96.1-97.7)	95.8	(94.5-96.8)
	AYA[f] (15-39)	1,083	97.4	(96.2-98.2)	96.2	(94.8-97.2)	93.7	(91.8-95.1)	90.1	(87.4-92.3)
	Adults (40+)	373	94.7	(91.5-96.7)	86.7	(82.3-90.1)	79.0	(73.4-83.6)	74.5	(67.0-80.5)
Diffuse astrocytoma	Children[d] (0-14)	658	92.1	(89.7-94.0)	87.1	(84.2-89.5)	83.4	(80.2-86.2)	81.7	(78.1-84.7)
	AYA[e] (15-39)	1,822	94.1	(92.9-95.2)	87.5	(85.8-89.0)	70.6	(68.2-72.9)	53.3	(50.1-56.4)
	Adults (40+)	3,301	59.8	(58.0-61.5)	45.4	(43.6-47.2)	30.8	(29.1-32.6)	21.8	(19.9-23.8)
Anaplastic astrocytoma	Children[d] (0-14)	214	61.1	(54.0-67.5)	35.4	(28.6-42.3)	23.8	(17.7-30.5)	16.8	(11.0-23.7)
	AYA[e] (15-39)	1,035	89.9	(87.8-91.6)	75.8	(72.8-78.4)	54.7	(51.1-58.2)	39.9	(35.7-44.1)
	Adults (40+)	2,542	54.4	(52.3-56.3)	34.6	(32.6-36.6)	19.9	(18.1-21.8)	13.4	(11.5-15.4)
Glioblastoma	Children[d] (0-14)	300	52.2	(46.2-57.8)	28.3	(23.0-33.9)	19.6	(14.8-25.0)	16.0	(11-21.7)
	AYA[e] (15-39)	1,744	74.2	(72.0-76.2)	47.4	(44.9-49.8)	22.9	(20.7-25.2)	13.6	(11.5-16)
	Adults (40+)	29,323	37.0	(36.5-37.6)	14.9	(14.4-15.3)	4.30	(4.0-4.6)	2.0	(1.7-2.3)
Oligodendroglioma	Children[d] (0-14)	115	94.7	(88.5-97.6)	93.7	(87.3-97.0)	89.8	(82.2-94.2)	89.8	(82.2-94.2)
	AYA[e] (15-39)	1,239	98.9	(98.1-99.4)	96.8	(95.6-97.7)	88.9	(86.7-90.8)	72.3	(68.6-75.7)
	Adults (40+)	1,727	91.0	(89.4-92.3)	85.0	(83.0-86.7)	74.5	(72.0-76.8)	57.6	(54.1-61.0)
Anaplastic oligodendroglioma	Children[d] (0-14)	--	--	--	--	--	--	--	--	--
	AYA[e] (15-39)	357	93.1	(89.8-95.4)	85.3	(81.0-88.7)	71.9	(66.3-76.8)	53.8	(46.6-60.5)
	Adults (40+)	931	79.9	(77.1-82.5)	66.3	(62.9-69.4)	51.0	(47.3-54.6)	38.3	(34.0-42.5)
Ependymal tumors	Children[d] (0-14)	646	94.5	(92.4-96.1)	86.9	(83.8-89.4)	73.6	(69.5-77.2)	64.8	(59.8-69.3)
	AYA[e] (15-39)	757	96.8	(95.2-97.9)	94.4	(92.3-95.9)	90.1	(87.4-92.3)	87.1	(83.4-89.9)
	Adults (40+)	1,330	92.7	(91.0-94.1)	89.6	(87.5-91.3)	86.1	(83.6-88.4)	83.8	(80.1-86.9)
Oligoastrocytic tumors	Children[d] (0-14)	69	97.1	(88.4-99.3)	90.7	(80.3-95.8)	83.0	(70.2-90.6)	80.4	(66.8-88.9)
	AYA[e] (15-39)	887	97.4	(96.0-98.3)	91.2	(89.0-93.0)	75.0	(71.5-78.2)	55.6	(50.7-60.3)
	Adults (40+)	1,079	81.2	(78.6-83.5)	68.2	(65.1-71.1)	52.9	(49.4-56.3)	40.3	(35.8-44.7)
Glioma malignant, NOS	Children[d] (0-14)	1,516	76.1	(73.8-78.2)	64.7	(62.1-67.1)	61.7	(59.1-64.3)	60.1	(57.3-62.7)
	AYA[e] (15-39)	843	89.4	(87.0-91.3)	82.3	(79.3-84.8)	71.3	(67.7-74.7)	60.0	(55.1-64.5)
	Adults (40+)	2,103	47.2	(44.9-49.4)	36.8	(34.6-39.1)	29.4	(27.2-31.7)	24.1	(21.5-26.7)
Neuronal and mixed neuronal-glial tumors	Children[d] (0-14)	--	--	--	--	--	--	--	--	--
	AYA[e] (15-39)	133	96.1	(90.8-98.4)	90.2	(83.1-94.4)	79.5	(70.5-86.1)	75.2	(63.3-83.7)
	Adults (40+)	352	89.4	(85.3-92.4)	81.7	(76.5-85.8)	74.0	(67.6-79.2)	53.6	(43.6-62.6)
Embryonal tumors	Children[d] (0-14)	1,819	79.9	(78.0-81.7)	70.1	(67.9-72.3)	61.7	(59.3-64.1)	55.4	(52.6-58.1)
	AYA[e] (15-39)	695	87.7	(85.0-90.0)	79.5	(76.1-82.4)	65.1	(60.9-68.9)	57.1	(52.3-61.5)
	Adults (40+)	221	73.9	(67.3-79.4)	57.9	(50.6-64.5)	46.9	(39.1-54.2)	34.1	(25.7-42.7)

