Neuro-Oncology 14:v1–v49, 2012.
doi:10.1093/neuonc/nos218

CBTRUS Statistical Report: Primary Brain and Central Nervous System Tumors Diagnosed in the United States in 2005–2009

Therese A. Dolecek, Jennifer M. Propp, Nancy E. Stroup, and Carol Kruchko

Introduction

The objective of CBTRUS Statistical Report: Primary Brain and Central Nervous System Tumors Diagnosed in the United States in 2005–2009 is to provide a current and comprehensive review of the descriptive epidemiology of primary brain and central nervous system (CNS) tumors in the United States population. CBTRUS has obtained data on all primary brain and CNS tumors from the Centers for Disease Control and Prevention, National Program of Cancer Registries (NPCR) and the National Cancer Institute, Surveillance, Epidemiology and End Results (SEER) program for diagnosis years 2005–2009. Incidence counts and rates of primary malignant and non-malignant brain and CNS tumors are documented by histology, gender, age, race, and Hispanic ethnicity.

Background

The Central Brain Tumor Registry of the United States (CBTRUS) is a unique professional research organization that focuses exclusively on providing quality statistical data on population-based primary brain and CNS incident tumors in the United States. CBTRUS is currently the only population-based site-specific registry in the United States that works in partnership with a public surveillance organization, the National Program of Central Registries (NPCR), and from which data are directly received under a special agreement. This agreement permits transfer of data through the 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] CBTRUS combines the NPCR data with data from the SEER program[3] which was established for national cancer surveillance in the early 1970s. Working with these premier surveillance organizations enables CBTRUS to report high quality data on brain and CNS tumors that are useful to the communities it serves.

Since 1995, CBTRUS has self-published fourteen reports that have contributed to the surveillance of brain and CNS tumors in the United States. As a result of partnering with the Society for Neuro-Oncology (SNO)[4], this fifteenth CBTRUS report is the first to be published as a supplement to *Neuro-Oncology*, the official journal of SNO and marks an historic milestone for both organizations.

CBTRUS was incorporated as a nonprofit 501(c)3 organization with a founding and sustaining grant from the Pediatric Brain Tumor Foundation in 1992 following a two–year study conducted by the American Brain Tumor Association to determine the feasibility of a central registry for all primary brain and CNS tumor cases in the United States. Until that time, standard data reporting in the United States had been limited to only malignant cases. Non–malignant brain tumors, those classified as having a benign or uncertain behavior, however, may, and often do, impose similar costs to society in terms of medical care, case fatality, and lost productivity as do malignant brain tumors. In addition, as molecular markers have been discovered, it has become clear that certain non–malignant brain tumors may become malignant over time.

Passed in 2002, the Benign Brain Tumor Cancer Registries Amendment Act (Public Law 107–260)[5] expanded the collection of primary brain and CNS tumor incidence data by the NPCR to include non-malignant brain and CNS tumors having International Classification of Diseases for Oncology Third Edition (ICD-O-3)[6] codes beginning with the 2004 diagnosis year. All central (state) cancer registries now include these data in their collection practices. Starting in 2004, Uniform Data Standards (UDS) as directed by the North American Association of Cancer Registries (NAACCR)[7], an umbrella organization for tumor registries, governmental agencies, professional associations and private groups, guide the collection of required information on non-malignant brain and CNS tumors; in 2005, the UDS for the collection of malignant brain and CNS tumors were revised. The Multiple Primary and Histology Coding Rules for malignant and non-malignant brain and CNS tumors have been undergoing revision in 2012 under the leadership of SEER.

The CBTRUS database contains the largest aggregation of population–based data on the incidence of all

© The Centers for Disease Control. Published by Oxford University Press on behalf of the Society for Neuro-Oncology in cooperation with the Central Brain Tumor Registry 2012.

primary brain and CNS tumors in the United States. This report represents a dramatic increase in population coverage (approximately 97% from the initial CBTRUS Reports). The central cancer registries receive population-based, standardized data from all healthcare data sources primarily through certified tumor registrars. Along with the UDS, there are quality control checks and a system for rating each central registry to further insure that these data are reported as accurately and completely as possible. These individuals and organizations provide the high quality data that are the foundation of the CBTRUS statistical reports and scientific activities.

This statistical report continues the past efforts that CBTRUS has made to provide population–based incidence rates for all primary brain and CNS tumors by histology, age, gender, race, and Hispanic ethnicity. As in previous reports, these data have been organized by clinically relevant histological groupings that are useful for surveillance. The information is important for allocation and planning of specialty health–care services, in the planning of disease prevention and control programs, and in research activities. These data may lead to clues that will stimulate research into the causes of this terrible disease.

In 2012, the CBTRUS staff in collaboration with three neuropathologists, Drs. Janet Bruner (University of Texas M.D. Anderson Medical Center), Roger McLendon (Duke University) and Tarik Tihan (University of California at San Francisco) revised the CBTRUS Histology Grouping Scheme to reflect the *2007 WHO Classification of Tumours of the Central Nervous System*.[8] CBTRUS will continue to update its grouping scheme to reflect state-of-the-art classification for brain and CNS tumors mindful that any future revisions will incorporate accepted ICD-O coding. CBTRUS will continue to share its expertise and to work cooperatively with other surveillance organizations as well as brain tumor clinicians and researchers to assure that primary brain and CNS tumors are collected and reported as accurately and completely as possible.

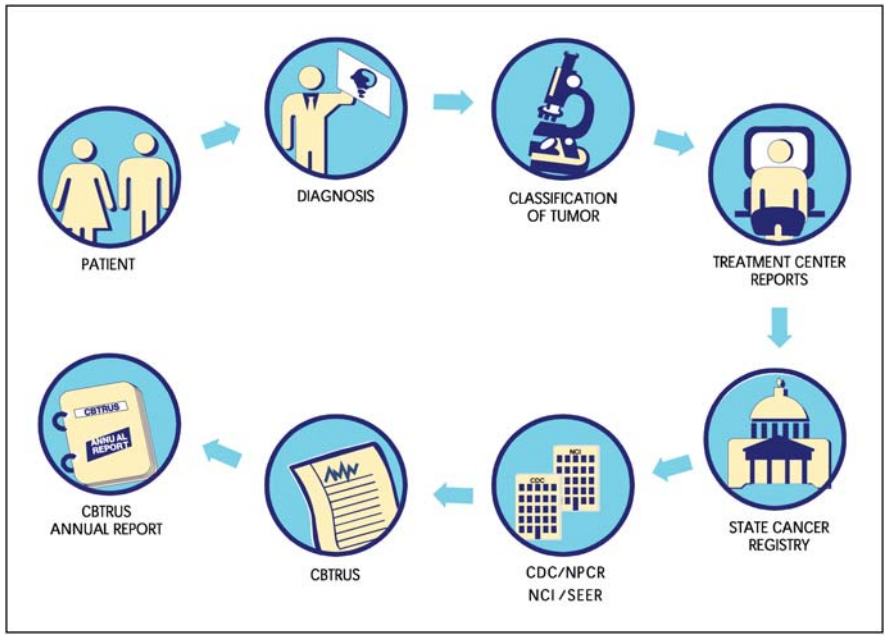
Technical Notes

Data Collection

CBTRUS does not collect data directly from patient's medical records. As noted, data for CBTRUS analyses come from NPCR and SEER programs. By law, cancer and benign brain tumors are reportable diseases, and central cancer registries in states are mandated to collect pertinent information on their residents, collate these data, and provide data files to NPCR and SEER. State central cancer registries (including the District of Columbia) play an essential role in the collection process, diagrammatically presented as follows.

CBTRUS obtained incidence data from 49 population-based cancer registries (44 NPCR and 5 SEER) that include cases of malignant and non–malignant (benign and uncertain) primary brain and CNS tumors. It should be noted that metastatic tumors including those found in the brain and CNS are not collected by surveillance organizations in the United States. Data were requested for all newly-diagnosed primary malignant and non-malignant tumors in 2005–2009 at any of the following anatomic sites (ICD-O-3 topography codes in parentheses): 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 (ICD-O-3 histology codes 9522 and 9523)].[6]

NPCR provided data on 300,205 primary brain and CNS tumors diagnosed in 2005–2009. NPCR cancer registries had to agree to participate in the CBTRUS Statistical Report and to pass certain data quality



standards required by NPCR in order for CBTRUS to receive data. From the SEER research data files, data from state central cancer registries not included in the NPCR dataset were obtained and included 12,339 primary brain and CNS tumor case records diagnosed in 2005–2009. These data were combined into a single data set for analyses. A total of 1,342 records (0.43%) were deleted from the final analytic data set because of invalid site/histology combinations based on a review by the CBTRUS consulting neuropathologist, or because of reclassification based on adjudication of multiple records. Of these, 131 cases had bilateral acoustic neuromas in which the records were consolidated. The final analytic data set included 311,202 records from 49 population-based central cancer registries.

Definitions

Measures in Surveillance Epidemiology.—The incidence rate is the basic measure of disease occurrence as it expresses probability or risk of disease in a defined population over a specified period of time. *Incidence Rates* measure the occurrence of newly-diagnosed cases of disease per 100,000 population. *Mortality Rates* quantify the number of people who have died from the disease per 100,000 population in a specific time period. *Prevalence Rates* measure the number of people with a disease per 100,000 population at a particular point in time or during a particular period of time. *Survival Rates* (percentages) are the probability of surviving for a specified time period. *Relative Survival Rates* are defined as the observed probability of survival adjusted for the expected survival rate of the population for that age, gender and calendar year.

Incidence and mortality rates in this report are expressed per units of observation. For cancer, rates are usually expressed per 100,000 population. The unadjusted rate of disease in an entire population is the *Crude Rate*. Crude rates are frequently adjusted by age because as a population ages the crude rate would increase, reflecting only the aging of the population, not an actual incidence increase. *Age–Adjusted Rates* to a common standard population allow for comparisons of rates in populations across regions with different age structures. Incidence and mortality brain and CNS tumor rates in this report are age adjusted to the *Year 2000 U.S. Standard Population*. Rates for a subset of a population are termed *specific rates*. *Age–Specific Rates* that describe the rate of disease in a defined age group are presented in this report. Specific rates by gender, race, and Hispanic ethnicity are also reported. The variability around the estimates of rates is reflected in the *Standard Error*, which is incorporated into the formula for computing the confidence interval associated with a certain rate. A *Confidence Interval* (CI) is the computed interval with a given probability, eg, 95 percent, that the true value of a variable such as a mean, proportion or rate occurs within the interval. For example, the age–adjusted primary brain and CNS tumor incidence rate is 20.59 cases per 100,000. We can assume with 95 percent certainty that the actual incidence rate is within the range of 20.52 and 20.66 cases per 100,000. Statistically Significant refers to the likelihood that a result or relationship is caused by something other than mere random chance. Statistical hypothesis testing is traditionally employed to determine if a result is statistically significant or not. This provides a "p-value" representing the probability that random chance could explain the result. In general, a 5% or lower p-value is considered to be statistically significant.

In order to be able to compare incidence rates among statistical reports, agencies, or registries a number of factors should be considered such as whether the case definition, data collection, and rate calculation are similar by asking some of the following questions:

- *How is an incident case defined?*
- *Are all primary malignant and non–malignant tumors included in the data set?*
- *Or, are only malignant tumors being analyzed?*
- *What anatomic locations (primary sites) are included?*
- *Are lymphomas and hematopoietic neoplasms included in the incidence rates?*
- *Are the populations comparable?*
- *Are the incidence rates age–adjusted? And if so, to which standard population are they age–adjusted?*

Classification by Behavior and Histology.—Brain and CNS tumor classifications according to behavior ICD-O-3 standards for benign, uncertain and malignant behaviors are coded 0, 1, and 3, respectively. The histology groupings in CBTRUS statistical reports were initially developed in collaboration with the CBTRUS consulting neuropathologist, Dr. Janet Bruner. In 2012, Drs. Roger McLendon and Tarik Tihan joined Dr. Bruner and the CBTRUS staff to synchronize the CBTRUS histology grouping scheme with the 2007 World Health Organization (WHO) classification of tumors of the central nervous system.[8,9] This report uses this most recent 2012 CBTRUS histology grouping scheme (Table 1). The classification scheme utilizes ICD-O-3 codes[6] and may include morphology codes that were not previously reported to CBTRUS.[10] Tables 1a and 1b list malignant only and non-malignant only histologies, respectively. In this report, incidence rates are provided by major histology grouping and detailed histology.

Gliomas are tumors that arise from glial cells, and include astrocytoma, glioblastoma, oligodendroglioma, ependymoma, mixed glioma, malignant glioma, not otherwise specified (NOS), and a few more rare histologies. Whereas there is no standard definition, CBTRUS defines glioma as ICD-O-3 histology codes 9380-9384, 9391-9460, and 9480. 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.

Anatomic Location of Tumor Sites.—Various terms are used to describe the regions of the brain and central nervous system. The sites referred to in this report are broadly based on the categories and site codes defined in the SEER Site/Histology Validation List.[11] Tumors include olfactory tumors of the nasal cavity in addition to brain tumors located in sites included in the standard definition from the Consensus Conference on Brain Tumor Definition for Registration.[10] According to the standard definition from the Consensus Conference, reportable primary brain–related tumors (intracranial and central nervous system tumors) are all primary tumors, irrespective of histology and behavior, occurring in the following sites: brain; meninges; pineal gland; pituitary gland and craniopharyngeal duct; and spinal cord, cranial nerves, and other parts of the central nervous system. As per the site definition outlined by the Consensus Conference, brain lymphomas coded to any of the brain or CNS site codes listed above are included in the CBTRUS report. The group of tumors known as spinal cord tumors is coded to the following sites: spinal meninges, spinal cord, and cauda equina, and is highlighted in this report.

Statistics by ICD-O-3 primary sites are grouped in the following manner: the frontal lobe (C71.1); temporal lobe (C71.2); parietal lobe (C71.3); and occipital lobe (C71.4) are grouped together. Cerebrum (C71.0), ventricle (C71.5), cerebellum (C71.6), and brain stem (C71.7) are each grouped independently. Overlapping lesions of the brain, as well as brain sites not otherwise specified (NOS), are defined by ICD-O site codes C71.8–C71.9. The cranial nerve category (C72.2–C72.5) includes the olfactory nerve, optic nerve, acoustic nerve, and other cranial nerves. The spinal cord (C72.0) and cauda equina (C72.1) are grouped together. Overlapping lesions of the brain and central nervous system, as well as nervous system sites not otherwise specified (NOS), are defined by ICD-O site codes C72.8–C72.9. The meninges (C70.0–C70.9) include the cerebral meninges and spinal meninges. Pituitary tumors (C75.1–C75.2) include tumors located in the pituitary gland and craniopharyngeal duct. Pineal tumors (C75.3) include tumors located in the pineal gland. In this report, tumors located in the nasal cavity (C30.0) are olfactory tumors (defined by ICD-O-3 histology codes 9522 and 9523).

Measurement Methods.—Counts, means, rates, ratios, proportions, and other relevant statistics were calculated using SPSS and/or SEER*Stat statistical software.[12,13] Statistics are suppressed when counts are fewer than 16 within a cell. However, the data in the suppressed cells are included in the counts and rates for the totals.

Population data for each geographic region were obtained from the SEER program website[14] for the purpose of rate calculation. The estimates adjusted for the impact of the Katrina and Rita hurricanes on affected state populations were used in the data analyses for the statistics presented in this report.

Age-adjusted incidence rates and 95% confidence intervals[15] for malignant and non–malignant tumors and for selected histology groupings by gender, race, Hispanic ethnicity, and pediatric, young adult, and adult age groups were estimated. Age–adjustment was based on five–year age groupings and standardized to the Year 2000 U.S. standard population. Age-specific incidence rates by five-year age groups were also calculated. The age distribution of the 2000 U.S. 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 age group 0-19 years in order to include and describe specific brain and CNS tumor patterns in age groups 0-4, 5-9, 10-14 as well as 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 all race statistics. 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.[16] Trends across annual incidence rates were not estimated because a timeframe of five years for both malignant and non-malignant tumors as presented in this report is not sufficient to detect a real change in the rate pattern with any degree of confidence.

Brain Tumor Definition Differences.—It should be noted that NPCR, SEER, and NAACCR report brain tumors differently than CBTRUS. The definition of brain and CNS tumors used by these organizations (in their published incidence and mortality statistics) includes tumors located in the 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 CNS sites. NPCR and SEER include separate tables for malignant and non–malignant brain and CNS tumors reflecting the 2002 Consensus Conference[10] definition in their respective publications. With the inclusion of non-malignant brain tumors, an increase in incidence rates may result, especially for the following histology groups and subgroups: (groups) tumors of meninges; tumors of cranial and spinal nerves; tumors of the sellar region; and (subgroups) unique astrocytoma variants; ependymal tumors; choroid plexus; neuronal and mixed neuronal-glial tumors; tumors of the pineal region; nerve sheath tumors; meningioma; mesenchymal tumors; other neoplasms related to the meninges; germ cell tumors; tumors of the pituitary; craniopharyngioma; hemangioma; neoplasm, unspecified; and all other.

In contrast, the CBTRUS reports data on all tumor morphologies located within the Consensus Conference site definition including the leukemia and lymphoma histologies (9590–9989) as well as olfactory tumors of the nasal cavity [C30.0 (9522–9523)].[10] NPCR, SEER, and NAACCR include pilocytic astrocytomas [a tumor listed in the *WHO Classification of Tumours of the*

Central Nervous System[8] as having uncertain behavior (ICD-0-3 behavior code of 1)] in their malignant (ICD-0-3 behavior code of 3) brain tumor data and statistics. In support of consistency within cancer surveillance reporting, the CBTRUS categorizes pilocytic astrocytomas in the malignant tumor category to enhance comparability of rates to those reported by NPCR, SEER, and NAACCR, especially for comparison of childhood brain and CNS tumor rates. It is important to understand these differences in definition, as they influence the direct comparison of published rates.

Estimation of Expected Numbers of Brain and CNS Tumors in 2012 and 2013.—Estimated numbers of expected malignant and non–malignant brain and CNS tumors were calculated for diagnosis years 2012 and 2013. The age-specific rate method was utilized to project 2012 and 2013 estimates of all primary brain and CNS tumors using the CBTRUS 2005–2009 age-sex-race-specific brain tumor incidence rates for a group by the age-sex-race-specific population projections for that group. Projected population estimates for 2012 and 2013 were derived for the 50 states and District of Columbia using the US Census Bureau 2000-2009 population data (seer.cancer.gov/popdata/index.html).[14]

Estimation of Mortality Rates for Underlying Cause from Brain and CNS Tumors.—Age-adjusted mortality rates for deaths resulting from all brain and CNS tumors were calculated using SEER Stat 7.0.9.[12,17] The underlying mortality data were provided to the SEER program by the National Center for Health Statistics (NCHS) (www.cdc.gov/nchs). In addition to total age-adjusted rate for the United States, age-adjusted rates are presented by gender and state.

Estimation of Survival Rates.—SEER*Stat 7.0.9 statistical software was used to estimate one–through ten–year relative survival rates for primary malignant brain tumor cases diagnosed between 1995–2009 in eighteen SEER areas.[12,18] This software utilizes life–table (actuarial) methods to compute survival estimates and accounts for current follow-up. The traditional cohort analysis of survival rates was utilized for the survival estimates presented in this report. 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)]. Lymphomas and leukemias (morphology codes 9590–9989) and meningiomas (9530–9539) are included from all brain and CNS sites. 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.

Data Interpretation.—The CBTRUS works diligently to support the broader surveillance efforts aimed at improving the collection and reporting of primary brain and CNS tumors. The central cancer registry 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. The data presented in this report must be interpreted within this surveillance framework as well as taking into account the information provided in the technical notes. Therefore, it is important to note that data from previous CBTRUS Reports cannot be compared to data in *CBTRUS Statistical Report: Primary Brain and Central Nervous System Tumors Diagnosed in the United States in 2005–2009*.

Random fluctuations in average annual rates are usual especially for rates based on small incidence counts. The CBTRUS policy to suppress data presentation for cells with counts of less than 16 is consistent with the NPCR policy. The rationale for this policy is that rates produced with small counts are unreliable. The suppression of data with counts of fewer than 16 is more than adequate to protect confidentially given the CBTRUS data set is an aggregate of 48 states and the District of Columbia for 2005–2009.