Table 26. *Continued*

Histology	Age Group (years)	N[d]	1-Year %	1-Year 95% CI	2-Year %	2-Year 95% CI	5-Year %	5-Year 95% CI	10-Year %	10-Year 95% CI
Meningioma	Children[d] (0-14)	--	--	--	--	--	--	--	--	--
	AYA[e] (15-39)	90	97.8	(90.9-99.5)	97.8	(90.9-99.5)	88.6	(78.3-94.1)	81.7	(69.2-89.5)
	Adults (40+)	1,010	80.3	(77.4-82.8)	73.1	(69.8-76.0)	62.6	(58.7-66.2)	54.6	(49.9-59.1)
Lymphoma	Children[d] (0-14)	--	--	--	--	--	--	--	--	--
	AYA[e] (15-39)	522	57.2	(52.8-61.4)	52.0	(47.5-56.4)	46.0	(41.4-50.5)	42.0	(37.2-46.8)
	Adults (40+)	3,889	51.2	(49.6-52.8)	42.3	(40.6-43.9)	30.6	(28.9-32.3)	22.6	(20.6-24.6)
TOTAL: All Malignant Brain and Other Nervous System Tumors[g]	**Children[d] (0-14)**	**8,443**	**85.9**	**(85.1-86.6)**	**78.6**	**(77.7-79.5)**	**73.0**	**(72.0-74.0)**	**69.4**	**(68.3-70.6)**
	AYA[e] (15-39)	**12,292**	**89.4**	**(88.8-89.9)**	**80.7**	**(79.9-81.4)**	**67.6**	**(66.7-68.5)**	**56.3**	**(55.1-57.5)**
	Adults (40+)	**51,095**	**47.6**	**(47.2-48.1)**	**30.7**	**(30.3-31.1)**	**20.3**	**(19.9-20.7)**	**15.6**	**(15.2-16.1)**