Delays in reporting and late ascertainment are a reality and a known issue influencing registry completeness and, consequently, rate underestimations - especially for more recent data collection years.[19] CBTRUS also recognizes that the problem may be even more likely to occur in the reporting of non-malignant brain and CNS tumors, where reporting often comes from non-hospital based sources and mandated collection is relatively recent (2004).

Reporting from Veteran's Health Administration (VHA) hospitals, the sole source of data for cancer cases diagnosed among Veterans served by those institutions, affects completeness of data. Cancer cases from VHA facilities account for at least three percent and possibly as much as eight percent of all cancer cases diagnosed among men. VHA policy that went into effect in 2007 restricting Veterans' health data sharing has resulted in the underreporting of cancer incidence data for diagnosis years 2005 through 2007. Since late 2008, VHA facilities and states with central cancer registries have been working to establish data transfer agreements that correct the problem to assure more complete ascertainment of national cancer incidence including brain and CNS tumor incidence data used in CBTRUS statistical reports.[20]

CBTRUS editing practices conducted yearly aim to refine the data for accuracy and clinical relevance should also be recognized in interpreting these report data. Exclusion of site and histology combinations considered to be invalid by the consulting neuropathologists may have the impact of conservatively underestimating the incidence of brain and CNS tumors. Editing changes also incorporate updates to the cancer registration coding rules that influence case ascertainment and data collection. For example, beginning in 2004, some brain and CNS site codes were reconsidered as paired sites, that is having a tumor on the left and right

hemispheres, would result in multiple tumors being reported rather than unpaired sites which has likely caused some increase in reported incidence. Another relevant coding tool affecting reporting was the 2007 Multiple Primary and Histology Coding Rules. These rules revised the way malignant and non-malignant brain tumors are reported and may affect incident rate changes for certain histologies.

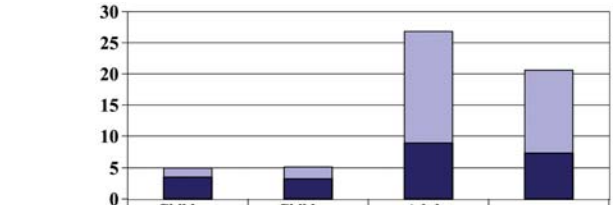
Population estimates used for denominators affect incidence rates. CBTRUS has utilized population data estimates for years 2005–2009 available on the SEER website for rate calculations in this report. These population estimates are provided to SEER on an annual basis from the United States Bureau of the Census. It should be noted that these estimates do not reflect the 2010 decennial census which may or may not impact the rates published. Finally, because this report includes incidence for diagnosis year 2005, adjusted population estimates were used for rate calculation in this report. These estimates adjust for the impact of hurricanes Katrina and Rita on the displacement of populations along the Gulf Coast of Louisiana, Alabama, Mississippi, and Texas in the fall of 2005.

Results

Primary Brain and CNS Tumors: Distributions and Incidence by Histology Group, Histology, Gender, Race, Hispanic Ethnicity, Age Group, Cancer Registry and Behavior

Counts of the 311,202 incident tumors (109,695 malignant; 201,507 non-malignant) reported during 2005–2009 by histology and demographic characteristics for all ages and for children ages 0-19 are presented in Tables 2–4. Approximately seven percent of the cases were in individuals less than 20 years of age at the time of diagnosis, and 93% were in individuals 20 years of age or older. Approximately 42% of all brain and CNS tumors occurred in males and 58% in females. The overall number of all reported tumors is listed by central cancer registry in Table 5. The average annual combined 2005–2009 population of 293,011,631 represents approximately 97% of the U.S. population for those years. The overall percent of non–malignant tumors varied considerably by cancer registry (range: 53-73%). About 65% of all tumors had a histologically confirmed diagnosis, with substantial regional variation (see range: 53-97% in Table 5).

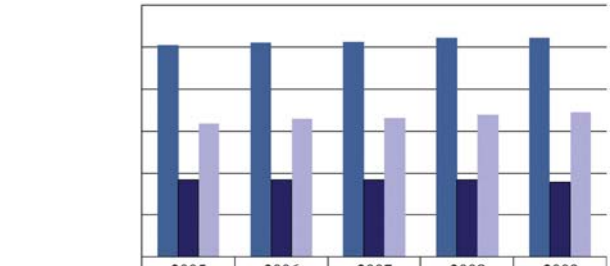
Overall Incidence Rates.—The overall average annual age-adjusted incidence rate for 2005–2009 for primary brain and CNS tumors was 20.59 per 100,000. The overall incidence rate was 5.13 per 100,000 for children 0–19 years of age (4.97 per 100,000 for children less than 15 years), and 26.81 per 100,000 for adults (20+ years). The overall incidence rates of tumors by behavior and age group (0–19 years and 20+ years) are shown in Figure 1.



	Children (0-14 yr)	Children (0-19 yr)	Adults (20+ yr)	All Ages
Non-malignant	1.5	1.9	17.9	13.3
Malignant	3.5	3.3	8.9	7.3

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

Fig. 1. Average Annual Age-Adjusted Incidence Rates† of Primary Brain and CNS Tumors by Age and Behavior.



	2005	2006	2007	2008	2009
Total	20.1	20.5	20.5	20.9	20.9
Malignant	7.4	7.3	7.3	7.3	7.1
Non-malignant	12.7	13.1	13.2	13.6	13.8

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

Fig. 2. Annual Age-Adjusted Incidence Rates† of Primary Brain and CNS Tumors by Year and Behavior.

Overall Incidence Rates by Year.—Figure 2 presents annual age-adjusted incidence rates of all primary brain and CNS tumors by behavior from 2005 through 2009. The incidence rates of all primary brain and CNS tumors during diagnostic years 2005–2009 did not differ statistically significantly from each other.

Incidence Rates by Central Cancer Registry, Age, and Behavior.—The overall average annual age-adjusted incidence rates by central cancer registry, age group, and behavior are presented in Table 6. The overall average annual age-adjusted incidence rates of all primary brain and CNS tumors (malignant and non–malignant) for each individual central cancer registry ranged from 15.78 to 26.39 per 100,000. In addition, the average annual age-adjusted incidence rates of all primary malignant brain and CNS tumors ranged from 4.95 to 8.97 per 100,000, and the average annual age-adjusted incidence rates of all primary non–malignant brain and CNS tumors ranged from 8.90 to 19.02 per 100,000. Among adults 20 years of age and older, the central cancer registry–specific incidence rates ranged from 5.80 to 11.70 per 100,000 for malignant tumors and from 11.94 to 25.94 per 100,000 for non-malignant tumors. For several central cancer registries, the numbers of non-malignant tumors in those less than 20 years of age were too small to report; the highest

reported incidence rate was 4.09 per 100,000 for malignant tumors and 3.61 per 100,000 for non-malignant tumors among the age group.

It is apparent that there is less variation by state in malignant tumor incidence rates as compared to incidence rates for tumors of non-malignant behavior, suggesting greater consistency in reporting of the malignant tumors. The central cancer registry and regional variations apparent in Table 6, especially in reported incidence rates for the non–malignant tumors, likely reflects differences in reporting practices including case ascertainment. Improvements in standardization of brain and CNS tumor collection and reporting with time will allow observation of the true variation in the incidence of brain and CNS tumors among states. Many non–malignant brain and CNS tumors are not histologically confirmed, ie the percent of diagnostically confirmed non-malignant tumors is lower than the percent of diagnostically confirmed malignant tumors. A statistically significant negative correlation exists between the proportion of tumors with non–malignant behavior and the proportion of tumors diagnostically confirmed by central cancer registry for the data presented in Table 5. Conversely, a statistically significant positive correlation is evident for the proportion of non-malignant tumors with the proportion of radiographic diagnostic confirmations.

Primary Brain and CNS Tumors: Incidence by Site, Histology, Age, Gender, Race, and Hispanic Ethnicity

Distribution of Tumors by Site and Histology.—The distribution of brain and CNS tumors by site is shown in Figure 3. The most common tumor site is the meninges (35%). Twenty-one percent of tumors are located within the frontal, temporal, parietal, and occipital lobes of the brain. Cerebrum, ventricle, cerebellum, and brain stem tumors account for 7.5% of all tumors. The cranial nerves and the spinal cord/cauda equina account for 10% of all tumors. Together, the pituitary and pineal glands account for about 16% of tumors. Olfactory tumors of the nasal cavity account for less than 1% of tumors.

The distribution by brain and CNS histology is shown in Figure 4. The most frequently reported histology is the predominately non–malignant meningioma, which accounts for more than one-third of all tumors, followed by glioblastoma, a malignant brain tumor. Tumors of the pituitary and nerve sheath tumors combined account for about one-fourth of all tumors, the majority of which are non-malignant. Acoustic neuromas (defined by ICD-O-3 site code C72.4 and histology code 9560) account for 65% of all nerve sheath tumors (data not shown).

The broad category glioma represents approximately 30% of all tumors (Figure 4). The distribution of tumors by site for glioma is shown in Figure 5. About 60% of gliomas occur in the four lobes of the brain.

The distribution by specific histology for glioma is illustrated in Figure 6. Glioblastoma accounts for the majority of gliomas, while astrocytoma and glioblastoma combined account for about three–fourths of gliomas.

Incidence of Spinal Cord Tumors.—Spinal Cord Tumors are a special group of CNS tumors located in the spinal cord, spinal meninges, and cauda equina. Although these tumors account for a relatively small percentage of all brain and CNS tumors, they result in significant morbidity and are highlighted in this report. The most prevalent histologies found in the spinal cord, spinal meninges, and cauda equina are presented in Figure 7 for both children (0-19 years) and adults (20+ years). For the age group 0-19 years, the predominant histology is ependymal tumors followed by other neuroepithelial tumors, whereas tumors of the meninges account for the largest proportion of histologies among those ages 20 years and older.

Distribution of Tumors by Site and Histology in Young Adults (Ages 20-34 Years).—Almost 9% of all brain and CNS tumors occurred in young adults, ages 20-34 years and the distribution of these tumors

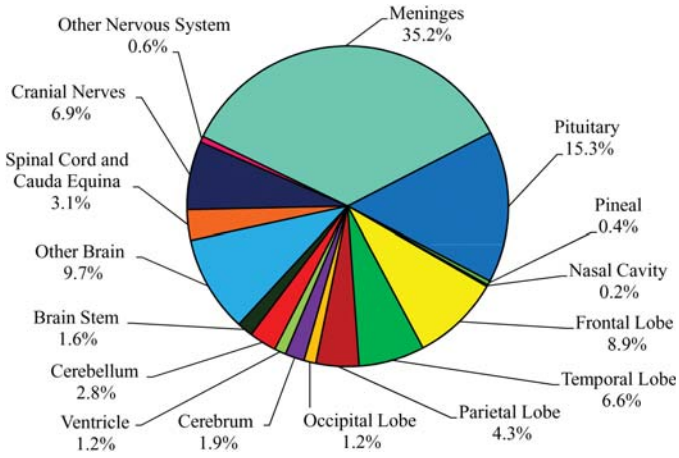


Fig. 3. Distribution of Primary Brain and CNS Tumors by Site (N = 311,202).

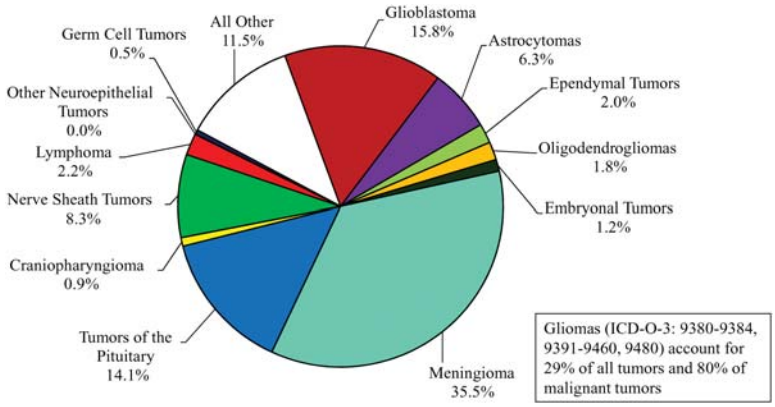


Fig. 4. Distribution of Primary Brain and CNS Tumors by Histology (N = 311,202).

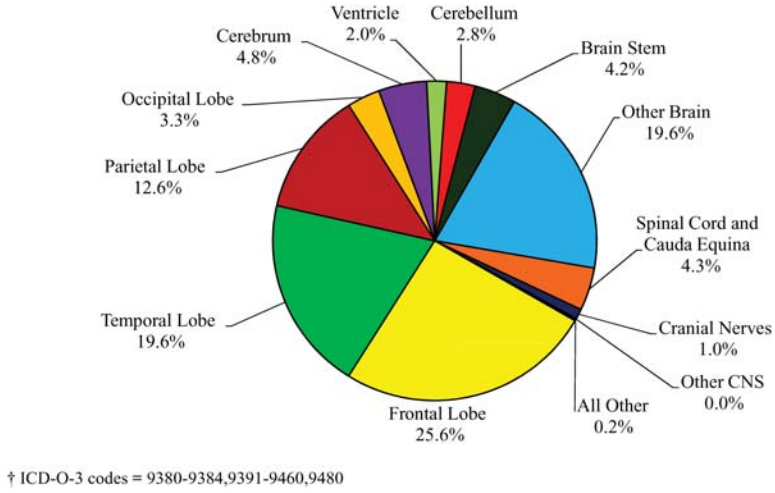


Fig. 5. Distribution of Primary Brain and CNS Gliomas† by Site (N = 90,828).

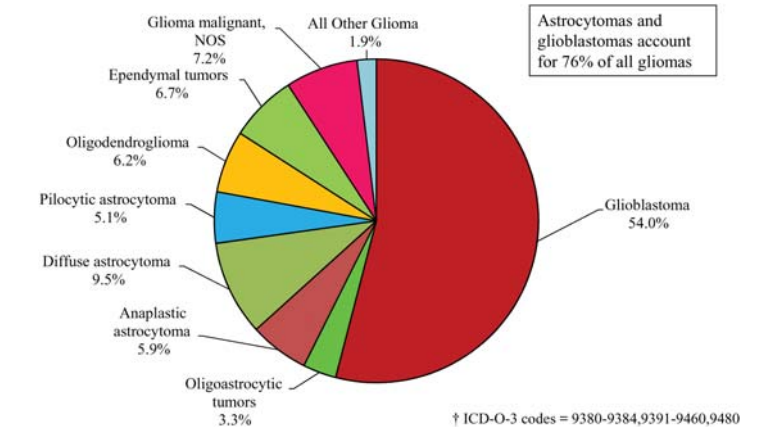


Fig. 6. Distribution of Primary Brain and CNS Gliomas† by Histology Subtypes (N = 90,828).

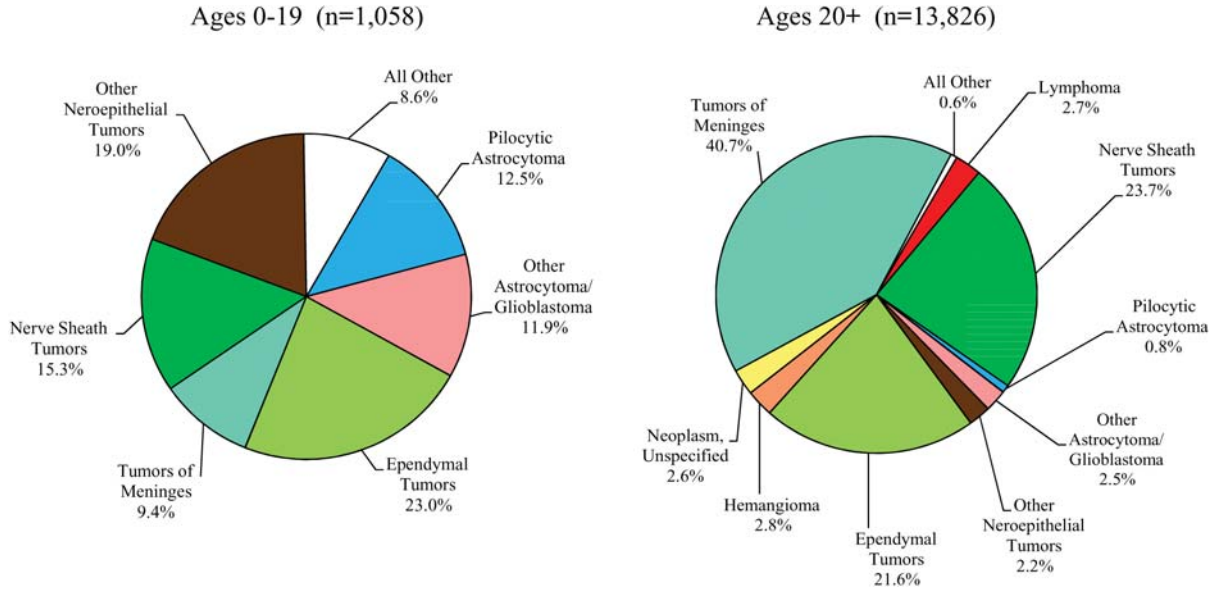


Fig. 7. Distribution of Spinal Cord, Spinal Meninges and Cauda Equina Tumors by Age Group and Histology.

by site is shown in Figure 8. Approximately 22% of tumors diagnosed in young adults are located within the frontal, temporal, parietal and occipital lobes of the brain. Cerebrum, ventricle, cerebellum and brain stem tumors combined account for about 12% of all young adult tumors. Tumors of the meninges represent 14%, while the cranial nerves and the spinal cord and cauda equina combined account for about 12%. Tumors located in the pituitary and pineal glands together account for about 32% of young adult tumors. The distribution by histology for young adults is also shown in Figure 8. Over half of reported histologies for tumors diagnosed in those 20-34 years of age are the predominately non–malignant tumors of the pituitary (29%), meningioma (14%), and nerve sheath (9%). The broad category glioma accounts for 31% of all brain and CNS tumors and about 81% of malignant tumors in young adults.

Incidence Rates by Site and Gender.—Incidence counts and average annual age-adjusted rates for brain and CNS tumors by site and gender are provided in Table 7. Incidence rates were highest for tumors located in the meninges (7.18 per 100,000), followed by tumors located in the four lobes of the brain, pituitary, other areas of the brain, cranial nerves, spinal cord/cauda equina, cerebellum, cerebrum, brain stem, ventricle, other nervous system and pineal gland. Incidence rates were lowest for olfactory tumors of the nasal cavity (0.04 per 100,000). By gender, incidence rates were statistically significantly higher in females than in males for tumors located in the meninges, pituitary, and cranial nerves. Males had statistically significantly higher incidence rates of tumors located in the four lobes of the brain, 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.—Tables 8 through 16 present incidence rates by major histology groupings and specific histologies. Among major histology groupings, incidence rates were highest for tumors of the meninges (7.49 per 100,000), followed by tumors of the neuroepithelial tissue (6.60 per 100,000 person–years), tumors of the sellar region (3.12 per 100,000) and tumors of the cranial and spinal nerves (1.70 per 100,000) (Table 8).

Incidence rates also varied by specific brain and CNS histology (Table 8). Incidence rates were highest for meningiomas (7.22 per 100,000), glioblastomas (3.19 per 100,000), tumors of the pituitary (2.94 per 100,000), and nerve sheath tumors (1.70 per 100,000). The incidence rate for glioma was 6.03 per 100,000, a major contributor to the magnitude of the neuroepithelial tissue rate (data not shown). Acoustic neuromas, included under tumors of cranial and spinal nerves, comprise the majority (65%; 1.10 per 100,000) of nerve sheath tumors (1.70 per 100,000) and account for 5% of all primary brain and CNS tumors (data not shown).

Incidence Rates by Behavior and Histology.—Brain and CNS tumor incidence rates by behavior (malignant and non-malignant) are presented in Table 8. For those with malignant behavior, the incidence rate was highest for glioblastoma (3.19 per 100,000) followed by diffuse astrocytoma (0.58 per 100,000), and lymphoma (0.45 per 100,000. Meningioma (7.10 per 100,000), tumors of the pituitary (2.93 per 100,000), and nerve sheath (1.69 per 100,000) tumors were the non-malignant histologies with the highest incidence rates.

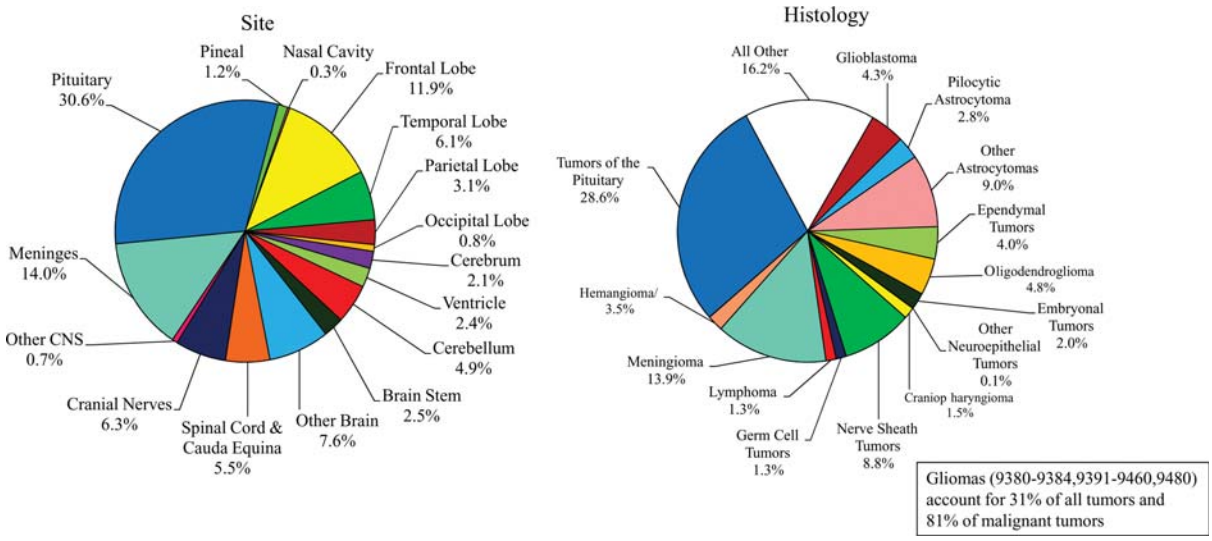


Fig. 8. Distribution of Primary Brain and CNS Tumors by Site and Histology in Young Adults (Ages 20-34 years) (N = 26,616)

Median Age at Diagnosis.—The median age at diagnosis for all primary brain and CNS tumors is 59 years (Table 8). The histology-specific median ages range from 8 to 71 years. 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 age at diagnosis onset. Meningioma and glioblastoma are primarily diagnosed at older ages. Unclassified tumors have a median age of 65 years suggesting that younger individuals may receive more specific tumor identification and classification.

Incidence Rates by Gender and Histology.—Incidence rates by histology and gender are presented in Table 9. Incidence rates for all primary brain and CNS tumors combined are higher among females (22.25 per 100,000 person–years) than males (18.80 per 100,000 person–years). The difference between these incidence rates is statistically significant. Incidence rates for tumors of the neuroepithelial tissue are 1.4 times greater in males as compared to females, while tumors of the meninges are 2.2 times greater in females as compared to males. Incidence rates for tumors of the neuroepithelial and tumors of the meninges were statistically significantly different between males and females. The incidence rate of gliomas is higher in males (7.16 per 100,000 person–years) than in females (5.06 per 100,000 person–years). Similar patterns were found for individual histologies with incidence rates higher in males, especially for germ cell tumors, most glial tumors, lymphomas, and embryonal tumors, or comparable between males and females, with the notable exception of meningiomas and tumors of the pituitary, which are more common in women. Incidence rate ratios (male: female) for selected histologies are shown in Figure 9.

Incidence Rates by Race and Histology.—Incidence rates by histology and race are shown in Table 10. Incidence rates for all primary brain and CNS tumors combined are substantially and statistically significantly lower for race groups AIAN (13.15 per 100,000) and API (12.98 per 100,000) compared with whites (20.61 per 100,000) and blacks (20.12 per 100,000). Incidence rates for most histologies are statistically significantly higher for whites than black, AIAN, and API race groups. An exception is observed for meningioma, tumors of the pituitary, and craniopharyngioma where the rates for blacks significantly exceed those observed for white, AIAN, and API races. It should also be noted that the average annual incidence rate for tumors of the cranial and spinal nerves in the API group is statistically significantly higher than those rates observed for black or AIAN races.

Incidence rate ratios (white: black) for selected histologies are shown in Figure 10. Incidence rates for anaplastic astrocytoma, glioblastoma, oligodendroglioma, oligoastrocytic tumors, and nerve sheath tumors are two or more times greater in whites than in blacks. Incidence rates for pilocytic astrocytoma, ependymal tumors, embryonal tumors, lymphoma and germ cell tumors also are significantly higher among whites than blacks. In contrast, incidence rates for meningioma and tumors of the pituitary are statistically significantly higher among blacks than 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 CNS tumors among Hispanics is 19.36 per 100,000 and among non–Hispanics is 20.81 per 100,000. The difference between these two incidence rates is statistically significant, with rates among non-Hispanics exceeding those observed for Hispanics overall and for most histologies. Only the incidence

rate for tumors of the pituitary is statistically significantly higher in Hispanics than non-Hispanics.

Incidence Rates by Age and Histology.—The age–specific incidence rates by histology are presented in Table 12. The incidence for all brain and CNS tumors is highest among the 85+ year olds (75.27 per 100,000) and lowest among children ages 0-19 years (5.13 per 100,000). However, the distribution patterns of histologies within age groups differ substantially as is apparent in Table 12. For example, the incidence rates of pilocytic astrocytoma, germ cell tumors and embryonal tumors are higher in the younger age groups and decrease with advancing age. This is in contrast to the incidence rate of meningioma, which increases progressively with age. Age–specific incidence rates for selected histologies are graphically displayed in Figure 11. Figure 12 shows the most common and second most common brain and CNS tumor histologies by age at occurrence.

Childhood Primary Brain and CNS Tumors: Incidence by Site, Histology, Gender, and Age

Childhood Brain Tumors.—Brain and CNS tumors are the second most common malignancy among children; leukemias as a group are the most common.[21,22] However, brain and CNS tumors are the most common form of solid tumors in children.[21] About 7% of the reported brain and CNS tumors during 2005–2009 occurred in children ages 0-19 years.

Distribution of Tumors by Site and Histology.—The distribution of brain and CNS tumors for children ages 0-19 years by site is shown in Figure 13. The largest percentage of childhood tumors (17%) are located within the frontal, temporal, parietal and occipital lobes of the brain. Cerebrum, ventricle, cerebellum, and brain stem tumors account for 6%, 6%, 16%, and 10% of all childhood tumors, respectively. The listing, Other Brain, account for 14% and tumors of the meninges represent 3% of all childhood tumors. The cranial nerves and the spinal cord and cauda equina account for 6% and 5%, respectively. Tumors located in the pituitary and pineal glands together account for about 16% of all childhood brain and CNS tumors.

Figure 14 presents the most common brain and CNS histologies in children ages 0–14 years and adolescents ages 15-19 years. For children ages 0-14 years, pilocytic astrocytomas, embryonal tumors, and malignant glioma, NOS, account for 18%, 15%, and 14%, respectively. The most common histologies in adolescents ages 15–19 years include tumors of the pituitary (23%) and pilocytic astrocytoma (11%) (Figure 14). The broad category glioma accounts for 53% of tumors in children ages 0-14 years and 37% in adolescents ages 15–19 years.

Childhood Incidence Rates by Histology and Gender.—The incidence rates of the most common childhood tumors by gender are shown in Table 13. The overall incidence rate for childhood brain and CNS tumors (ages 0–19 years) is 5.13 per 100,000. Among major histology groupings, incidence rates were highest for tumors of the neuroepithelial tissue (3.51 per 100,000). Pilocytic astrocytoma (0.80 per 100,000), embryonal tumors (0.65 per 100,000), and glioma malignant, NOS (0.58 per 100,000) have the highest rates among individual

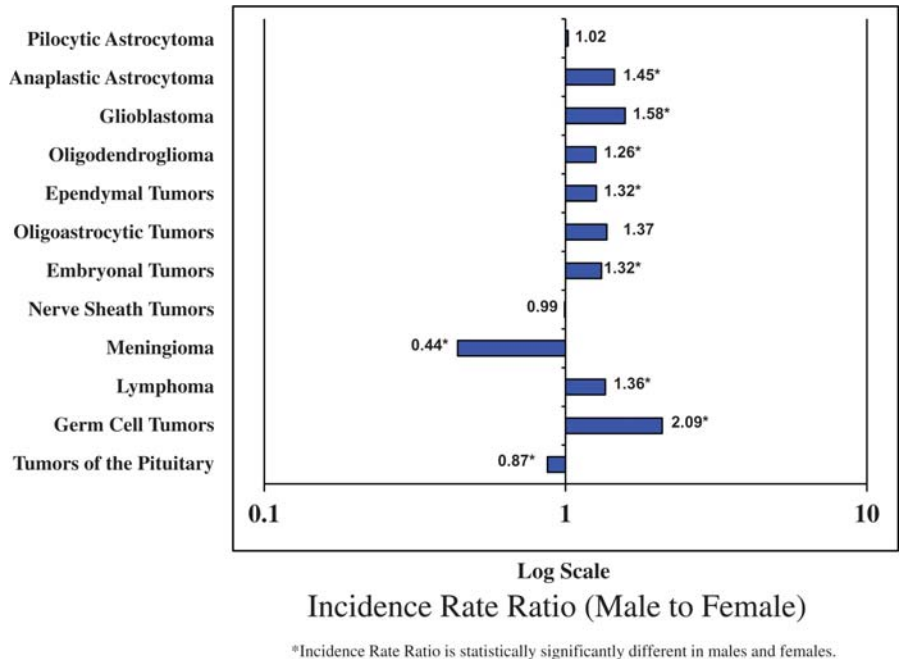


Fig. 9. Patterns by Gender for Selected Histologies.

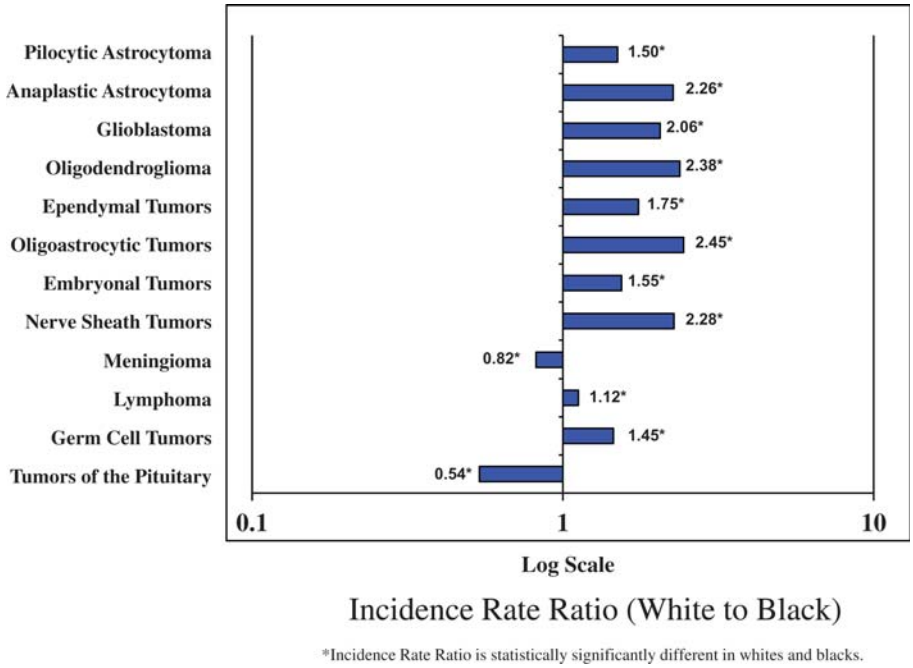


Fig. 10. Patterns by Race for Selected Histologies.

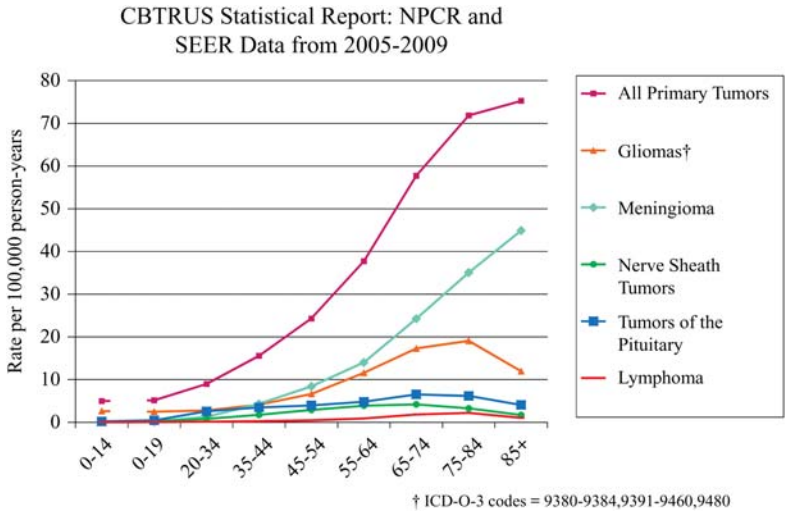


Fig. 11. Age-Specific Incidence Rates of Primary Brain and CNS Tumors by Selected Histologies.

histologies. Germ cell tumors are more than twice as common in males compared to females. Conversely, the incidence rate of tumors of the pituitary for females is more than two and one-half times the rate observed for males. Differences in incidence rates between males and females for ependymal tumors, embryonal tumors, germ cell tumors, and tumors of the pituitary are statistically significant. Due to small numbers for some tumors caution when interpreting and comparing incidence rates is required.

Childhood Incidence Rates by Histology and Race.— Table 14 shows incidence rates by histology and race for children ages 0-19 years. Incidence rates were highest among whites (5.31 per 100,000) compared with black (3.96 per 100,000), AIAN (3.40 per 100,000) or API (3.07 per 100,000) race groups. The observed overall incidence rate differences between whites and each of the three other race groups are statistically significant. Total brain and CNS tumor incidence rates between black and AIAN races are not significantly different. However, the total average annual incidence rate for the API race group is statistically significantly lower than the rate observed for black children ages 0-19 years. Children ages 0-19 years of API races have statistically significantly higher rates of germ cell tumors and cysts than either white or black races. Conversely, API incidence rate for tumors of the sellar region is

Age (yr)	Most Common Histology	Second Most Common Histology
0-4	Embryonal Tumors	Pilocytic Astrocytoma
5-9	Pilocytic Astrocytoma	Glioma Malignant, NOS
10-14	Pilocytic Astrocytoma	Neuronal and Mixed Neuronal-Glial Tumors
15-19	Tumors of the Pituitary	Pilocytic Astrocytoma
20-34	Tumors of the Pituitary	Meningioma
35-44	Meningioma	Tumors of the Pituitary
45-54	Meningioma	Tumors of the Pituitary
55-64	Meningioma	Glioblastoma
65-74	Meningioma	Glioblastoma
75-84	Meningioma	Glioblastoma
85+	Meningioma	Neoplasm, Unspecified

Fig. 12. Most Common Primary Brain and CNS Tumors by Age.

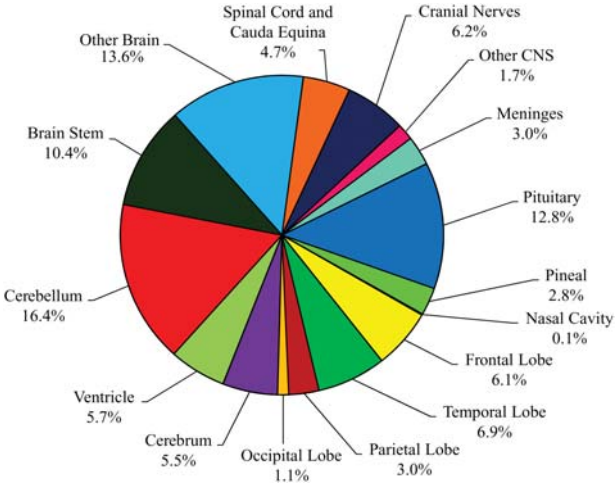


Fig. 13. Distribution of Childhood (Ages 0-19 years) Primary Brain and CNS Tumors by Site (N = 20,709).

statistically significantly lower than those observed for white, black, or AIAN race groups.

Childhood Incidence rates by Histology and Hispanic Ethnicity.—Incidence rates for children ages 0-19 years by Hispanic ethnicity are shown in Table 15. The non-Hispanic rate (5.30 per 100,000) is statistically significantly higher than the observed rate for Hispanics (4.55 per 100,000). This difference is apparent for incidence rates of tumors of neuroepithelial tissue and tumors of cranial and spinal nerves. Conversely, incidence rates for tumors of the pituitary are statistically significantly higher among Hispanic children ages 0-19 years than their non-Hispanic counterparts.

Childhood Incidence Rates by Age and Histology.—The detailed age–specific incidence rates by histology for children age groups 0-4 years, 5-9 years, 10-14 years, 15-19 years, 0-19 years, and 0-14 years are shown in Table 16. The overall incidence rates for age groups 0-4 years and 15-19 years statistically significantly exceeded those observed in age groups 5-9 years and 10-14 years. It should also be noted that individual histology distributions vary substantially within these childhood age groups. The incidence rates of pilocytic astrocytoma, malignant glioma NOS, ependymal tumors, choroid plexus tumors and embryonal tumors decrease with increasing age groups.

Age–specific incidence rates for selected histologies are graphically shown in Figure 15. The U-shaped overall incidence rate pattern across the four age group categories is apparent on the graph. Sharp declines in incidence rates between age groups for the broad gliomas and embryonal tumor histology groups are evident. The incidence decline rate for pilocytic astrocytoma is substantial from the 10-14 years to the 15-19 years age group. In contrast, ependymal tumor incidence rates are highest in the 0-4 years age group then decline and remain relatively stable across the 5-9 years, 10-14 years, and 15-19 years age groups.

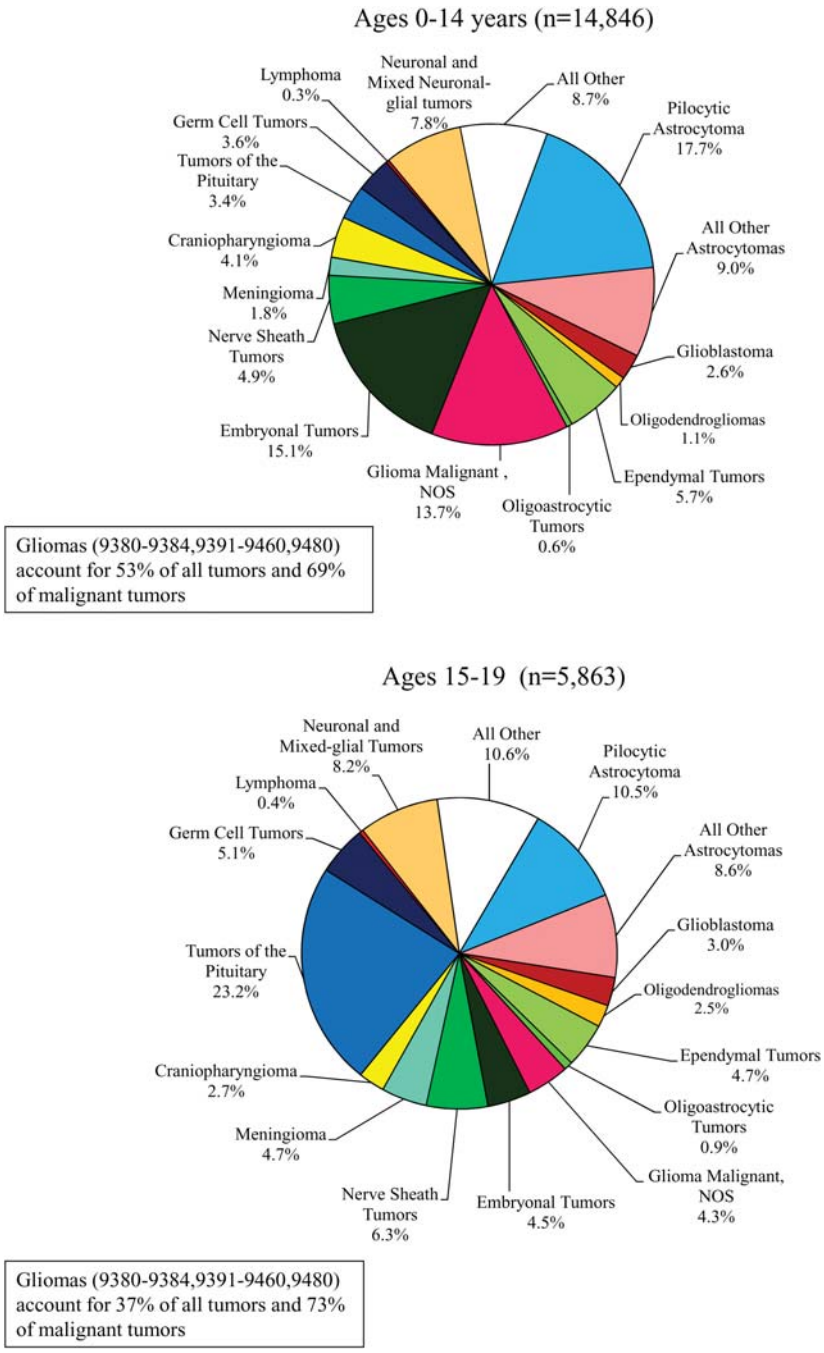


Fig. 14. Distribution of Childhood Primary Brain and CNS Tumors by Histology.