[a]The cohort analysis of survival rates was utilized for calculating the survival estimates presented in this table. Long-term cohort-based survival estimates reflect the survival experience of individuals diagnosed over the time period, and they may not necessarily reflect the long-term survival outlook of newly diagnosed cases.
[b]Rates are an estimate of the percentage of patients alive at one, two, five, and ten year, respectively. Rates were not presented for categories with 50 or less cases and were suppressed for rates where less than 16 cases were surviving within a category.
[c]Estimated by CBTRUS using Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 18 Regs Research Data + Hurricane Katrina Impacted Louisiana Cases, Nov 2015 Sub (2000-2013) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total U.S., 1969-2014 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2016, based on the November 2015 submission.
[d]Total number of case that occurred within the SEER registries between 2000 and 2013.
[e]Children as defined by the National Cancer Institute, see: http://www.cancer.gov/researchandfunding/snapshots/pediatric.
[f]Adolescents and Young Adults (AYA), as defined by the National Cancer Institute, see: http://www.cancer.gov/researchandfunding/snapshots/adolescent-young-adult.
[g]Includes histologies not listed in this table.
Abbreviation: SEER, Survival, Epidemiology and End Results; CI, confidence interval; NOS, not otherwise specified.

Table 27. One-, Two-, Three-, Four-, and Five-Year Relative Survival Rates[a,b] for Selected Non-Malignant Brain and Other Central Nervous System Tumors by Histology, SEER 18 Registries, 2004-2013[c]

		1-Year		2-Year		3-Year		4-Year		5-Year	
Histology	N[d]	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Unique astrocytoma variants	217	97.2	(93.6-98.8)	95.6	(91.5-97.8)	94.5	(89.9-97.0)	94.5	(89.9-97.0)	94.5	(89.9-97.0)
Ependymal tumors	1,333	97.9	(96.8-98.7)	97.6	(96.2-98.5)	97.5	(95.9-98.5)	97.5	(95.9-98.5)	97.5	(95.9-98.5)
Choroid plexus tumors	389	93.7	(90.5-95.8)	92.8	(89.4-95.2)	91.8	(88.0-94.4)	90.0	(85.8-93.1)	89.3	(84.8-92.6)
Neuronal and mixed neuronal-glial tumors	1,906	97.3	(96.3-97.9)	96.4	(95.3-97.3)	95.2	(93.9-96.2)	94.1	(92.6-95.3)	93.5	(91.9-94.8)
Nerve sheath tumors	15,399	99.4	(99.2-99.6)	99.3	(98.9-99.6)	99.3	(98.9-99.6)	99.3	(98.9-99.6)	99.3	(98.9-99.6)
Meningioma	65,753	92.2	(92.0-92.5)	90.3	(90.0-90.6)	88.9	(88.6-89.3)	87.7	(87.3-88.1)	86.4	(86.0-86.9)
Mesenchymal tumors	590	96.9	(94.8-98.2)	96.1	(93.5-97.7)	94.5	(91.3-96.5)	93.4	(89.7-95.8)	91.9	(87.6-94.8)
Other neoplasms related to the meninges	1,507	95.2	(93.8-96.3)	94.4	(92.8-95.7)	93.5	(91.7-94.9)	92.6	(90.6-94.2)	91.6	(89.3-93.5)
Germ cell tumors, cysts and heterotopias	222	94.6	(90.3-97.1)	94.0	(89.1-96.7)	94.0	(89.1-96.7)	94.0	(89.1-96.7)	94.0	(89.1-96.7)
Tumors of the pituitary	30,700	97.9	(97.7-98.1)	97.4	(97.1-97.6)	97.1	(96.7-97.4)	96.6	(96.2-96.9)	96.4	(95.9-96.8)
Craniopharyngioma	1,560	92.1	(90.5-93.4)	89.5	(87.7-91.1)	87.2	(85.1-89.0)	84.7	(82.4-86.8)	83.9	(81.4-86.1)
Hemangioma	2,238	96.6	(95.5-97.4)	95.6	(94.4-96.6)	95.2	(93.7-96.3)	94.6	(93.0-95.9)	94.3	(92.4-95.7)
TOTAL: All Non-Malignant Brain and Other Nervous System Tumors[i]	**125,581**	**94.2**	**(94.0-94.3)**	**92.9**	**(92.7-93.1)**	**92.0**	**(91.8-92.2)**	**91.1**	**(90.9-91.4)**	**90.4**	**(90.1-90.6)**