Childhood Incidence Rates by Histology Defined by ICCC.—Table 17 presents the CBTRUS childhood brain and CNS tumor data used for this report according to the International Classification of Childhood Cancer (ICCC) grouping system for pediatric cancers.[23] As shown, the Table 17 age group category total 0-19 age group count and age-specific and adjusted rates are equivalent to those presented throughout this report. However, the histology grouping scheme differences are apparent and reflect different approaches to the description of childhood brain and CNS tumors.

Mortality Rates, Expected Incidence, and Survival

Estimated Mortality Rates from Brain and CNS Malignant Tumors by State and Gender.—Table 18 shows average annual age-adjusted mortality rates from primary malignant brain and CNS tumors in the

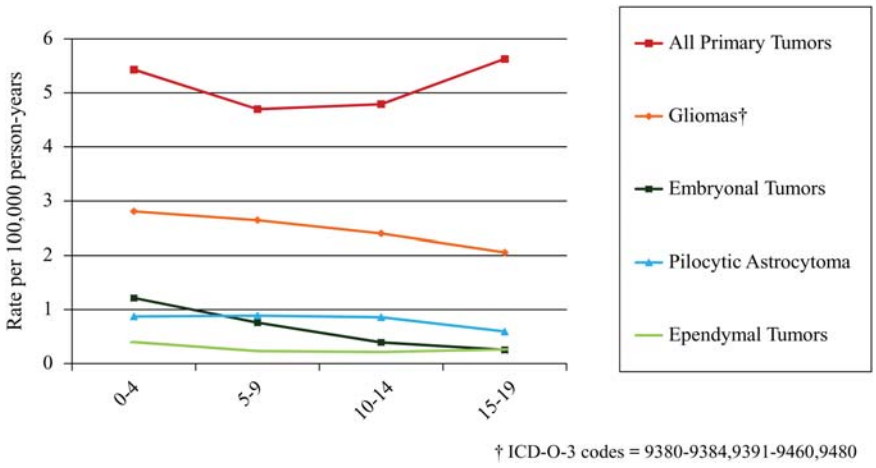


Fig. 15. Age-Specific Incidence of Childhood Brain and CNS Tumors by Selected Histologies.

United States during 2005–2009 by state and gender. The aggregate total rate is 4.28 deaths per 100,000. However, there is considerable variation by individual state, which ranges from a low of 2.30 deaths per 100,000 to a high of 5.53 deaths per 100,000. Males have statistically significantly higher mortality rates from brain and CNS tumors than females in the U.S.

Estimated Numbers of Expected Cases of All Primary Brain and CNS Tumors by State.—The estimated numbers of cases of all primary brain and CNS tumors for 2012 and 2013 by state are shown in Table 19. The estimated numbers of cases of malignant and non–malignant tumors by state were calculated using the CBTRUS age–specific incidence rates (2005–2009) for 18 age groups, race (white, black, and other), and gender and applying them to the 2012 and 2013 population projections for each state and the District of Columbia. The total number of new cases of primary brain and CNS tumors for all 50 states and the District of Columbia in 2012 is estimated to be 68,530 with 24,170 being malignant and 44,360 being non-malignant. For 2013, the estimates are 69,720 primary brain and CNS cases of which 24,560 and 45,160 would be expected to be malignant and non-malignant, respectively.

Relative Survival Rates for Malignant Brain and CNS Tumors by Tumor Location (Site).—Relative survival estimates by brain and CNS tumor location (site) are presented in Table 20. Individuals diagnosed from 1995 through 2009 with tumors located in the cerebrum, the frontal, temporal, parietal and occipital lobes of the brain, other brain, and other nervous system have poor short- and long-term survival rates. In contrast, those with tumor locations in the cerebellum, spinal cord and cauda equina, cranial nerves, pituitary and pineal glands and nasal cavity are observed to have better survival outcomes with ten–year survival rates ranging from 60% to as high as more than 90% (cranial nerves).

Survival Rates for Malignant Brain and CNS Tumors by Histology and Age.—Survival estimates for malignant brain tumors by histology and age at diagnosis are presented in Tables 21 and 22. The one– through ten–year relative survival rates by histology are shown in Table 21. The estimated five– and ten–year relative survival rates for malignant brain and CNS tumors are 33.8% and 28.0%, respectively. However, there is a large variation in survival estimates depending upon tumor histologies (Table 21). For example, five–year survival rates are 94% for pilocytic astrocytomas but are less than 5% for glioblastomas. Survival generally decreases with older age at diagnosis (Table 22). Children and young adults generally have better survival outcomes for most histologies.

Descriptive Summary of Meningioma and Glioblastoma.—The findings in the CBTRUS Statistical Report 2005–2009 are synthesized to describe the two most common histologies, meningioma and glioblastoma. Meningiomas are the most frequently reported tumors and account for more than 35% of tumors reported to CBTRUS (Table 8; Figure 4). Ninety–eight percent of meningiomas reported to CBTRUS had a non–malignant behavior code (Table 8). Of the non-malignant meningiomas, 49% were histologically confirmed, while 49% were radiographically confirmed. Meningiomas are more common in older adults (Table 12) and are uncommon in children. The incidence of meningiomas increases with increasing age. The rates for meningiomas increase dramatically after age 65 and continue to be high even among the population aged 85 years and older (Table 12). Meningiomas are more than twice as common in females as compared to males (Table 9). The incidence of meningiomas is statistically significantly higher in blacks than whites (Table 10). As only malignant meningiomas were reported in the SEER database prior to 2004, insufficient time has passed to estimate 5-year survival for non-malignant meningiomas, and therefore, survival estimates were not generated

for this report. However, information about meningioma survival estimates was obtained from a manuscript that used the National Cancer Data Base and showed the overall five–year survival rate for meningioma to be 69% (70% for benign and 55% for malignant).[24] In addition, a recent study of 12,284 patients with a diagnosis of nonmalignant intracranial meningioma reported to SEER for diagnosis years 2004-2007 found that over 85% of patients survived three years after diagnosis, and resection was associated with improved survival.[25]

Glioblastomas are the second most frequently reported histology and the most common malignancy. They account for 16% of all primary brain tumors (Table 8; Figure 4). Glioblastomas are more common in older adults (Table 12) and are uncommon in children. Glioblastomas comprise approximately 3% of all brain and CNS tumors reported among 0–19 year olds (Table 4). The incidence of glioblastomas increases with increasing age, with rates highest in the 75 to 84 years olds (Table 12). Glioblastomas are 1.6 times more common in males (Table 9). Glioblastomas are two to three times higher among whites as compared to black, AIAN and API race groups (Table 10). The relative survival estimates for glioblastoma are quite low; less than 5% of patients survived five years post diagnosis (Table 21). Glioblastoma survival estimates are somewhat higher for the small number of patients who are diagnosed under age 20 (Table 22).

Concluding Comment

The CBTRUS Statistical Report: Primary Brain and Central Nervous System Tumors Diagnosed in the United States in 2005–2009 presents a comprehensive view of current population-based incidence and related surveillance measures on primary malignant and nonmalignant brain and CNS tumors collected and reported by central cancer registries that cover approximately 97% of the United States population. This report aims to serve as a useful resource for researchers, patient families as well as clinicians. In keeping with its mission, CBTRUS continually revises its reports mindful of the broader surveillance community in which it works while balancing the input it receives from the clinical and research community, especially those comments from neuropathologists. 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 CNS tumors in the United States.

Abbreviations

AIAN – American Indian/Alaskan Native
API – Asian Pacific Islander
CBTRUS – Central Brain Tumor Registry of the United States
CDC –Centers for Disease Control and Prevention
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
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
SEER – Surveillance, Epidemiology and End Results
SPSS –Statistical Packages for the Social Sciences
UDS – Uniform Data Standards
US – United States
VHA – Veterans Health Administration
WHO – World Health Organization

References

1. http://www.cdc.gov/cancer/npcr/pdf/npcr_css.pdf
2. http://www.cdc.gov/cancer/npcr/npcrpdfs/publaw.pdf
3. http://seer.cancer.gov/about/overview.html
4. http://www.soc-neuro-onc.org/about-sno/
5. http://www.gpo.gov/fdsys/pkg/PLAW-107publ260/pdf/PLAW-107publ260.pdf
6. Fritz A, Percy C, Jack A, Shanmugaratnam K, Sobin L, Perkin DM, Whelan S (eds). International Classification of Diseases for Oncology, Third edition. World Health Organization, 2000.
7. http://www.naaccr.org/
8. Louis DN, Ohgaki H, Wiestler OD, Cavanee WK. (Eds): WHO Classification of Tumours of the Central Nervous System. IARC: Lyon, 2007.
9. Kleihues P, Burger PC, Scheithauer BW. The new WHO classification of brain tumors. *Brain Pathology*, 3: 255–268, 1993.
10. McCarthy BJ, Surawicz T, Bruner JM, Kruchko C, Davis F. Consensus conference on brain tumor definition for registration. *Neuro–Oncology*. 4:134–145, 2002 (Posted to Neuro–Oncology [serial online], Doc. 01–059, February 21, 2002. <neuro-oncoogy.mc.duke.edu>).
11. ICD–O–3 SEER Site/Histology Validation List. Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, June 21, 2004. [http://seer.cancer.gov/icd-o-3/sitetype.d06212004.pdf]
12. Surveillance Research Program, National Cancer Institute SEER*Stat software (www.seer.cancer.gov/seerstat) version 7.0.9.
13. Statistical Packages for Social Sciences Statistics for Windows, version 18.0.0, Released July 30, 2009, (SPSS Inc., Chicago, IL).
14. US population data. Surveillance, Epidemiology, and End Results (SEER) Program Populations (1990–2009) (http://seer.cancer.gov/popdata/), National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released November 2011.
15. Tiwari RC, Clegg LX, Zou Z. Efficient interval estimation for age-adjusted cancer rates. *Statistical Methods in Medical Research* 2006;15(6):547–569.
16. NAACCR Race and Ethnicity Work Group. NAACCR Guideline for Enhancing Hispanic/Latino Identification: Revised NAACCR Hispanic/Latino Identification Algorithm [NHIA v2.2.1].1 Springfield (IL): North American Association of Central Cancer Registries. September 2011
17. Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Mortality - All COD, Aggregated With State, Total U.S. (1969-2009) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2012.Underlying mortality data provided by NCHS (www.cdc.gov/nchs).
18. Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 18 Regs Research Data + Hurricane Katrina Impacted LouisianaCases, Nov 2011 Sub, Vintage 2009 Pops (2000-2009) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total U.S., 1969-2010 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2012, based on the November 2011 submission.
19. Clegg LX, Feuer EJ, Midthune D, Fay MP, Hankey BF. Impact of reporting delay and reporting error on cancer incidence rates and trends. *J Natl Cancer Inst*. 2002;94:1537–1545.
20. Howlader H, Ries LA, Stinchcomb DG, Edwards BK. The Impact of Underreported Veterans Affairs Data on National Cancer Statistics: Analysis Using Population-Based SEER Registries. *J Natl Cancer Inst*. 2009 101(7):533–536.
21. Gurney JG, Smith MA, Bunin GR. Chapter III: CNS and miscellaneous intracranial and intraspinal neoplasms. In: Ries LAG, Smith MA, Gurney JG, Linet M, Tamra T, Young JL, Bunin GR (eds). Cancer Incidence and Survival among Children and Adolescents: United States SEER Program 1975–1995, National Cancer Institute, SEER Program. NIH Pub. No. 99–4649. Bethesda, MD, 1999. [http://seer.cancer.gov/publications/childhood/]
22. Howlader N, Noone AM, Krapcho M, Neyman N, Aminou R, Altekruse SF, Kosary CL, Ruhl J, Tatalovich Z, Cho H, Mariotto A, Eisner MP, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2009 (Vintage 2009 Populations), National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2009_pops09/, based on November 2011 SEER data submission, posted to the SEER web site, April 2012.
23. Steliarova-Foucher E, Stiller C, Lacour B, Kaatsch P. International classification of childhood cancer, third edition. *Cancer* 2005;103:1457–1467.
24. McCarthy BJ, Davis FG, Freels S, Surawicz TS, Damek DM, Grutsch J, Menck HR, Laws ER, Jr. Factors associated with survival in patients with meningioma. *J Neurosurg* 1998;88: 831–839.
25. Cahill KS, Claus EB. Treatment and survival of patients with nonmalignant intracranial meningioma: results from the Surveillance, Epidemiology, and End Results Program of the National Cancer Institute. Clinical article. *J Neurosurg*. 2011 Aug;115(2):259–67.

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

Histology	ICD-O-3[†] Histology Code
Tumors of Neuroepithelial Tissue	
Pilocytic astrocytoma	9421
Diffuse astrocytoma	9400, 9410, 9411, 9420
Anaplastic astrocytoma	9401
Unique astrocytoma variants	9381, 9384, 9424
Glioblastoma	9440, 9441, 9442/3[‡]
Oligodendroglioma	9450
Anaplastic oligodendroglioma	9451, 9460
Oligoastrocytic tumors	9382
Ependymal tumors	9383, 9391, 9392, 9393, 9394
Glioma malignant, NOS	9380
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[§], 9492 (excluding site C75.1), 9493, 9505, 9506, 9522, 9523
Tumors of the pineal region	9360, 9361, 9362
Embryonal tumors	8963, 9364, 9470, 9471, 9472, 9473, 9474, 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, 9480
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

[†] International Classification of Diseases for Oncology, 3rd Edition, 2000. World Health Organization, Geneva, Switzerland.
[‡] Morphology 9442/3 only.
[§] Morphology 9442/1 only.
CBTRUS defines the broad category of gliomas to include ICD-O-3 histology codes 9380-9384,9391-9460,9480.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NOS, not otherwise specified.

Table 1a. Central Brain Tumor Registry of the United States (CBTRUS), Brain and Central Nervous System Tumor Malignant Histologies[†]

Histology	ICD-O-3[‡] Histology Code
Tumors of Neuroepithelial Tissue	
Pilocytic astrocytoma	9421/1 [Included with malignant tumors]
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
Choroid plexus	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
Embryonal tumors	8963/3, 9364/3, 9470/3, 9471/3, 9472/3,9473/3, 9474/3, 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, 9480/3
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

[†] Includes all the histologies listed in the standard definition of reportable brain tumors from the Consensus Conference[10] on Brain Tumor Definitions.
[‡] International Classification of Diseases for Oncology, 3rd Edition, 2000. World Health Organization, Geneva, Switzerland.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NOS, not otherwise specified.

Table 1b. Central Brain Tumor Registry of the United States (CBTRUS), Brain and Central Nervous System Tumor Non-Malignant Histologies[†]

Histology	ICD-O-3[‡] Histology Code
Tumors of Neuroepithelial Tissue	
Pilocytic astrocytoma	9421/1 [Included with malignant tumors]
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 neuronalglial 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
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

[†] Includes all the histologies listed in the standard definition of reportable brain tumors from the Consensus Conference[10] on Brain Tumor Definition.
[‡] International Classification of Diseases for Oncology, 3rd Edition, 2000. World Health Organization, Geneva, Switzerland.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NOS, not otherwise specified.

Table 2. Number of Brain and Central Nervous System Tumors by Major Histology Groupings, Histology, Gender, Race and Hispanic Ethnicity, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

	Total	Gender		Race				Hispanic Ethnicity†	
Histology		Male	Female	White	Black	AIAN	API	Hispanic	Non-Hispanic
Tumors of Neuroepithelial Tissue	**99,063**	**55,149**	**43,914**	**88,414**	**6,666**	**516**	**1,823**	**9,034**	**90,029**
Pilocytic astrocytoma	4,636	2,374	2,262	3,870	491	39	104	649	3,987
Diffuse astrocytoma	8,616	4,811	3,805	7,616	591	67	170	814	7,802
Anaplastic astrocytoma	5,374	3,059	2,315	4,856	295	31	103	455	4,919
Unique astrocytoma variants	938	500	438	757	126	–	–	132	806
Glioblastoma	49,088	27,994	21,094	45,140	2,614	182	668	3,203	45,885
Oligodendroglioma	3,973	2,181	1,792	3,558	231	19	85	419	3,554
Anaplastic oligodendroglioma	1,687	933	754	1,507	88	–	40	156	1,531
Oligoastrocytic tumors	3,020	1,724	1,296	2,691	165	22	81	310	2,710
Ependymal tumors	6,117	3,371	2,746	5,311	473	41	144	707	5,410
Glioma malignant, NOS	6,574	3,329	3,245	5,569	638	33	164	770	5,804
Choroid plexus tumors	772	375	397	664	58	–	21	131	641
Other neuroepithelial tumors	95	35	60	80	–	–	–	–	82
Neuronal and mixed neuronal-glial tumors	3,887	2,093	1,794	3,245	396	25	108	438	3,449
Tumors of the pineal region	579	240	339	444	103	–	–	80	499
Embryonal tumors	3,707	2,130	1,577	3,106	384	24	111	757	2,950
Tumors of Cranial and Spinal Nerves	**25,942**	**12,377**	**13,565**	**22,614**	**1,349**	**106**	**854**	**2,108**	**23,834**
Nerve sheath tumors	25,926	12,371	13,555	22,603	1,348	106	852	2,107	23,819
Other tumors of cranial and spinal nerves	16	–	–	–	–	–	–	–	–
Tumors of Meninges	**114,363**	**31,030**	**83,333**	**94,854**	**13,112**	**592**	**3,380**	**9,790**	**104,573**
Meningioma	110,359	28,884	81,475	91,469	12,757	561	3,238	9,298	101,061
Mesenchymal tumors	1,192	584	608	998	113	–	38	127	1,065
Primary melanocytic lesions	106	65	41	95	–	–	–	–	91
Other neoplasms related to the meninges	2,706	1,497	1,209	2,292	236	19	101	350	2,356
Lymphomas and Hemopoietic Neoplasms	**6,956**	**3,701**	**3,255**	**5,874**	**693**	**39**	**251**	**721**	**6,235**
Lymphoma	6,774	3,607	3,167	5,731	667	36	245	694	6,080
Other hemopoietic neoplasms	182	94	88	143	26	–	–	27	155
Germ Cell Tumors and Cysts	**1,418**	**967**	**451**	**1,126**	**146**	**–**	**91**	**285**	**1,133**
Germ cell tumors, cysts and heterotopias	1,418	967	451	1,126	146	–	91	285	1,133
Tumors of Sellar Region	**46,562**	**21,057**	**25,505**	**34,608**	**8,535**	**372**	**1,566**	**6,699**	**39,863**
Tumors of the pituitary	43,882	19,728	24,154	32,590	8,056	351	1,473	6,289	37,593
Craniopharyngioma	2,680	1,329	1,351	2,018	479	21	93	410	2,270
Unclassified Tumors	**16,898**	**7,489**	**9,409**	**14,313**	**1,733**	**108**	**337**	**1,791**	**15,107**
Hemangioma	3,240	1,436	1,804	2,765	256	17	111	370	2,870
Neoplasm, unspecified	13,566	6,008	7,558	11,471	1,470	89	222	1,409	12,157
All other	92	45	47	77	–	–	–	–	80
Total	**311,202**	**131,770**	**179,432**	**261,803**	**32,234**	**1,742**	**8,302**	**30,428**	**280,774**

- Counts are not presented when fewer than 16 cases were reported for the specific histology category. The suppressed cases are included in the counts for totals. Counts for other race, unspecified and unknown race are included in the counts for totals.
† 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).
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; AIAN, American Indian/Alaskan Native; API, Asian Pacific Islander.

Table 3. Number of Childhood (Ages 0-19) Brain and Central Nervous System Tumors by Major Histology Groupings, Histology, Gender, Race and Hispanic Ethnicity, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

	Total	Gender		Race				Hispanic Ethnicity[†]	
Histology		**Male**	**Female**	**White**	**Black**	**AIAN**	**API**	**Hispanic**	**Non-Hispanic**
Tumors of Neuroepithelial Tissue	**14,152**	**7,631**	**6,521**	**11,484**	**1,717**	**114**	**399**	**2,449**	**11,703**
Pilocytic astrocytoma	3,220	1,668	1,552	2,654	367	28	74	502	2,718
Diffuse astrocytoma	1,082	577	505	869	136	–	31	178	904
Anaplastic astrocytoma	320	187	133	258	40	–	–	61	259
Unique astrocytoma variants	430	224	206	328	74	–	–	73	357
Glioblastoma	562	324	238	425	101	–	23	105	457
Oligodendroglioma	233	131	102	187	38	–	–	34	199
Anaplastic oligodendroglioma	49	27	22	40	–	–	–	–	40
Oligoastrocytic tumors	137	63	74	117	–	–	–	18	119
Ependymal tumors	1,112	641	471	899	126	16	48	228	884
Glioma malignant, NOS	2,345	1,148	1,197	1,885	273	–	76	397	1,948
Choroid plexus tumors	394	221	173	339	26	–	–	86	308
Other neuroepithelial tumors	30	–	24	23	–	–	–	–	29
Neuronal and mixed neuronal-glial tumors	1,456	805	651	1,203	163	–	27	204	1,252
Tumors of the pineal region	165	80	85	103	51	–	–	34	131
Embryonal tumors	2,617	1,529	1,088	2,154	294	21	84	519	2,098
Tumors of Cranial and Spinal Nerves	**1,100**	**558**	**542**	**884**	**134**	**–**	**27**	**193**	**907**
Nerve sheath tumors	1,100	558	542	884	134	–	27	193	907
Other tumors of cranial and spinal nerves	–	–	–	–	–	–	–	–	–
Tumors of Meninges	**857**	**409**	**448**	**687**	**107**	**–**	**23**	**144**	**713**
Meningioma	548	263	285	431	74	–	17	71	477
Mesenchymal tumors	150	61	89	129	–	–	–	28	122
Primary melanocytic lesions	19	–	–	16	–	–	–	–	–
Other neoplasms related to the meninges	140	75	65	111	18	–	–	39	101
Lymphomas and Hemopoietic Neoplasms	**90**	**56**	**34**	**67**	**–**	**–**	**–**	**27**	**63**
Lymphoma	59	38	21	40	–	–	–	18	41
Other hemopoietic neoplasms	31	18	–	27	–	–	–	–	22
Germ Cell Tumors and Cysts	**823**	**581**	**242**	**640**	**88**	**–**	**63**	**186**	**637**
Germ cell tumors, cysts and heterotopias	823	581	242	640	88	–	63	186	637
Tumors of Sellar Region	**2,660**	**931**	**1,729**	**2,028**	**377**	**45**	**72**	**614**	**2,046**
Tumors of the pituitary	1,894	542	1,352	1,441	262	35	53	436	1,458
Craniopharyngioma	766	389	377	587	115	–	19	178	588
Unclassified Tumors	**1,027**	**543**	**484**	**834**	**106**	**–**	**23**	**243**	**784**
Hemangioma	293	158	135	249	23	–	–	68	225
Neoplasm, unspecified	727	381	346	579	83	–	–	174	553
All other	–	–	–	–	–	–	–	–	–
Total	**20,709**	**10,709**	**10,000**	**16,624**	**2,542**	**199**	**612**	**3,856**	**16,853**

- Counts are not presented when fewer than 16 cases were reported for the specific histology category. The suppressed cases are included in the counts for totals. Counts for other race, unspecified and unknown race are included in the counts for totals.
[†]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).
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; AIAN, American Indian/Alaskan Native; API, Asian Pacific Islander.

Table 4. Number of Childhood (Ages 0-19) Brain and Central Nervous System Tumors by Major Histology Groupings, Histology and Age at Diagnosis, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

	Age at Diagnosis					
Histology	**0-4**	**5-9**	**10-14**	**15-19**	**0-19**	**0-14**
Tumors of Neuroepithelial Tissue	**4,566**	**3,596**	**3,136**	**2,854**	**14,152**	**11,298**
Pilocytic astrocytoma	886	867	849	618	3,220	2,602
Diffuse astrocytoma	334	217	259	272	1,082	810
Anaplastic astrocytoma	53	80	91	96	320	224
Unique astrocytoma variants	65	94	134	137	430	293
Glioblastoma	89	139	160	174	562	388
Oligodendroglioma	30	36	57	110	233	123
Anaplastic oligodendroglioma	–	–	–	25	49	24
Oligoastrocytic tumors	28	25	32	52	137	85
Ependymal tumors	402	226	211	273	1,112	839
Glioma malignant, NOS	875	789	427	254	2,345	2,091
Choroid plexus tumors	265	40	38	51	394	343
Other neuroepithelial tumors	–	–	–	–	30	23
Neuronal and mixed neuronal-glial tumors	248	297	429	482	1,456	974
Tumors of the pineal region	53	38	32	42	165	123
Embryonal tumors	1,232	737	387	261	2,617	2,356
Tumors of Cranial and Spinal Nerves	**272**	**207**	**252**	**369**	**1,100**	**731**
Nerve sheath tumors	272	207	252	369	1,100	731
Other tumors of cranial and spinal nerves	–	–	–	–	–	–
Tumors of Meninges	**139**	**98**	**210**	**410**	**857**	**447**
Meningioma	70	60	143	275	548	273
Mesenchymal tumors	56	28	31	35	150	115
Primary melanocytic lesions	–	–	–	–	19	–
Other neoplasms related to the meninges	–	–	33	94	140	46
Lymphomas and Hemopoietic Neoplasms	**–**	**22**	**20**	**35**	**90**	**55**
Lymphoma	–	–	–	25	59	34
Other hemopoietic neoplasms	–	–	–	–	31	21
Germ Cell Tumors and Cysts	**129**	**133**	**262**	**299**	**823**	**524**
Germ cell tumors, cysts and heterotopias	129	133	262	299	823	524
Tumors of Sellar Region	**174**	**358**	**608**	**1,520**	**2,660**	**1,140**
Tumors of the pituitary	33	107	392	1,362	1,894	532
Craniopharyngioma	141	251	216	158	766	608
Unclassified Tumors	**224**	**175**	**252**	**376**	**1,027**	**651**
Hemangioma	49	38	74	132	293	161
Neoplasm, unspecified	173	136	176	242	727	485
All other	–	–	–	–	–	–
Total	**5,517**	**4,589**	**4,740**	**5,863**	**20,709**	**14,846**

- Counts are not presented when fewer than 16 cases were reported for the specific histology category. The suppressed cases are included in the counts for totals.

Abbreviation: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program.

Table 5. Characteristics of Brain and Central Nervous System Tumors by Population-Based Cancer Registry, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

State	No. of Newly Diagnosed Tumors	Percent Non-Malignant Tumors	Histologically Confirmed Percent	Radio-graphically Confirmed Percent	Average Annual 2005–2009 Population[†]
Alabama	4,170	57.4	71.7	24.6	4,632,619
Alaska	669	68.5	62.0	34.8	683,142
Arizona	6,343	63.9	64.8	29.2	6,324,866
Arkansas	2,954	63.6	58.8	35.1	2,838,145
California	33,666	64.8	69.0	27.6	36,308,524
Colorado	6,123	71.8	53.7	43.5	4,843,209
Connecticut	3,499	58.1	73.1	24.0	3,494,486
Delaware	898	59.8	71.0	25.3	863,831
District of Columbia	485	56.9	67.0	27.4	588,433
Florida	23,552	68.3	58.2	38.2	18,222,422
Georgia	8,805	65.0	63.7	32.6	9,497,665
Hawaii	1,264	73.4	60.8	36.1	1,280,241
Idaho	1,438	58.2	68.8	26.4	1,492,565
Illinois	13,649	66.3	60.1	37.5	12,785,049
Indiana	6,500	62.2	58.2	39.0	6,342,471
Iowa	3,363	60.8	63.3	34.1	2,978,881
Kentucky	5,629	69.5	52.9	43.3	4,251,998
Louisiana	4,271	66.7	65.1	31.2	4,383,629
Maine	1,291	52.9	76.8	19.1	1,316,379
Massachusetts	6,426	58.2	74.4	21.7	6,511,177
Michigan	11,158	64.0	62.4	33.2	10,039,210
Minnesota	4,210	56.7	96.8	0.0	5,188,579
Mississippi	2,754	64.4	63.4	31.8	2,916,885
Missouri	6,727	65.3	61.3	34.4	5,904,390
Montana	1,022	62.2	69.2	26.5	956,256
Nebraska	1,729	59.1	70.9	25.9	1,772,127
Nevada	2,117	60.8	71.7	22.5	2,545,764
New Hampshire	1,385	59.9	72.1	25.2	1,315,420
New Jersey	9,001	60.9	68.4	27.1	8,650,548
New Mexico	1,659	61.5	71.5	20.9	1,964,862
New York	23,773	68.4	61.3	35.4	19,423,895
North Carolina	9,568	65.2	69.9	27.0	9,045,704
North Dakota	554	55.6	60.3	33.9	639,721
Ohio	10,658	56.2	70.4	24.4	11,511,858
Oklahoma	3,286	56.6	64.6	31.6	3,610,073
Oregon	4,031	60.7	72.3	25.7	3,727,404
Pennsylvania	15,836	65.8	61.8	32.8	12,516,594
Rhode Island	1,149	64.6	68.9	27.9	1,057,381
South Carolina	4,524	63.4	63.1	30.9	4,416,870
South Dakota	714	60.8	65.7	30.7	796,511
Tennessee	7,026	66.0	60.4	36.4	6,158,955
Texas	25,611	68.8	56.5	37.2	23,818,417
Utah	2,517	66.0	74.3	24.9	2,651,814
Vermont	899	65.3	63.1	34.5	620,414
Virginia	7,064	63.1	69.9	27.0	7,721,729
Washington	8,530	69.9	56.7	39.8	6,465,754
West Virginia	2,063	61.0	61.3	35.8	1,811,401
Wisconsin	6,143	60.8	92.8	4.2	5,599,416
Wyoming	499	62.7	72.1	27.3	523,950
Total	**311,202**	**64.8**	**64.6**	**31.5**	**293,011,631**

[†] Population estimates were obtained from the United States Bureau of the Census available on the SEER program website.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; CNS, central nervous system; NPCR, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program.

Table 6. Brain and Central Nervous System Tumor Average Annual Age-Adjusted Incidence Rates[†] by Age, Behavior, and Central Cancer Registry, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

State	0-19 Years				20+ Years				All Ages					
	Malignant		Non-Malignant		Malignant		Non-Malignant		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
Alabama	2.99	(2.57-3.45)	0.99	(0.76–1.26)	8.95	(8.51–9.40)	13.24	(12.70–13.79)	7.24	(6.90–7.58)	9.72	(9.34–10.13)	16.96	(16.45–17.49)
Alaska	2.77	(1.84–4.00)	3.61	(2.56–4.96)	8.98	(7.63–10.50)	19.96	(17.97–22.12)	7.20	(6.19–8.32)	15.27	(13.82–16.84)	22.47	(20.69–24.37)
Arizona	3.23	(2.87–3.62)	1.59	(1.34–1.87)	8.67	(8.29–9.06)	17.10	(16.57–17.65)	7.11	(6.82–7.41)	12.65	(12.26–13.05)	19.76	(19.28–20.26)
Arkansas	3.42	(2.87–4.06)	3.51	(2.95–4.14)	8.63	(8.08–9.20)	16.18	(15.42–16.97)	7.13	(6.71–7.58)	12.55	(11.98–13.13)	19.68	(18.97–20.41)
California	2.95	(2.80–3.10)	1.74	(1.63–1.86)	8.29	(8.13–8.46)	16.79	(16.56–17.02)	6.76	(6.64–6.88)	12.47	(12.30–12.64)	19.23	(19.02–19.44)
Colorado	2.78	(2.40–3.21)	1.83	(1.51–2.18)	9.21	(8.75–9.69)	25.94	(25.15–26.74)	7.37	(7.02–7.73)	19.02	(18.45–19.60)	26.39	(25.72–27.07)
Connecticut	3.33	(2.82–3.90)	1.54	(1.21–1.94)	9.68	(9.16–10.23)	14.41	(13.77–15.07)	7.86	(7.46–8.28)	10.72	(10.25–11.20)	18.58	(17.96–19.21)
Delaware	3.25	(2.29–4.48)	2.09	(1.34–3.11)	9.72	(8.68–10.85)	15.28	(13.98–16.68)	7.86	(7.07–8.73)	11.50	(10.54–12.52)	19.36	(18.10–20.68)
District of Columbia	2.73	(1.61–4.32)	–	–	8.82	(7.60–10.18)	12.01	(10.58–13.57)	7.08	(6.13–8.12)	9.18	(8.11–10.34)	16.25	(14.82–17.79)
Florida	3.40	(3.16–3.65)	1.94	(1.76–2.13)	8.77	(8.56–8.99)	20.29	(19.97–20.62)	7.23	(7.06–7.40)	15.03	(14.79–15.27)	22.26	(21.97–22.55)
Georgia	3.04	(2.75–3.34)	1.59	(1.39–1.81)	8.44	(8.12–8.77)	17.41	(16.95–17.89)	6.89	(6.64–7.14)	12.87	(12.54–13.22)	19.76	(19.34–20.18)
Hawaii	2.85	(2.08–3.80)	1.48	(0.95–2.20)	5.80	(5.14–6.52)	18.27	(17.08–19.51)	4.95	(4.43–5.52)	13.45	(12.59–14.36)	18.40	(17.39–19.46)
Idaho	2.86	(2.21–3.64)	1.42	(0.97–2.01)	10.26	(9.40–11.18)	15.56	(14.49–16.68)	8.14	(7.49–8.82)	11.50	(10.73–12.32)	19.64	(18.63–20.69)
Illinois	2.98	(2.73–3.24)	1.83	(1.64–2.04)	8.80	(8.53–9.08)	18.87	(18.47–19.27)	7.13	(6.93–7.34)	13.98	(13.69–14.27)	21.11	(20.76–21.47)
Indiana	3.58	(3.19–3.99)	1.85	(1.57–2.15)	9.09	(8.70–9.48)	16.62	(16.10–17.15)	7.51	(7.21–7.81)	12.38	(12.00–12.77)	19.89	(19.40–20.38)
Iowa	3.30	(2.76–3.91)	1.57	(1.21–2.00)	10.11	(9.53–10.71)	16.90	(16.15–17.67)	8.16	(7.72–8.62)	12.50	(11.95–13.06)	20.66	(19.95–21.38)
Kentucky	3.43	(2.96–3.95)	2.33	(1.95–2.77)	9.46	(8.99–9.96)	23.68	(22.93–24.46)	7.73	(7.37–8.11)	17.56	(17.01–18.12)	25.29	(24.63–25.97)
Louisiana	2.97	(2.56–3.44)	1.68	(1.37–2.03)	7.78	(7.35–8.23)	17.32	(16.67–17.98)	6.40	(6.07–6.75)	12.83	(12.36–13.32)	19.23	(18.65–19.82)
Maine	3.80	(2.89–4.91)	1.39	(0.87–2.12)	9.85	(9.03–10.73)	12.31	(11.37–13.31)	8.11	(7.47–8.80)	9.18	(8.49–9.91)	17.29	(16.34–18.28)
Massachusetts	3.42	(3.03–3.85)	1.61	(1.35–1.90)	9.51	(9.13–9.91)	14.18	(13.72–14.66)	7.77	(7.47–8.07)	10.57	(10.24–10.92)	18.34	(17.89–18.80)
Michigan	3.48	(3.17–3.81)	1.90	(1.68–2.15)	9.34	(9.03–9.66)	18.17	(17.74–18.61)	7.66	(7.42–7.90)	13.50	(13.19–13.82)	21.16	(20.76–21.56)
Minnesota	2.98	(2.59–3.42)	1.34	(1.09–1.64)	8.45	(8.03–8.87)	11.94	(11.45–12.44)	6.88	(6.56–7.21)	8.90	(8.54–9.27)	15.78	(15.30–16.27)
Mississippi	2.80	(2.32–3.35)	1.58	(1.23–2.00)	8.16	(7.62–8.73)	16.28	(15.51–17.08)	6.62	(6.21–7.05)	12.06	(11.51–12.64)	18.68	(17.99–19.40)
Missouri	3.20	(2.82–3.62)	1.50	(1.25–1.80)	9.19	(8.80–9.60)	19.05	(18.48–19.64)	7.47	(7.17–7.78)	14.02	(13.60–14.44)	21.49	(20.97–22.01)
Montana	2.36	(1.58–3.40)	1.74	(1.10–2.62)	9.28	(8.32–10.32)	16.44	(15.13–17.83)	7.30	(6.57–8.08)	12.22	(11.27–13.23)	19.52	(18.31–20.78)
Nebraska	3.58	(2.88–4.39)	2.58	(1.99–3.29)	9.49	(8.75–10.28)	14.58	(13.66–15.55)	7.80	(7.23–8.40)	11.14	(10.46–11.85)	18.94	(18.05–19.86)
Nevada	2.40	(1.91–2.96)	0.63	(0.39–0.95)	8.17	(7.58–8.78)	14.27	(13.49–15.10)	6.51	(6.07–6.98)	10.36	(9.79–10.95)	16.87	(16.15–17.61)
New Hampshire	3.71	(2.84–4.77)	2.26	(1.61–3.08)	9.70	(8.85–10.61)	15.30	(14.24–16.42)	7.98	(7.32–8.68)	11.56	(10.78–12.39)	19.54	(18.51–20.61)
New Jersey	3.63	(3.29–4.00)	1.88	(1.63–2.15)	9.40	(9.07–9.74)	15.85	(15.42–16.29)	7.75	(7.49–8.01)	11.84	(11.53–12.16)	19.59	(19.18–20.00)
New Mexico	2.17	(1.66–2.78)	1.70	(1.25–2.26)	7.99	(7.34–8.68)	13.57	(12.72–14.46)	6.32	(5.83–6.83)	10.17	(9.55–10.81)	16.48	(15.69–17.30)
New York	3.57	(3.34–3.81)	2.37	(2.19–2.57)	8.93	(8.71–9.15)	21.07	(20.74–21.41)	7.39	(7.23–7.56)	15.71	(15.46–15.95)	23.10	(22.80–23.40)

Continued

Table 6. *Continued*

State	0-19 Years				20+ Years				All Ages					
	Malignant		Non-Malignant		Malignant		Non-Malignant		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
North Carolina	3.20	(2.89–3.53)	1.91	(1.68–2.17)	8.78	(8.46–9.10)	18.03	(17.57–18.50)	7.18	(6.93–7.42)	13.41	(13.07–13.75)	20.58	(20.17–21.00)
North Dakota	2.96	(1.89–4.40)	–	–	8.90	(7.74–10.18)	12.05	(10.69–13.54)	7.19	(6.30–8.18)	8.95	(7.95–10.03)	16.14	(14.79–17.58)
Ohio	3.41	(3.12–3.72)	2.01	(1.79–2.24)	9.32	(9.03–9.61)	12.84	(12.51–13.18)	7.62	(7.40–7.85)	9.73	(9.49–9.99)	17.36	(17.03–17.69)
Oklahoma	2.92	(2.47–3.44)	1.42	(1.11–1.79)	9.44	(8.92–9.98)	13.32	(12.70–13.95)	7.57	(7.18–7.98)	9.90	(9.45–10.37)	17.47	(16.87–18.09)
Oregon	3.77	(3.24–4.36)	2.39	(1.98–2.87)	9.75	(9.24–10.28)	16.15	(15.49–16.83)	8.03	(7.64–8.44)	12.20	(11.72–12.71)	20.24	(19.61–20.88)
Pennsylvania	3.52	(3.23–3.83)	1.98	(1.77–2.21)	9.46	(9.19–9.73)	19.73	(19.34–20.12)	7.76	(7.55–7.97)	14.63	(14.35–14.92)	22.39	(22.04–22.75)
Rhode Island	3.11	(2.23–4.23)	1.87	(1.22–2.75)	8.73	(7.85–9.69)	17.23	(15.98–18.56)	7.12	(6.44–7.86)	12.83	(11.91–13.80)	19.95	(18.80–21.15)
South Carolina	3.11	(2.67–3.59)	1.63	(1.32–1.98)	8.71	(8.27–9.17)	16.71	(16.08–17.35)	7.10	(6.76–7.46)	12.38	(11.93–12.85)	19.48	(18.91–20.07)
South Dakota	2.60	(1.74–3.74)	–	–	8.28	(7.27–9.39)	13.89	(12.58–15.30)	6.65	(5.88–7.49)	10.22	(9.26–11.24)	16.87	(15.64–18.17)
Tennessee	3.52	(3.13–3.95)	2.24	(1.93–2.59)	8.95	(8.57–9.34)	19.18	(18.62–19.76)	7.39	(7.10–7.70)	14.32	(13.91–14.74)	21.71	(21.20–22.23)
Texas	3.41	(3.22–3.60)	2.28	(2.13–2.44)	8.66	(8.46–8.87)	21.80	(21.47–22.14)	7.16	(7.00–7.32)	16.20	(15.96–16.45)	23.36	(23.07–23.65)
Utah	4.09	(3.53–4.72)	1.76	(1.39–2.19)	8.45	(7.81–9.13)	20.48	(19.47–21.53)	7.20	(6.71–7.71)	15.11	(14.38–15.86)	22.31	(21.43–23.21)
Vermont	2.20	(1.29–3.51)	2.54	(1.56–3.92)	11.70	(10.38–13.14)	22.99	(21.10–25.01)	8.97	(7.99–10.05)	17.13	(15.74–18.60)	26.10	(24.39–27.90)
Virginia	2.97	(2.65–3.33)	1.19	(0.99–1.42)	8.13	(7.80–8.48)	15.41	(14.95–15.88)	6.65	(6.40–6.92)	11.33	(10.99–11.67)	17.98	(17.56–18.41)
Washington	3.65	(3.26–4.08)	2.76	(2.42–3.14)	9.44	(9.05–9.85)	24.18	(23.55–24.82)	7.78	(7.48–8.09)	18.04	(17.58–18.51)	25.82	(25.27–26.38)
West Virginia	3.06	(2.36–3.89)	1.45	(0.99–2.05)	9.67	(8.98–10.41)	16.18	(15.27–17.13)	7.78	(7.24–8.35)	11.95	(11.29–12.65)	19.73	(18.87–20.62)
Wisconsin	3.67	(3.24–4.13)	1.64	(1.36–1.95)	10.02	(9.60–10.46)	16.99	(16.43–17.56)	8.20	(7.87–8.54)	12.59	(12.18–13.00)	20.78	(20.26–21.32)
Wyoming	2.39	(1.39–3.82)	–	–	8.79	(7.49–10.25)	15.23	(13.52–17.09)	6.95	(5.97–8.05)	11.37	(10.12–12.72)	18.32	(16.72–20.03)

[†] Rates are per 100,000 and are age–adjusted to the 2000 United States standard population.

Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 7. Brain and Central Nervous System Tumor Average Annual Age-Adjusted Incidence Rates[†] by Site[‡] and Gender, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

ICD-O-3 Code	Site	Total			Male			Female		
		N	Adjusted Rate	95% CI	N	Adjusted Rate	95% CI	N	Adjusted Rate	95% CI
C71.1-C71.4	Frontal, temporal, parietal, & occipital lobes of the brain	65,532	4.33	(4.29–4.36)	36,171	5.13	(5.08–5.18)	29,361	3.65	(3.60–3.69)
C71.0	Cerebrum	6,007	0.40	(0.39–0.41)	3,148	0.45	(0.43–0.46)	2,859	0.37	(0.35–0.38)
C71.5	Ventricle	3,639	0.25	(0.24–0.26)	1,993	0.28	(0.26–0.29)	1,646	0.22	(0.21–0.24)
C71.6	Cerebellum	8,601	0.59	(0.58–0.60)	4,655	0.65	(0.63–0.67)	3,946	0.53	(0.52–0.55)
C71.7	Brain stem	4,924	0.34	(0.33–0.35)	2,606	0.36	(0.35–0.38)	2,318	0.32	(0.31–0.33)
C71.8–C71.9	Other brain	30,334	2.00	(1.98–2.03)	15,763	2.28	(2.25–2.32)	14,571	1.77	(1.74–1.80)
C72.0–C72.1	Spinal cord and cauda equina	9,538	0.64	(0.63–0.65)	4,867	0.67	(0.65–0.69)	4,671	0.61	(0.59–0.62)
C72.2–C72.5	Cranial nerves	21,489	1.41	(1.39–1.43)	10,055	1.38	(1.35–1.41)	11,434	1.44	(1.42–1.47)
C72.8–C72.9	Other nervous system	1,902	0.13	(0.12–0.13)	1,013	0.14	(0.13–0.15)	889	0.11	(0.11–0.12)
C70.0–C70.9	Meninges (cerebral & spinal)	109,660	7.18	(7.14–7.22)	28,856	4.27	(4.22–4.32)	80,804	9.68	(9.61–9.75)
C75.1–C75.2	Pituitary	47,614	3.19	(3.16–3.22)	21,473	3.02	(2.98–3.06)	26,141	3.45	(3.40–3.49)
C75.3	Pineal	1,391	0.10	(0.09–0.10)	831	0.11	(0.11–0.12)	560	0.08	(0.07–0.08)
C30.0 (9522–9523)	Olfactory tumors of the nasal cavity	571	0.04	(0.03–0.04)	339	0.05	(0.04–0.05)	232	0.03	(0.03–0.03)
Total		**311,202**	**20.59**	**(20.52–20.66)**	**131,770**	**18.80**	**(18.69–18.90)**	**179,432**	**22.25**	**(22.15–22.35)**

[†] Rates are per 100,000 and are age adjusted to the 2000 US standard population.
[‡] The sites referred to in this table are loosely based on the categories and site codes defined in the SEER site/histology validation list.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval.

Table 8. Distribution and Average Annual Age-Adjusted Incidence Rates[†] of Brain and Central Nervous System Tumors by Major Histology Groupings and Histology, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

	Total					Malignant			Non-malignant		
Histology	**N**	**% of All Tumors**	**Median Age**	**Rate**	**(95% CI)**	**N**	**Rate**	**(95% CI)**	**N**	**Rate**	**(95% CI)**
Tumors of Neuroepithelial Tissue	**99,063**	**31.8**	**55**	**6.60**	**(6.56–6.64)**	**92,418**	**6.14**	**(6.10–6.18)**	**6,645**	**0.46**	**(0.45–0.47)**
Pilocytic astrocytoma	4,636	1.5	13	0.33	(0.32–0.34)	4,636	0.33	(0.32–0.34)	–	–	–
Diffuse astrocytoma	8,616	2.8	48	0.58	(0.57–0.60)	8,616	0.58	(0.57–0.60)	–	–	–
Anaplastic astrocytoma	5,374	1.7	54	0.36	(0.35–0.37)	5,374	0.36	(0.35–0.37)	–	–	–
Unique astrocytoma variants	938	0.3	22	0.07	(0.06–0.07)	613	0.04	(0.04–0.05)	325	0.02	(0.02–0.03)
Glioblastoma	49,088	15.8	64	3.19	(3.16–3.22)	49,088	3.19	(3.16–3.22)	–	–	–
Oligodendroglioma	3,973	1.3	43	0.27	(0.26–0.28)	3,973	0.27	(0.26–0.28)	–	–	–
Anaplastic oligodendroglioma	1,687	0.5	49	0.11	(0.11–0.12)	1,685	0.11	(0.11–0.12)	–	–	–
Oligoastrocytic tumors	3,020	1.0	42	0.21	(0.20–0.21)	3,019	0.21	(0.20–0.21)	–	–	–
Ependymal tumors	6,117	2.0	43	0.41	(0.40–0.42)	3,906	0.26	(0.26–0.27)	2,211	0.15	(0.14–0.16)
Glioma malignant, NOS	6,574	2.1	40	0.45	(0.44–0.46)	6,574	0.45	(0.44–0.46)	–	–	–
Choroid plexus tumors	772	0.2	19	0.05	(0.05–0.06)	133	0.01	(0.01–0.01)	639	0.04	(0.04–0.05)
Other neuroepithelial tumors	95	0.0	38	0.01	(0.01–0.01)	59	0.00	(0.00–0.01)	36	0.00	(0.00–0.00)
Neuronal and mixed neuronal–glial tumors	3,887	1.2	27	0.27	(0.26–0.28)	806	0.05	(0.05–0.06)	3,081	0.21	(0.21–0.22)
Tumors of the pineal region	579	0.2	34	0.04	(0.04–0.04)	324	0.02	(0.02–0.03)	255	0.02	(0.02–0.02)
Embryonal tumors	3,707	1.2	8	0.26	(0.25–0.27)	3,612	0.25	(0.24–0.26)	95	0.01	(0.01–0.01)
Tumors of Cranial and Spinal Nerves	**25,942**	**8.3**	**54**	**1.70**	**(1.68–1.73)**	**241**	**0.02**	**(0.01–0.02)**	**25,701**	**1.69**	**(1.67–1.71)**
Nerve sheath tumors	25,926	8.3	54	1.70	(1.68–1.72)	241	0.02	(0.01–0.02)	25,685	1.69	(1.67–1.71)
Other tumors of cranial and spinal nerves	16	0.0	58	0.00	(0.00–0.00)	–	–	–	16	0.00	(0.00–0.00)

Tumors of Meninges	**114,363**	**36.7**	**65**	**7.49**	**(7.45–7.54)**	**2,587**	**0.17**	**(0.16–0.18)**	**111,776**	**7.32**	**(7.28–7.37)**
Meningioma	110,359	35.5	65	7.22	(7.18–7.27)	1,878	0.12	(0.12–0.13)	108,481	7.10	(7.06–7.14)
Mesenchymal tumors	1,192	0.4	47	0.08	(0.08–0.09)	374	0.03	(0.02–0.03)	818	0.06	(0.05–0.06)
Primary melanocytic lesions	106	0.0	50	0.01	(0.01–0.01)	71	0.01	(0.00–0.01)	35	0.00	(0.00–0.00)
Other neoplasms related to the meninges	2,706	0.9	48	0.18	(0.17–0.19)	264	0.02	(0.02–0.02)	2,442	0.16	(0.16–0.17)
Lymphomas and Hemopoietic Neoplasms	**6,956**	**2.2**	**64**	**0.46**	**(0.45–0.47)**	**6,920**	**0.46**	**(0.45–0.47)**	**36**	**0.00**	**(0.00–0.00)**
Lymphoma	6,774	2.2	65	0.45	(0.44–0.46)	6,773	0.45	(0.44–0.46)	–	–	–
Other hemopoietic neoplasms	182	0.1	51	0.01	(0.01–0.01)	147	0.01	(0.01–0.01)	35	0.00	(0.00–0.00)
Germ Cell Tumors and Cysts	**1,418**	**0.5**	**17**	**0.10**	**(0.09–0.10)**	**947**	**0.07**	**(0.06–0.07)**	**471**	**0.03**	**(0.03–0.04)**
Germ cell tumors, cysts and heterotopias	1,418	0.5	17	0.10	(0.09–0.10)	947	0.07	(0.06–0.07)	471	0.03	(0.03–0.04)
Tumors of Sellar Region	**46,562**	**15.0**	**50**	**3.12**	**(3.09–3.15)**	**140**	**0.01**	**(0.01–0.01)**	**46,422**	**3.11**	**(3.08–3.14)**
Tumors of the pituitary	43,882	14.1	51	2.94	(2.91–2.97)	133	0.01	(0.01–0.01)	43,749	2.93	(2.90–2.96)
Craniopharyngioma	2,680	0.9	41	0.18	(0.18–0.19)	–	–	–	2,673	0.18	(0.18–0.19)
Unclassified Tumors	**16,898**	**5.4**	**65**	**1.12**	**(1.10–1.13)**	**6,442**	**0.42**	**(0.41–0.43)**	**10,456**	**0.70**	**(0.68–0.71)**
Hemangioma	3,240	1.0	49	0.22	(0.21–0.23)	20	0.00	(0.00–0.00)	3,220	0.22	(0.21–0.22)
Neoplasm, unspecified	13,566	4.4	71	0.89	(0.88–0.91)	6,402	0.42	(0.41–0.43)	7,164	0.47	(0.46–0.49)
All other	92	0.0	61	0.01	(0.01–0.01)	20	0.00	(0.00–0.00)	72	0.01	(0.00–0.01)
Total[‡]	**311,202**	**100.0**	**59**	**20.59**	**(20.52–20.66)**	**109,695**	**7.28**	**(7.24–7.33)**	**201,507**	**13.31**	**(13.25–13.37)**

[†] Rates are per 100,000 and are age–adjusted to the 2000 US standard population.
[‡] Refers to all brain tumors including histologies not presented in this table.
– Counts are not presented when fewer than 16 cases were reported 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, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 9. Brain and Central Nervous System Tumor Average Annual Age–Adjusted Incidence Rates[†] by Major Histology Groupings, Histology and Gender, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

Histology	Total		Male		Female	
	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumors of Neuroepithelial Tissue	**6.60**	**(6.56–6.64)**	**7.77**	**(7.70–7.84)**	**5.59**	**(5.54–5.64)**
Pilocytic astrocytoma	0.33	(0.32–0.34)	0.33	(0.32–0.34)	0.32	(0.31–0.34)
Diffuse astrocytoma	0.58	(0.57–0.60)	0.68	(0.66–0.70)	0.50	(0.48–0.52)
Anaplastic astrocytoma	0.36	(0.35–0.37)	0.43	(0.42–0.45)	0.30	(0.28–0.31)
Unique astrocytoma variants	0.07	(0.06–0.07)	0.07	(0.06–0.08)	0.06	(0.06–0.07)
Glioblastoma	3.19	(3.16–3.22)	3.98	(3.94–4.03)	2.53	(2.49–2.56)
Oligodendroglioma	0.27	(0.26–0.28)	0.30	(0.29–0.31)	0.24	(0.23–0.25)
Anaplastic oligodendroglioma	0.11	(0.11–0.12)	0.13	(0.12–0.14)	0.10	(0.09–0.11)
Oligoastrocytic tumors	0.21	(0.20–0.21)	0.24	(0.23–0.25)	0.18	(0.17–0.19)
Ependymal tumors	0.41	(0.40–0.42)	0.46	(0.45–0.48)	0.37	(0.35–0.38)
Glioma malignant, NOS	0.45	(0.44–0.46)	0.48	(0.46–0.49)	0.43	(0.41–0.44)
Choroid plexus tumors	0.05	(0.05–0.06)	0.05	(0.05–0.06)	0.05	(0.05–0.06)
Other neuroepithelial tumors	0.01	(0.01–0.01)	0.01	(0.00–0.01)	0.01	(0.01–0.01)
Neuronal and mixed neuronal–glial tumors	0.27	(0.26–0.28)	0.29	(0.28–0.30)	0.25	(0.24–0.26)
Tumors of the pineal region	0.04	(0.04–0.04)	0.03	(0.03–0.04)	0.05	(0.04–0.05)
Embryonal tumors	0.26	(0.25–0.27)	0.29	(0.28–0.31)	0.22	(0.21–0.24)
Tumors of Cranial and Spinal Nerves	**1.70**	**(1.68–1.73)**	**1.70**	**(1.67–1.73)**	**1.71**	**(1.69–1.74)**
Nerve sheath tumors	1.70	(1.68–1.72)	1.70	(1.67–1.73)	1.71	(1.68–1.74)
Other tumors of cranial and spinal nerves	0.00	(0.00–0.00)	–	–	–	–
Tumors of Meninges	**7.49**	**(7.45–7.54)**	**4.58**	**(4.53–4.63)**	**10.00**	**(9.93–10.07)**
Meningioma	7.22	(7.18–7.27)	4.28	(4.23–4.33)	9.76	(9.69–9.83)
Mesenchymal tumors	0.08	(0.08–0.09)	0.08	(0.08–0.09)	0.08	(0.07–0.09)
Primary melanocytic lesions	0.01	(0.01–0.01)	0.01	(0.01–0.01)	0.01	(0.00–0.01)
Other neoplasms related to the meninges	0.18	(0.17–0.19)	0.21	(0.20–0.22)	0.16	(0.15–0.17)
Lymphomas and Hemopoietic Neoplasms	**0.46**	**(0.45–0.47)**	**0.54**	**(0.52–0.55)**	**0.40**	**(0.38–0.41)**
Lymphoma	0.45	(0.44–0.46)	0.52	(0.51–0.54)	0.39	(0.37–0.40)
Other hemopoietic neoplasms	0.01	(0.01–0.01)	0.01	(0.01–0.02)	0.01	(0.01–0.01)
Germ Cell Tumors and Cysts	**0.10**	**(0.09–0.10)**	**0.13**	**(0.12–0.14)**	**0.06**	**(0.06–0.07)**
Germ cell tumors, cysts and heterotopias	0.10	(0.09–0.10)	0.13	(0.12–0.14)	0.06	(0.06–0.07)
Tumors of Sellar Region	**3.12**	**(3.09–3.15)**	**2.96**	**(2.92–3.00)**	**3.36**	**(3.32–3.41)**
Tumors of the pituitary	2.94	(2.91–2.97)	2.78	(2.74–2.81)	3.18	(3.14–3.22)
Craniopharyngioma	0.18	(0.18–0.19)	0.18	(0.17–0.19)	0.18	(0.17–0.19)
Unclassified Tumors	**1.12**	**(1.10–1.13)**	**1.12**	**(1.10–1.15)**	**1.12**	**(1.10–1.14)**
Hemangioma	0.22	(0.21–0.23)	0.20	(0.19–0.21)	0.23	(0.22–0.25)
Neoplasm, unspecified	0.89	(0.88–0.91)	0.92	(0.89–0.94)	0.88	(0.86–0.90)
All other	0.01	(0.01–0.01)	0.01	(0.01–0.01)	0.01	(0.00–0.01)
Total[‡]	**20.59**	**(20.52–20.66)**	**18.80**	**(18.69–18.90)**	**22.25**	**(22.15–22.35)**

[†] Rates are per 100,000 and are age–adjusted to the 2000 US standard population.
[‡] Refers to all brain tumors including histologies not presented in this table.
– Counts are not presented when fewer than 16 cases were reported for the specific histology category. Suppressed cases are included in the total count.
Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NPCR, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 10. Brain and Central Nervous System Tumor Average Annual Age–Adjusted Incidence Rates[†] by Major Histology Groupings, Histology and Race, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