[a]The cohort analysis of survival rates was utilized for calculating the survival estimates presented in this table. Long-term cohort-based survival estimates reflect the survival experience of individuals diagnosed over the time period, and they may not necessarily reflect the long-term survival outlook of newly diagnosed cases.
[b]Rates are an estimate of the percentage of patients alive at one, two, five, and ten year, respectively. Rates were not presented for categories with 50 or less cases and were suppressed for rates where less than 16 cases were surviving within a category.
[c]Estimated by CBTRUS using Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 18 Regs Research Data + Hurricane Katrina Impacted Louisiana Cases, Nov 2015 Sub (2000-2013) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total U.S., 1969-2014 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2016, based on the November 2015 submission.
[d]Total number of case that occurred within the SEER registries between 2000 and 2013.
[e]ICD-O-3 histology codes: 9470/3, 9471/3, 9472/3, 9474/3.
[f]ICD-O-3 histology code: 9473/3.
[g]ICD-O-3 histology code: 9508/3.
[h]ICD-O-3 histology codes: 8963/3, 9364/3, 9480/3, 9490/0, 9490/3, 9500/3, 9501/3, 9502/3.
[i]Includes histologies not listed in this table.
Abbreviation: SEER, Survival, Epidemiology and End Results; CI, confidence interval; NOS, not otherwise specified.

Table 28. One-, Two-, Five- and Ten-Year Relative Survival Rates[a,b] for Selected Non-Malignant Brain and Other Central Nervous System Tumors by NCI Age Groups, SEER 18 Registries, 2004-2013[c]

			1-Year		2-Year		5-Year	
Histology	Age Group (years)	N[d]	%	95% CI	%	95% CI	%	95% CI
Unique astrocytoma variants	Children[e] (0-14)	119	97.4	(91.9-99.2)	97.4	(91.9-99.2)	97.4	(91.9-99.2)
	AYA[f] (15-39)	85	96.3	(88.8-98.8)	96.3	(88.8-98.8)	93.3	(84.0-97.3)
	Adults (40+)	--	--	--	--	--	--	--
Ependymal tumors	Children[e] (0-14)	64	100.0	**	100.0	**	95.0	(80.6-98.8)
	AYA[f] (15-39)	435	99.6	(97.7-99.9)	99.1	(97.0-99.7)	98.3	(95.3-99.4)
	Adults (40+)	837	96.9	(95.2-98.1)	96.7	(94.6-98.0)	96.7	(94.6-98.0)
Choroid plexus tumors	Children[e] (0-14)	146	98.8	(93.9-99.8)	98.0	(93.0-99.4)	94.8	(88.3-97.8)
	AYA[f] (15-39)	118	98.3	(92.7-99.6)	98.3	(92.7-99.6)	97.2	(90.6-99.2)
	Adults (40+)	125	83.6	(75.2-89.3)	81.8	(72.8-88.0)	75.0	(63.6-83.3)
Neuronal and mixed neuronal-glial tumors	Children[e] (0-14)	579	98.9	(97.6-99.5)	98.5	(97.0-99.3)	97.0	(94.8-98.3)
	AYA[f] (15-39)	858	98.5	(97.3-99.1)	98.0	(96.6-98.8)	95.3	(93.2-96.8)
	Adults (40+)	472	92.9	(89.9-95.1)	90.9	(87.3-93.5)	85.7	(80.7-89.4)
Nerve sheath tumors	Children[e] (0-14)	403	100.0	**	100.0	**	99.7	(95.2-100)
	AYA[f] (15-39)	2,417	99.6	(99.2-99.8)	99.3	(98.7-99.6)	98.9	(98.0-99.3)
	Adults (40+)	12,639	99.4	(99.1-99.6)	99.3	(98.9-99.6)	99.3	(98.9-99.6)
Meningioma	Children[e] (0-14)	135	97.6	(92.6-99.2)	96.6	(91.1-98.8)	96.6	(91.1-98.8)
	AYA[f] (15-39)	4,322	98.7	(98.3-99.0)	98.1	(97.6-98.5)	96.5	(95.7-97.2)
	Adults (40+)	61,501	91.8	(91.5-92.0)	89.7	(89.4-90.1)	85.7	(85.2-86.1)
Mesenchymal tumors	Children[e] (0-14)	127	99.3	(91.0-100.0)	98.1	(91.0-99.6)	95.8	(85.0-98.9)
	AYA[f] (15-39)	135	97.7	(92.6-99.3)	97.7	(92.6-99.3)	95.0	(86.5-98.2)
	Adults (40+)	330	95.8	(92.3-97.7)	94.8	(90.6-97.2)	89.6	(83.0-93.8)
Other neoplasms related to the meninges	Children[e] (0-14)	--	--	--	--	--	--	--
	AYA[f] (15-39)	488	97.3	(95.2-98.4)	96.9	(94.7-98.2)	95.8	(93.1-97.4)
	Adults (40+)	992	94.0	(92.1-95.5)	93.0	(90.8-94.8)	89.4	(86.0-91.9)
Germ cell tumors, cysts and heterotopias	Children[e] (0-14)	76	93.0	(83.6-97.1)	93.0	(83.6-97.1)	93.0	(83.6-97.1)
	AYA[f] (15-39)	77	98.6	(89.4-99.8)	95.2	(85.2-98.5)	95.2	(85.2-98.5)
	Adults (40+)	72	92.5	(81.8-97.0)	92.5	(81.8-97.0)	92.5	(81.8-97.0)