Histology	White		Black		AIAN		API	
	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumors of Neuroepithelial Tissue	**7.07**	**(7.02–7.12)**	**3.80**	**(3.71–3.90)**	**3.56**	**(3.24–3.90)**	**2.71**	**(2.59–2.84)**
Pilocytic astrocytoma	0.35	(0.34–0.36)	0.23	(0.21–0.25)	0.22	(0.15–0.31)	0.14	(0.12–0.18)
Diffuse astrocytoma	0.63	(0.61–0.64)	0.33	(0.31–0.36)	0.46	(0.36–0.60)	0.25	(0.21–0.29)
Anaplastic astrocytoma	0.39	(0.38–0.40)	0.17	(0.15–0.19)	0.21	(0.14–0.30)	0.16	(0.13–0.20)
Unique astrocytoma variants	0.07	(0.06–0.07)	0.06	(0.05–0.07)	–	–	–	–
Glioblastoma	3.44	(3.40–3.47)	1.67	(1.61–1.74)	1.50	(1.28–1.74)	1.07	(0.99–1.16)
Oligodendroglioma	0.30	(0.29–0.31)	0.13	(0.11–0.15)	0.13	(0.08–0.20)	0.12	(0.09–0.15)
Anaplastic oligodendroglioma	0.12	(0.12–0.13)	0.05	(0.04–0.06)	–	–	0.06	(0.04–0.08)
Oligoastrocytic tumors	0.23	(0.22–0.24)	0.09	(0.08–0.11)	0.13	(0.08–0.21)	0.11	(0.09–0.14)
Ependymal tumors	0.44	(0.43–0.45)	0.25	(0.23–0.28)	0.24	(0.17–0.33)	0.20	(0.17–0.24)
Glioma malignant, NOS	0.46	(0.45–0.48)	0.35	(0.32–0.38)	0.22	(0.15–0.31)	0.25	(0.21–0.29)
Choroid plexus tumors	0.06	(0.05–0.06)	0.03	(0.02–0.04)	–	–	0.03	(0.02–0.04)
Other neuroepithelial tumors	0.01	(0.01–0.01)	–	–	–	–	–	–
Neuronal and mixed neuronal–glial tumors	0.28	(0.27–0.29)	0.20	(0.18–0.22)	0.14	(0.09–0.21)	0.15	(0.12–0.18)
Tumors of the pineal region	0.04	(0.03–0.04)	0.05	(0.04–0.06)	–	–	–	–
Embryonal tumors	0.28	(0.27–0.29)	0.18	(0.16–0.20)	0.13	(0.08–0.20)	0.15	(0.12–0.18)
Tumors of Cranial and Spinal Nerves	**1.78**	**(1.76–1.81)**	**0.78**	**(0.74–0.83)**	**0.75**	**(0.61–0.92)**	**1.25**	**(1.16–1.33)**
Nerve sheath tumors	1.78	(1.76–1.81)	0.78	(0.74–0.83)	0.75	(0.61–0.92)	1.24	(1.16–1.33)
Other tumors of cranial and spinal nerves	–	–	–	–	–	–	–	–
Tumors of Meninges	**7.28**	**(7.23–7.33)**	**8.75**	**(8.60–8.91)**	**5.05**	**(4.63–5.50)**	**5.61**	**(5.42–5.81)**
Meningioma	7.00	(6.96–7.05)	8.55	(8.40–8.70)	4.86	(4.44–5.30)	5.41	(5.22–5.61)
Mesenchymal tumors	0.08	(0.08–0.09)	0.06	(0.05–0.08)	–	–	0.06	(0.04–0.08)
Primary melanocytic lesions	0.01	(0.01–0.01)	–	–	–	–	–	–
Other neoplasms related to the meninges	0.19	(0.18–0.19)	0.14	(0.12–0.16)	0.12	(0.07–0.19)	0.14	(0.11–0.17)
Lymphomas and Hemopoietic Neoplasms	**0.46**	**(0.44–0.47)**	**0.41**	**(0.38–0.45)**	**0.31**	**(0.22–0.43)**	**0.41**	**(0.36–0.47)**
Lymphoma	0.44	(0.43–0.46)	0.40	(0.37–0.43)	0.29	(0.20–0.41)	0.40	(0.35–0.46)
Other hemopoietic neoplasms	0.01	(0.01–0.01)	–	–	–	–	–	–
Germ Cell Tumors and Cysts	**0.10**	**(0.09–0.11)**	**0.07**	**(0.06–0.08)**	**–**	**–**	**0.13**	**(0.11–0.16)**
Germ cell tumors, cysts and heterotopias	0.10	(0.09–0.11)	0.07	(0.06–0.08)	–	–	0.13	(0.11–0.16)
Tumors of Sellar Region	**2.81**	**(2.78–2.84)**	**5.17**	**(5.06–5.28)**	**2.53**	**(2.27–2.82)**	**2.31**	**(2.19–2.43)**
Tumors of the pituitary	2.64	(2.61–2.67)	4.90	(4.80–5.01)	2.39	(2.13–2.66)	2.17	(2.06–2.29)
Craniopharyngioma	0.17	(0.16–0.18)	0.26	(0.24–0.29)	0.14	(0.09–0.23)	0.14	(0.11–0.17)
Unclassified Tumors	**1.11**	**(1.09–1.13)**	**1.13**	**(1.08–1.19)**	**0.90**	**(0.73–1.10)**	**0.56**	**(0.50–0.63)**
Hemangioma	0.23	(0.22–0.23)	0.15	(0.13–0.17)	0.11	(0.07–0.18)	0.16	(0.13–0.19)
Neoplasm, unspecified	0.88	(0.86–0.90)	0.98	(0.93–1.04)	0.76	(0.60–0.95)	0.40	(0.35–0.46)
All other	0.01	(0.01–0.01)	–	–	–	–	–	–
Total[‡]	**20.61**	**(20.53–20.69)**	**20.12**	**(19.90–20.35)**	**13.15**	**(12.50–13.82)**	**12.98**	**(12.70–13.27)**

[†] Rates are per 100,000 and are age–adjusted to the 2000 US standard population.
[‡] Refers to all brain tumors including histologies not presented in this table.
– Counts and rates are not presented when fewer than 16 cases were reported 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, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified; AIAN, American Indian/Alaskan Native; API, Asian Pacific Islander.

Table 11. Brain and Central Nervous System Tumor Average Annual Age-Adjusted Incidence Rates† By Major Histology Groupings, Histology, and Hispanic Ethnicity‡, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

Histology	Hispanic		Non-Hispanic	
	Rate	95% CI	Rate	95% CI
Tumors of Neuroepithelial Tissue	**5.08**	**(4.96-5.19)**	**6.81**	**(6.77-6.86)**
Pilocytic astrocytoma	0.23	(0.21-0.25)	0.35	(0.34-0.36)
Diffuse astrocytoma	0.43	(0.39-0.46)	0.61	(0.59-0.62)
Anaplastic astrocytoma	0.26	(0.24-0.29)	0.37	(0.36-0.38)
Unique astrocytoma variants	0.05	(0.05-0.07)	0.07	(0.06-0.07)
Glioblastoma	2.40	(2.31-2.49)	3.26	(3.23-3.29)
Oligodendroglioma	0.21	(0.19-0.24)	0.28	(0.27-0.29)
Anaplastic oligodendroglioma	0.09	(0.07-0.10)	0.12	(0.11-0.12)
Oligoastrocytic tumors	0.15	(0.14-0.17)	0.22	(0.21-0.22)
Ependymal tumors	0.34	(0.31-0.37)	0.43	(0.42-0.44)
Glioma malignant, NOS	0.37	(0.34-0.40)	0.47	(0.45-0.48)
Choroid plexus tumors	0.05	(0.04-0.06)	0.05	(0.05-0.06)
Other neuroepithelial tumors	–	–	0.01	(0.01-0.01)
Neuronal and mixed neuronal-glial tumors	0.19	(0.17-0.21)	0.28	(0.28-0.29)
Tumors of the pineal region	0.03	(0.03-0.04)	0.04	(0.04-0.04)
Embryonal tumors	0.27	(0.25-0.29)	0.26	(0.25-0.27)
Tumors of Cranial and Spinal Nerves	**1.26**	**(1.20-1.32)**	**1.77**	**(1.74-1.79)**
Nerve sheath tumors	1.26	(1.20-1.32)	1.76	(1.74-1.79)
Other tumors of cranial and spinal nerves	–	–	–	–
Tumors of Meninges	**7.40**	**(7.24-7.55)**	**7.53**	**(7.48-7.57)**
Meningioma	7.14	(6.99-7.30)	7.26	(7.21-7.30)
Mesenchymal tumors	0.07	(0.05-0.08)	0.08	(0.08-0.09)
Primary melanocytic lesions	–	–	0.01	(0.01-0.01)
Other neoplasms related to the meninges	0.18	(0.16-0.21)	0.18	(0.17-0.19)
Lymphomas and Hemopoietic Neoplasms	**0.49**	**(0.45-0.53)**	**0.45**	**(0.44-0.47)**
Lymphoma	0.48	(0.44-0.52)	0.44	(0.43-0.45)
Other hemopoietic neoplasms	0.01	(0.01-0.02)	0.01	(0.01-0.01)
Germ Cell Tumors and Cysts	**0.11**	**(0.10-0.13)**	**0.10**	**(0.09-0.10)**
Germ cell tumors, cysts and heterotopias	0.11	(0.10-0.13)	0.10	(0.09-0.10)
Tumors of Sellar Region	**3.82**	**(3.72-3.92)**	**3.04**	**(3.01-3.07)**
Tumors of the pituitary	3.63	(3.53-3.73)	2.86	(2.83-2.89)
Craniopharyngioma	0.19	(0.17-0.21)	0.18	(0.17-0.19)
Unclassified Tumors	**1.21**	**(1.15-1.27)**	**1.11**	**(1.09-1.12)**
Hemangioma	0.20	(0.18-0.22)	0.22	(0.21-0.23)
Neoplasm, unspecified	1.00	(0.95-1.06)	0.88	(0.87-0.90)
All other	–	–	0.01	(0.01-0.01)
Total§	**19.36**	**(19.13-19.60)**	**20.81**	**(20.73-20.88)**

† Rates are per 100,000 and age-adjusted to the 2000 US standard population.
‡ 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).
§ Refers to all brain tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported 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, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 12. Brain and Central Nervous System Tumor Average Annual Age-Adjusted and Age-Specific Incidence Rates[†] by Major Histology Groupings, Histology and Age at Diagnosis, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

Histology	Age at Diagnosis										Age at Diagnosis							
	0-14		0-19		20-34		35-44		45-54		55-64		65-74		75-84		85 +	
	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
Tumors of Neuroepithelial Tissue	**3.77**	**(3.70-3.84)**	**3.51**	**(3.45-3.57)**	**3.26**	**(3.20-3.33)**	**4.49**	**(4.40-4.59)**	**6.98**	**(6.87-7.10)**	**11.92**	**(11.75-12.09)**	**17.57**	**(17.30-17.84)**	**19.37**	**(19.03-19.71)**	**12.14**	**(11.72-12.57)**
Pilocytic astrocytoma	0.87	(0.84-0.91)	0.80	(0.78-0.83)	0.24	(0.23-0.26)	0.12	(0.10-0.13)	0.09	(0.08-0.10)	0.08	(0.07-0.10)	0.07	(0.06-0.09)	0.07	(0.05-0.09)	–	–
Diffuse astrocytoma	0.27	(0.25-0.29)	0.27	(0.25-0.28)	0.49	(0.46-0.51)	0.64	(0.61-0.67)	0.64	(0.61-0.68)	0.84	(0.80-0.89)	1.14	(1.07-1.21)	1.28	(1.19-1.37)	0.71	(0.61-0.82)
Anaplastic astrocytoma	0.08	(0.07-0.09)	0.08	(0.07-0.09)	0.26	(0.24-0.28)	0.35	(0.33-0.38)	0.43	(0.41-0.46)	0.67	(0.63-0.71)	0.92	(0.86-0.98)	0.96	(0.88-1.04)	0.40	(0.33-0.48)
Unique astrocytoma variants	0.10	(0.09-0.11)	0.11	(0.10-0.12)	0.06	(0.05-0.07)	0.04	(0.03-0.05)	0.04	(0.03-0.05)	0.04	(0.03-0.05)	0.04	(0.03-0.06)	0.06	(0.05-0.09)	–	–
Glioblastoma	0.13	(0.12-0.15)	0.14	(0.13-0.15)	0.39	(0.37-0.41)	1.21	(1.16-1.25)	3.66	(3.58-3.74)	8.16	(8.02-8.30)	13.21	(12.98-13.45)	14.64	(14.34-14.94)	8.96	(8.59-9.33)
Oligodendroglioma	0.04	(0.04-0.05)	0.06	(0.05-0.07)	0.32	(0.30-0.34)	0.49	(0.46-0.52)	0.42	(0.39-0.45)	0.33	(0.30-0.36)	0.25	(0.22-0.28)	0.18	(0.15-0.22)	0.07	(0.05-0.12)
Anaplastic oligodendroglioma	0.01	(0.01-0.01)	0.01	(0.01-0.02)	0.09	(0.08-0.10)	0.17	(0.15-0.19)	0.18	(0.17-0.20)	0.22	(0.20-0.25)	0.19	(0.17-0.22)	0.14	(0.11-0.17)	–	–
Oligoastrocytic tumors	0.03	(0.02-0.04)	0.03	(0.03-0.04)	0.28	(0.26-0.30)	0.35	(0.32-0.37)	0.28	(0.26-0.31)	0.26	(0.24-0.29)	0.23	(0.20-0.26)	0.16	(0.13-0.19)	–	–
Ependymal tumors	0.28	(0.26-0.30)	0.27	(0.26-0.29)	0.36	(0.33-0.38)	0.49	(0.46-0.52)	0.58	(0.55-0.62)	0.59	(0.55-0.62)	0.55	(0.50-0.59)	0.37	(0.32-0.42)	0.11	(0.07-0.16)
Glioma malignant, NOS	0.70	(0.67-0.73)	0.58	(0.56-0.61)	0.23	(0.22-0.25)	0.24	(0.22-0.26)	0.28	(0.25-0.30)	0.39	(0.36-0.42)	0.68	(0.63-0.73)	1.22	(1.14-1.31)	1.55	(1.40-1.71)
Choroid plexus tumors	0.11	(0.10-0.12)	0.10	(0.09-0.11)	0.04	(0.03-0.05)	0.04	(0.03-0.05)	0.03	(0.03-0.04)	0.04	(0.03-0.05)	0.03	(0.02-0.04)	0.04	(0.03-0.06)	–	–
Other neuroepithelial tumors	0.01	(0.01-0.01)	0.01	(0.01-0.01)	0.01	(0.00-0.01)	–	–	0.01	(0.01-0.01)	–	–	–	–	–	–	–	–
Neuronal and mixed neuronal-glial tumors	0.33	(0.31-0.35)	0.36	(0.34-0.38)	0.29	(0.27-0.30)	0.23	(0.21-0.25)	0.21	(0.19-0.23)	0.22	(0.19-0.24)	0.19	(0.16-0.22)	0.18	(0.15-0.22)	0.08	(0.05-0.12)
Tumors of the pineal region	0.04	(0.03-0.05)	0.04	(0.04-0.05)	0.04	(0.04-0.05)	0.04	(0.03-0.05)	0.05	(0.04-0.06)	0.04	(0.03-0.05)	0.04	(0.02-0.05)	–	–	–	–
Embryonal tumors	0.78	(0.75-0.81)	0.65	(0.62-0.67)	0.18	(0.17-0.20)	0.10	(0.09-0.12)	0.08	(0.07-0.09)	0.05	(0.04-0.07)	0.04	(0.03-0.06)	0.05	(0.03-0.07)	–	–
Tumors of Cranial and Spinal Nerves	**0.24**	**(0.23-0.26)**	**0.27**	**(0.26-0.29)**	**0.80**	**(0.76-0.83)**	**1.75**	**(1.69-1.81)**	**2.90**	**(2.83-2.97)**	**3.90**	**(3.81-4.00)**	**4.21**	**(4.08-4.34)**	**3.26**	**(3.12-3.40)**	**1.71**	**(1.55-1.87)**
Nerve sheath tumors	0.24	(0.23-0.26)	0.27	(0.26-0.29)	0.79	(0.76-0.83)	1.75	(1.69-1.81)	2.90	(2.83-2.97)	3.90	(3.81-4.00)	4.20	(4.07-4.34)	3.26	(3.12-3.40)	1.70	(1.55-1.87)
Other tumors of cranial and spinal nerves	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tumors of Meninges	**0.15**	**(0.14-0.17)**	**0.21**	**(0.20-0.23)**	**1.51**	**(1.47-1.56)**	**4.64**	**(4.55-4.74)**	**8.79**	**(8.66-8.92)**	**14.47**	**(14.28-14.66)**	**24.74**	**(24.42-25.06)**	**35.47**	**(35.01-35.93)**	**45.11**	**(44.29-45.94)**
Meningioma	0.09	(0.08-0.10)	0.14	(0.12-0.15)	1.27	(1.23-1.31)	4.31	(4.22-4.40)	8.41	(8.29-8.53)	14.02	(13.83-14.20)	24.26	(23.95-24.58)	35.06	(34.60-35.52)	44.90	(44.08-45.73)
Mesenchymal tumors	0.04	(0.03-0.05)	0.04	(0.03-0.04)	0.06	(0.06-0.07)	0.10	(0.08-0.11)	0.10	(0.09-0.11)	0.14	(0.12-0.15)	0.14	(0.12-0.17)	0.12	(0.09-0.15)	0.08	(0.05-0.13)
Primary melanocytic lesions	–	–	0.01	(0.00-0.01)	–	–	–	–	0.01	(0.01-0.02)	0.01	(0.01-0.02)	0.02	(0.01-0.03)	–	–	–	–
Other neoplasms related to the meninges	0.02	(0.01-0.02)	0.03	(0.03-0.04)	0.17	(0.16-0.19)	0.23	(0.21-0.25)	0.27	(0.25-0.29)	0.31	(0.28-0.34)	0.32	(0.29-0.36)	0.27	(0.23-0.32)	0.13	(0.09-0.18)
Lymphomas and Hemopoietic Neoplasms	**0.02**	**(0.01-0.02)**	**0.02**	**(0.02-0.03)**	**0.12**	**(0.11-0.14)**	**0.28**	**(0.26-0.30)**	**0.48**	**(0.45-0.51)**	**0.92**	**(0.88-0.97)**	**1.86**	**(1.77-1.95)**	**2.23**	**(2.11-2.35)**	**1.06**	**(0.94-1.20)**
Lymphoma	0.01	(0.01-0.02)	0.02	(0.01-0.02)	0.12	(0.11-0.13)	0.27	(0.25-0.29)	0.47	(0.44-0.50)	0.90	(0.85-0.95)	1.83	(1.74-1.92)	2.21	(2.09-2.33)	1.05	(0.93-1.18)
Other hemopoietic neoplasms	0.01	(0.00-0.01)	0.01	(0.01-0.01)	0.01	(0.00-0.01)	0.01	(0.01-0.02)	0.01	(0.01-0.02)	0.02	(0.02-0.03)	0.03	(0.02-0.04)	–	–	–	–
Germ Cell Tumors and Cysts	**0.18**	**(0.16-0.19)**	**0.20**	**(0.19-0.22)**	**0.11**	**(0.10-0.12)**	**0.05**	**(0.04-0.06)**	**0.03**	**(0.02-0.04)**	**0.03**	**(0.02-0.03)**	**0.03**	**(0.02-0.05)**	**0.03**	**(0.02-0.04)**	**–**	**–**
Germ cell tumors, cysts and heterotopias	0.18	(0.16-0.19)	0.20	(0.19-0.22)	0.11	(0.10-0.12)	0.05	(0.04-0.06)	0.03	(0.02-0.04)	0.03	(0.02-0.03)	0.03	(0.02-0.05)	0.03	(0.02-0.04)	–	–
Tumors of Sellar Region	**0.39**	**(0.37-0.41)**	**0.66**	**(0.63-0.68)**	**2.68**	**(2.62-2.74)**	**3.65**	**(3.56-3.73)**	**4.17**	**(4.08-4.25)**	**5.04**	**(4.93-5.15)**	**6.78**	**(6.61-6.95)**	**6.36**	**(6.16-6.56)**	**4.14**	**(3.90-4.40)**
Tumors of the pituitary	0.18	(0.17-0.20)	0.47	(0.45-0.49)	2.56	(2.50-2.62)	3.48	(3.40-3.56)	3.96	(3.88-4.05)	4.80	(4.69-4.91)	6.53	(6.37-6.70)	6.17	(5.98-6.37)	4.07	(3.82-4.32)
Craniopharyngioma	0.21	(0.19-0.22)	0.19	(0.18-0.21)	0.13	(0.11-0.14)	0.17	(0.15-0.19)	0.21	(0.19-0.23)	0.24	(0.22-0.26)	0.25	(0.22-0.28)	0.18	(0.15-0.22)	0.08	(0.05-0.12)
Unclassified Tumors	**0.22**	**(0.20-0.24)**	**0.25**	**(0.24-0.27)**	**0.50**	**(0.47-0.52)**	**0.72**	**(0.69-0.76)**	**0.96**	**(0.92-1.00)**	**1.44**	**(1.38-1.50)**	**2.54**	**(2.44-2.64)**	**5.16**	**(4.99-5.34)**	**11.09**	**(10.69-11.51)**
Hemangioma	0.05	(0.05-0.06)	0.07	(0.06-0.08)	0.18	(0.16-0.19)	0.26	(0.24-0.28)	0.31	(0.29-0.34)	0.35	(0.32-0.38)	0.39	(0.36-0.44)	0.36	(0.31-0.41)	0.25	(0.20-0.32)
Neoplasm, unspecified	0.16	(0.15-0.18)	0.18	(0.17-0.19)	0.32	(0.30-0.34)	0.46	(0.43-0.49)	0.64	(0.61-0.68)	1.07	(1.02-1.12)	2.13	(2.04-2.22)	4.78	(4.61-4.95)	10.81	(10.41-11.22)
All other	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total[‡]	**4.97**	**(4.89-5.05)**	**5.13**	**(5.06-5.20)**	**8.98**	**(8.88-9.09)**	**15.58**	**(15.41-15.75)**	**24.31**	**(24.10-24.52)**	**37.72**	**(37.41-38.02)**	**57.72**	**(57.24-58.21)**	**71.86**	**(71.21-72.52)**	**75.27**	**(74.21-76.34)**