Table 28. *Continued*

Histology	Age Group (years)	N[d]	1-Year		2-Year		5-Year	
			%	95% CI	%	95% CI	%	95% CI
Tumors of the pituitary	Children[e] (0-14)	360	99.7	(97.7-100)	99.4	(97.3-99.9)	98.3	(95.1-99.4)
	AYA[f] (15-39)	9,331	99.5	(99.4-99.7)	99.4	(99.2-99.6)	99.1	(98.7-99.3)
	Adults (40+)	21,141	97.1	(96.8-97.4)	96.4	(96.0-96.8)	95.1	(94.5-95.7)
Craniopharyngioma	Children[e] (0-14)	385	97.2	(94.9-98.5)	96.3	(93.7-97.9)	92.7	(88.9-95.3)
	AYA[f] (15-39)	367	95.1	(92.1-96.9)	93.1	(89.7-95.4)	88.1	(83.4-91.5)
	Adults (40+)	813	88.3	(85.7-90.5)	84.7	(81.6-87.3)	77.7	(73.6-81.3)
Hemangioma	Children[e] (0-14)	144	99.3	(94.0-99.9)	99.3	(94.0-99.9)	99.3	(94.0-99.9)
	AYA[f] (15-39)	649	99.8	(98.3-100.0)	99.5	(98.0-99.9)	99.2	(97.2-99.8)
	Adults (40+)	1,462	94.9	(93.4-96.1)	93.5	(91.7-95.0)	91.5	(88.7-93.7)
TOTAL: All Non-Malignant Brain and Other Nervous System Tumors[g]	**Children[d] (0-14)**	**2,826**	**98.3**	**(97.7-98.7)**	**97.8**	**(97.2-98.3)**	**96.4**	**(95.4-97.1)**
	AYA[e] (15-39)	**20,053**	**99.0**	**(98.9-99.2)**	**98.6**	**(98.4-98.8)**	**97.7**	**(97.4-98.0)**
	Adults (40+)	**103,164**	**93.1**	**(93.0-93.3)**	**91.6**	**(91.4-91.8)**	**88.8**	**(88.4-89.1)**

**Confidence interval could not be calculated.
[a]The cohort analysis of survival rates was utilized for calculating the survival estimates presented in this table. Long-term cohort-based survival estimates reflect the survival experience of individuals diagnosed over the time period, and they may not necessarily reflect the long-term survival outlook of newly diagnosed cases.
[b]Rates are an estimate of the percentage of patients alive at one, two, five, and ten year, respectively. Rates were not presented for categories with 50 or less cases and were suppressed for rates where less than 16 cases were surviving within a category.
[c]Estimated by CBTRUS using Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 18 Regs Research Data + Hurricane Katrina Impacted Louisiana Cases, Nov 2015 Sub (2000-2013) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total U.S., 1969-2014 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2016, based on the November 2015 submission.
[d]Total number of case that occurred within the SEER registries between 2000 and 2013.
[e]Children as defined by the National Cancer Institute, see: http://www.cancer.gov/researchandfunding/snapshots/pediatric.
[f]Adolescents and Young Adults (AYA), as defined by the National Cancer Institute, see: http://www.cancer.gov/researchandfunding/snapshots/adolescent-young-adult.
[g]Includes histologies not listed in this table.
Abbreviation: SEER, Survival, Epidemiology and End Results; CI, confidence interval; NOS, not otherwise specified.

Appendix A. 2000 US Standard Population

Age Group	2000 U.S.	Age Group	2000 U.S.	Age Group	2000 U.S.
0-4	18,986,520	45-49	19,805,793	Total	274,633,642
5-9	19,919,840	50-54	17,224,359		
10-14	20,056,779	55-59	13,307,234		
15-19	19,819,518	60-64	10,654,272		
20-24	18,257,225	65-69	9,409,940		
25-29	17,722,067	70-74	8,725,574		
30-34	19,511,370	75-79	7,414,559		
35-39	22,179,956	80-84	4,900,234		
40-44	22,479,229	85+	4,259,173		

Appendix B. Average Annual Populations[a] for 2009-2013[b] by Age, Sex. and Race

Male					
Age Group	White	Black	AIAN	API	Total
0-4	7,681,529	1,722,920	195,371	604,544	10,204,363
5-9	7,881,319	1,680,895	190,973	597,914	10,351,101
10-14	8,034,982	1,724,097	187,337	569,005	10,515,421
15-19	8,413,669	1,858,934	195,411	594,654	11,062,668
20-24	8,590,932	1,776,526	194,739	686,888	11,249,085
25-29	8,324,464	1,489,665	177,019	714,658	10,705,805
30-34	7,969,429	1,381,742	162,597	696,136	10,209,904
35-39	7,705,465	1,291,615	147,844	692,731	9,837,655
40-44	8,249,147	1,328,907	142,142	642,037	10,362,232
45-49	8,782,925	1,368,758	138,346	578,602	10,868,630
50-54	8,968,224	1,321,604	125,932	519,873	10,935,632
55-59	8,125,924	1,096,878	100,435	444,147	9,767,385
60-64	7,021,183	829,966	75,429	358,365	8,284,944
65-69	5,338,680	554,313	50,164	255,018	6,198,174
70-74	3,840,779	381,109	32,378	185,070	4,439,336
75-79	2,834,624	255,653	19,746	124,041	3,234,064
80-84	2,073,548	155,231	11,406	77,044	2,317,229
85+	1,693,302	117,517	8,054	61,302	1,880,176
TOTAL	**121,530,125**	**20,336,330**	**2,155,322**	**8,402,029**	**152,423,806**
Female					
Age Group	White	Black	AIAN	API	Total
0-4	7,333,930	1,664,713	189,905	581,352	9,769,900
5-9	7,513,534	1,625,750	185,951	590,297	9,915,532
10-14	7,642,521	1,665,020	182,253	559,239	10,049,033
15-19	7,945,134	1,795,394	186,486	570,514	10,497,529
20-24	8,128,771	1,785,849	178,232	668,942	10,761,794
25-29	7,957,628	1,588,135	163,349	762,409	10,471,521
30-34	7,691,785	1,526,190	153,598	780,202	10,151,775
35-39	7,539,689	1,453,729	142,410	771,269	9,907,096
40-44	8,131,259	1,490,295	138,932	720,101	10,480,586
45-49	8,801,233	1,539,015	139,775	648,442	11,128,465
50-54	9,135,623	1,501,430	132,178	595,446	11,364,678
55-59	8,462,670	1,289,941	107,634	529,871	10,390,116
60-64	7,456,425	1,018,826	81,311	437,401	8,993,963
65-69	5,860,288	719,234	55,675	307,115	6,942,312
70-74	4,450,601	533,028	38,107	223,695	5,245,431
75-79	3,568,601	402,096	26,046	164,958	4,161,701
80-84	2,996,944	289,460	16,976	117,402	3,420,782
85+	3,391,618	295,688	15,275	105,495	3,808,076
TOTAL	**124,008,253**	**22,183,793**	**2,134,091**	**9,134,150**	**157,460,288**

[a]Population data source for 51 population-based geographic regions: Estimates from the United States. Bureau of the Census <http://seer.cancer.gov/popdata/index.html>.
Abbreviations: AIAN, American Indian Alaskan Native; API, Asian Pacific Islander.
[b]Estimated population for Nevada is for 2009-2010 only.

Appendix C. Average Annual Populations[a] for 2009-2013[b] by Age, Sex, and Hispanic Ethnicity

Male			
Age Group	Hispanic	Non-Hispanic	Total
0-4	7,612,797	2,591,566	10,204,363
5-9	7,874,641	2,476,460	10,351,101
10-14	8,184,793	2,330,628	10,515,421
15-19	8,736,225	2,326,443	11,062,668
20-24	8,910,007	2,339,078	11,249,085
25-29	8,421,764	2,284,042	10,705,805
30-34	8,027,371	2,182,534	10,209,904
35-39	7,842,995	1,994,660	9,837,655
40-44	8,559,122	1,803,111	10,362,232
45-49	9,301,323	1,567,308	10,868,630
50-54	9,666,574	1,269,058	10,935,632
55-59	8,816,339	951,045	9,767,385
60-64	7,597,339	687,605	8,284,944
65-69	5,731,288	466,886	6,198,174
70-74	4,117,787	321,548	4,439,336
75-79	3,010,551	223,512	3,234,064
80-84	2,170,260	146,969	2,317,229
85+	1,773,436	106,739	1,880,176
TOTAL	**126,354,612**	**26,069,194**	**152,423,806**
Female			
Age Group	Hispanic	Non-Hispanic	Total
0-4	7,280,001	2,489,899	9,769,900
5-9	7,537,956	2,377,576	9,915,532
10-14	7,814,811	2,234,222	10,049,033
15-19	8,320,456	2,177,073	10,497,529
20-24	8,687,812	2,073,983	10,761,794
25-29	8,453,248	2,018,273	10,471,521
30-34	8,155,852	1,995,924	10,151,775
35-39	8,013,758	1,893,338	9,907,096
40-44	8,756,970	1,723,615	10,480,586
45-49	9,602,094	1,526,371	11,128,465
50-54	10,082,771	1,281,907	11,364,678
55-59	9,379,012	1,011,104	10,390,116
60-64	8,225,313	768,650	8,993,963
65-69	6,383,919	558,392	6,942,312
70-74	4,832,378	413,052	5,245,431
75-79	3,851,749	309,952	4,161,701
80-84	3,197,815	222,968	3,420,782
85+	3,611,889	196,186	3,808,076
TOTAL	**132,187,804**	**25,272,484**	**157,460,288**

[a]Population data source for 51 population-based geographic regions: Estimates from the U.S. Census Bureau http://seer.cancer.gov/popdata/index.html .
[b]Estimated population for Nevada is for 2009-2010 only.