[†] Rates are per 100,000 and age-adjusted to the 2000 US. standard population.
[‡] Refers to all brain tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported 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, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 13. Selected Childhood (Ages 0–19) Brain and Central Nervous System Tumor Average Annual Age–Adjusted Incidence Rates[†] by Major Histology Groupings, Histology and Gender, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

Histology	Total		Male		Female	
	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumors of Neuroepithelial Tissue	**3.51**	**(3.45–3.57)**	**3.70**	**(3.62–3.78)**	**3.31**	**(3.23–3.40)**
Pilocytic astrocytoma	0.80	(0.78–0.83)	0.81	(0.77–0.85)	0.79	(0.75–0.83)
Diffuse astrocytoma	0.27	(0.25–0.28)	0.28	(0.26–0.30)	0.26	(0.23–0.28)
Anaplastic astrocytoma	0.08	(0.07–0.09)	0.09	(0.08–0.11)	0.07	(0.06–0.08)
Unique astrocytoma variants	0.11	(0.10–0.12)	0.11	(0.10–0.12)	0.11	(0.09–0.12)
Glioblastoma	0.14	(0.13–0.15)	0.16	(0.14–0.18)	0.12	(0.11–0.14)
Oligodendroglioma	0.06	(0.05–0.07)	0.06	(0.05–0.08)	0.05	(0.04–0.06)
Anaplastic oligodendroglioma	0.01	(0.01–0.02)	0.01	(0.01–0.02)	0.01	(0.01–0.02)
Oligoastrocytic tumors	0.03	(0.03–0.04)	0.03	(0.02–0.04)	0.04	(0.03–0.05)
Ependymal tumors	0.27	(0.26–0.29)	0.31	(0.29–0.33)	0.24	(0.22–0.26)
Glioma malignant, NOS	0.58	(0.56–0.61)	0.56	(0.53–0.59)	0.61	(0.58–0.65)
Choroid plexus tumors	0.10	(0.09–0.11)	0.10	(0.09–0.12)	0.09	(0.07–0.10)
Other neuroepithelial tumors	0.01	(0.01–0.01)	–	–	0.01	(0.01–0.02)
Neuronal and mixed neuronal–glial tumors	0.36	(0.34–0.38)	0.39	(0.36–0.42)	0.33	(0.31–0.36)
Tumors of the pineal region	0.04	(0.04–0.05)	0.04	(0.03–0.05)	0.04	(0.03–0.05)
Embryonal tumors	0.65	(0.62–0.67)	0.74	(0.70–0.78)	0.55	(0.52–0.58)
Tumors of Cranial and Spinal Nerves	**0.27**	**(0.26–0.29)**	**0.27**	**(0.25–0.29)**	**0.28**	**(0.25–0.30)**
Nerve sheath tumors	0.27	(0.26–0.29)	0.27	(0.25–0.29)	0.28	(0.25–0.30)
Other tumors of cranial and spinal nerves	–	–	–	–	–	–
Tumors of Meninges	**0.21**	**(0.20–0.23)**	**0.20**	**(0.18–0.22)**	**0.23**	**(0.21–0.25)**
Meningioma	0.14	(0.12–0.15)	0.13	(0.11–0.14)	0.14	(0.13–0.16)
Mesenchymal tumors	0.04	(0.03–0.04)	0.03	(0.02–0.04)	0.05	(0.04–0.06)
Primary melanocytic lesions	0.01	(0.00–0.01)	0.01	(0.00–0.01)	0.01	(0.00–0.01)
Other neoplasms related to the meninges	0.03	(0.03–0.04)	0.04	(0.03–0.05)	0.03	(0.03–0.04)
Lymphomas and Hemopoietic Neoplasms	**0.02**	**(0.02–0.03)**	**0.03**	**(0.02–0.04)**	**0.02**	**(0.01–0.02)**
Lymphoma	0.02	(0.01–0.02)	0.02	(0.01–0.03)	0.01	(0.01–0.02)
Other hemopoietic neoplasms	0.01	(0.01–0.01)	0.01	(0.01–0.01)	0.01	(0.00–0.01)
Germ Cell Tumors and Cysts	**0.20**	**(0.19–0.22)**	**0.28**	**(0.26–0.31)**	**0.12**	**(0.11–0.14)**
Germ cell tumors, cysts and heterotopias	0.20	(0.19–0.22)	0.28	(0.26–0.31)	0.12	(0.11–0.14)
Tumors of Sellar Region	**0.66**	**(0.63–0.68)**	**0.45**	**(0.42–0.48)**	**0.87**	**(0.83–0.92)**
Tumors of the pituitary	0.47	(0.45–0.49)	0.26	(0.24–0.28)	0.68	(0.64–0.72)
Craniopharyngioma	0.19	(0.18–0.21)	0.19	(0.17–0.21)	0.19	(0.18–0.21)
Unclassified Tumors	**0.25**	**(0.24–0.27)**	**0.26**	**(0.24–0.29)**	**0.25**	**(0.22–0.27)**
Hemangioma	0.07	(0.06–0.08)	0.08	(0.07–0.09)	0.07	(0.06–0.08)
Neoplasm, unspecified	0.18	(0.17–0.19)	0.18	(0.17–0.20)	0.18	(0.16–0.20)
All other	–	–	–	–	–	–
Total[‡]	**5.13**	**(5.06–5.20)**	**5.19**	**(5.09–5.29)**	**5.08**	**(4.98–5.18)**

[†] Rates are per 100,000 and are age–adjusted to the 2000 US standard population.
[‡] Refers to all brain tumors including histologies not presented in this table.
– Counts and rates are not presented when fewer than 16 cases were reported 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, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 14. Childhood (Ages 0–19) Brain and Central Nervous System Tumor Average Annual Age–Adjusted Incidence Rates[†] by Major Histology Groupings and Race, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

	White		Black		AIAN		API	
	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumors of Neuroepithelial Tissue	**3.67**	**(3.60–3.74)**	**2.69**	**(2.56–2.82)**	**1.96**	**(1.62–2.36)**	**1.96**	**(1.77–2.16)**
Pilocytic astrocytoma	0.85	(0.82–0.89)	0.58	(0.52–0.64)	–	–	0.37	(0.29–0.46)
Diffuse astrocytoma	0.28	(0.26–0.30)	0.21	(0.18–0.25)	–	–	0.16	(0.11–0.22)
Anaplastic astrocytoma	0.08	(0.07–0.09)	0.06	(0.05–0.09)	–	–	–	–
Unique astrocytoma variants	0.11	(0.09–0.12)	0.12	(0.09–0.15)	–	–	–	–
Glioblastoma	0.14	(0.12–0.15)	0.16	(0.13–0.19)	–	–	0.12	(0.08–0.18)
Oligodendroglioma	0.06	(0.05–0.07)	0.06	(0.04–0.08)	–	–	–	–
Anaplastic oligodendroglioma	0.01	(0.01–0.02)	–	–	–	–	–	–
Oligoastrocytic tumors	0.04	(0.03–0.05)	–	–	–	–	–	–
Ependymal tumors	0.29	(0.27–0.31)	0.20	(0.16–0.23)	0.27	(0.15–0.43)	0.24	(0.17–0.31)
Glioma malignant, NOS	0.60	(0.58–0.63)	0.43	(0.38–0.49)	–	–	0.37	(0.29–0.46)
Choroid plexus tumors	0.11	(0.10–0.12)	0.04	(0.03–0.06)	–	–	–	–
Other neuroepithelial tumors	0.01	(0.01–0.01)	–	–	–	–	–	–
Neuronal and mixed neuronal–glial tumors	0.39	(0.36–0.41)	0.25	(0.22–0.30)	–	–	0.14	(0.09–0.20)
Tumors of the pineal region	0.03	(0.03–0.04)	0.08	(0.06–0.11)	–	–	–	–
Embryonal tumors	0.69	(0.66–0.72)	0.46	(0.41–0.51)	–	–	0.40	(0.32–0.50)
Tumors of Cranial and Spinal Nerves	**0.28**	**(0.26–0.30)**	**0.21**	**(0.18–0.25)**	**0.20**	**(0.10–0.34)**	**0.14**	**(0.09–0.20)**
Nerve sheath tumors	0.28	(0.26–0.30)	0.21	(0.18–0.25)	–	–	0.14	(0.09–0.20)
Other tumors of cranial and spinal nerves	–	–	–	–	–	–	–	–
Tumors of Meninges	**0.22**	**(0.20–0.24)**	**0.16**	**(0.13–0.20)**	**–**	**–**	**0.12**	**(0.08–0.18)**
Meningioma	0.14	(0.12–0.15)	0.11	(0.09–0.14)	–	–	0.09	(0.05–0.14)
Mesenchymal tumors	0.04	(0.03–0.05)	–	–	–	–	–	–
Primary melanocytic lesions	0.01	(0.00–0.01)	–	–	–	–	–	–
Other neoplasms related to the meninges	0.04	(0.03–0.04)	0.03	(0.02–0.04)	–	–	–	–
Lymphomas and Hemopoietic Neoplasms	**0.02**	**(0.02–0.03)**	**–**	**–**	**–**	**–**	**–**	**–**
Lymphoma	0.01	(0.01–0.02)	–	–	–	–	–	–
Other hemopoietic neoplasms	0.01	(0.01–0.01)	–	–	–	–	–	–
Germ Cell Tumors and Cysts	**0.21**	**(0.19–0.22)**	**0.14**	**(0.11–0.17)**	**–**	**–**	**0.33**	**(0.26–0.43)**
Germ cell tumors, cysts and heterotopias	0.21	(0.19–0.22)	0.14	(0.11–0.17)	–	–	0.33	(0.26–0.43)
Tumors of Sellar Region	**0.65**	**(0.62–0.67)**	**0.58**	**(0.52–0.64)**	**0.77**	**(0.56–1.03)**	**0.38**	**(0.30–0.48)**
Tumors of the pituitary	0.46	(0.43–0.48)	0.40	(0.35–0.45)	0.60	(0.42–0.83)	0.28	(0.21–0.37)
Craniopharyngioma	0.19	(0.17–0.21)	0.18	(0.15–0.22)	–	–	0.10	(0.06–0.15)
Unclassified Tumors	**0.27**	**(0.25–0.28)**	**0.17**	**(0.14–0.20)**	**–**	**–**	**0.11**	**(0.07–0.17)**
Hemangioma	0.08	(0.07–0.09)	0.04	(0.02–0.05)	–	–	–	–
Neoplasm, unspecified	0.19	(0.17–0.20)	0.13	(0.10–0.16)	–	–	–	–
All other	–	–	–	–	–	–	–	–
Total[‡]	**5.31**	**(5.23–5.39)**	**3.96**	**(3.81–4.12)**	**3.40**	**(2.95–3.91)**	**3.07**	**(2.83–3.32)**

[†] Rates are per 100,000 and are age–adjusted to the 2000 US standard population.
[‡] Refers to all brain tumors including histologies not presented in this table.
– Counts and rates are not presented when fewer than 16 cases were reported 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, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified; AIAN, American Indian/Alaskan Native; API, Asian Pacific Islander.

Table 15. Selected Childhood (Ages 0-19) Brain and Central Nervous System Tumor Average Annual Age-Adjusted Incidence Rates[†] By Major Histology Groupings, Histology, and Hispanic Ethnicity[‡], CBTRUS Statistical Report: NPCR and SEER, 2005–2009

Histology	Hispanic		Non-Hispanic	
	Rate	95% CI	Rate	95% CI
Tumors of Neuroepithelial Tissue	**2.80**	**(2.69-2.91)**	**3.71**	**(3.64-3.77)**
Pilocytic astrocytoma	0.58	(0.53-0.64)	0.86	(0.83-0.90)
Diffuse astrocytoma	0.21	(0.18-0.24)	0.28	(0.27-0.30)
Anaplastic astrocytoma	0.07	(0.06-0.10)	0.08	(0.07-0.09)
Unique astrocytoma variants	0.09	(0.07-0.11)	0.11	(0.10-0.12)
Glioblastoma	0.13	(0.10-0.15)	0.14	(0.13-0.16)
Oligodendroglioma	0.04	(0.03-0.06)	0.06	(0.05-0.07)
Anaplastic oligodendroglioma	–	–	0.01	(0.01-0.02)
Oligoastrocytic tumors	0.02	(0.01-0.03)	0.04	(0.03-0.04)
Ependymal tumors	0.26	(0.23-0.30)	0.28	(0.26-0.30)
Glioma malignant, NOS	0.44	(0.40-0.49)	0.62	(0.60-0.65)
Choroid plexus tumors	0.09	(0.07-0.11)	0.10	(0.09-0.11)
Other neuroepithelial tumors	–	–	0.01	(0.01-0.01)
Neuronal and mixed neuronal-glial tumors	0.25	(0.21-0.28)	0.39	(0.37-0.42)
Tumors of the pineal region	0.04	(0.03-0.05)	0.04	(0.04-0.05)
Embryonal tumors	0.57	(0.52-0.62)	0.67	(0.64-0.70)
Tumors of Cranial and Spinal Nerves	**0.23**	**(0.20-0.26)**	**0.28**	**(0.27-0.30)**
Nerve sheath tumors	0.23	(0.20-0.26)	0.28	(0.27-0.30)
Other tumors of cranial and spinal nerves	–	–	–	–
Tumors of Meninges	**0.18**	**(0.15-0.21)**	**0.22**	**(0.20-0.24)**
Meningioma	0.09	(0.07-0.11)	0.15	(0.13-0.16)
Mesenchymal tumors	0.03	(0.02-0.05)	0.04	(0.03-0.05)
Primary melanocytic lesions	–	–	–	–
Other neoplasms related to the meninges	0.05	(0.04-0.07)	0.03	(0.03-0.04)
Lymphomas and Hemopoietic Neoplasms	**0.03**	**(0.02-0.05)**	**0.02**	**(0.02-0.03)**
Lymphoma	0.02	(0.01-0.04)	0.01	(0.01-0.02)
Other hemopoietic neoplasms	0.01	(0.00-0.02)	0.01	(0.00-0.01)
Germ Cell Tumors and Cysts	**0.23**	**(0.20-0.26)**	**0.20**	**(0.18-0.22)**
Germ cell tumors, cysts and heterotopias	0.23	(0.20-0.26)	0.20	(0.18-0.22)
Tumors of Sellar Region	**0.79**	**(0.73-0.85)**	**0.63**	**(0.60-0.66)**
Tumors of the pituitary	0.58	(0.52-0.63)	0.44	(0.42-0.46)
Craniopharyngioma	0.21	(0.18-0.25)	0.19	(0.17-0.20)
Unclassified Tumors	**0.29**	**(0.26-0.33)**	**0.24**	**(0.23-0.26)**
Hemangioma	0.08	(0.07-0.11)	0.07	(0.06-0.08)
Neoplasm, unspecified	0.21	(0.18-0.24)	0.17	(0.16-0.19)
All other	–	–	–	–
Total[§]	**4.55**	**(4.40-4.69)**	**5.30**	**(5.22-5.38)**

[†] Rates are per 100,000 and are age-adjusted to the 2000 US standard population.
[‡] 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).
§ Refers to all brain tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported 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, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 16. Selected Childhood Brain and Central Nervous System Tumor, Average Annual Age-Adjusted and Age-Specific Incidence Rates[†] by Major Histology Groupings, Histology and Age at Diagnosis, CBTRUS Statistical Report: NPCR and SEER, 2005–2009

	Age At Diagnosis								Age at Diagnosis			
	0-4		5-9		10-14		15-19		0-19[‡]		0-14[‡]	
	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumors of Neuroepithelial Tissue	**4.50**	**(4.37-4.63)**	**3.68**	**(3.56-3.81)**	**3.17**	**(3.06-3.28)**	**2.74**	**(2.64-2.84)**	**3.51**	**(3.45-3.57)**	**3.77**	**(3.70-3.84)**
Pilocytic astrocytoma	0.87	(0.82-0.93)	0.89	(0.83-0.95)	0.86	(0.80-0.92)	0.59	(0.55-0.64)	0.80	(0.78-0.83)	0.87	(0.84-0.91)
Diffuse astrocytoma	0.33	(0.29-0.37)	0.22	(0.19-0.25)	0.26	(0.23-0.30)	0.26	(0.23-0.29)	0.27	(0.25-0.28)	0.27	(0.25-0.29)
Anaplastic astrocytoma	0.05	(0.04-0.07)	0.08	(0.07-0.10)	0.09	(0.07-0.11)	0.09	(0.08-0.11)	0.08	(0.07-0.09)	0.08	(0.07-0.09)
Unique astrocytoma variants	0.06	(0.05-0.08)	0.10	(0.08-0.12)	0.14	(0.11-0.16)	0.13	(0.11-0.16)	0.11	(0.10-0.12)	0.10	(0.09-0.11)
Glioblastoma	0.09	(0.07-0.11)	0.14	(0.12-0.17)	0.16	(0.14-0.19)	0.17	(0.14-0.19)	0.14	(0.13-0.15)	0.13	(0.12-0.15)
Oligodendroglioma	0.03	(0.02-0.04)	0.04	(0.03-0.05)	0.06	(0.04-0.08)	0.11	(0.09-0.13)	0.06	(0.05-0.07)	0.04	(0.04-0.05)
Anaplastic oligodendroglioma	–	–	–	–	–	–	0.02	(0.02-0.04)	0.01	(0.01-0.02)	0.01	(0.01-0.01)
Oligoastrocytic tumors	0.03	(0.02-0.04)	0.03	(0.02-0.04)	0.03	(0.02-0.05)	0.05	(0.04-0.07)	0.03	(0.03-0.04)	0.03	(0.02-0.04)
Ependymal tumors	0.40	(0.36-0.44)	0.23	(0.20-0.26)	0.21	(0.19-0.24)	0.26	(0.23-0.30)	0.27	(0.26-0.29)	0.28	(0.26-0.30)
Glioma malignant, NOS	0.86	(0.81-0.92)	0.81	(0.75-0.87)	0.43	(0.39-0.47)	0.24	(0.22-0.28)	0.58	(0.56-0.61)	0.70	(0.67-0.73)
Choroid plexus tumors	0.26	(0.23-0.29)	0.04	(0.03-0.06)	0.04	(0.03-0.05)	0.05	(0.04-0.06)	0.10	(0.09-0.11)	0.11	(0.10-0.12)
Other neuroepithelial tumors	–	–	–	–	–	–	–	–	0.01	(0.01-0.01)	0.01	(0.01-0.01)
Neuronal and mixed neuronal-glial tumors	0.24	(0.21-0.28)	0.30	(0.27-0.34)	0.43	(0.39-0.48)	0.46	(0.42-0.51)	0.36	(0.34-0.38)	0.33	(0.31-0.35)
Tumors of the pineal region	0.05	(0.04-0.07)	0.04	(0.03-0.05)	0.03	(0.02-0.05)	0.04	(0.03-0.05)	0.04	(0.04-0.05)	0.04	(0.03-0.05)
Embryonal tumors	1.21	(1.15-1.28)	0.76	(0.70-0.81)	0.39	(0.35-0.43)	0.25	(0.22-0.28)	0.65	(0.62-0.67)	0.78	(0.75-0.81)
Tumors of Cranial and Spinal Nerves	**0.27**	**(0.24-0.30)**	**0.21**	**(0.18-0.24)**	**0.26**	**(0.22-0.29)**	**0.35**	**(0.32-0.39)**	**0.27**	**(0.26-0.29)**	**0.24**	**(0.23-0.26)**
Nerve sheath tumors	0.27	(0.24-0.30)	0.21	(0.18-0.24)	0.26	(0.22-0.29)	0.35	(0.32-0.39)	0.27	(0.26-0.29)	0.24	(0.23-0.26)
Other tumors of cranial and spinal nerves	–	–	–	–	–	–	–	–	–	–	–	–
Tumors of Meninges	**0.14**	**(0.12-0.16)**	**0.10**	**(0.08-0.12)**	**0.21**	**(0.18-0.24)**	**0.39**	**(0.36-0.43)**	**0.21**	**(0.20-0.23)**	**0.15**	**(0.14-0.17)**
Meningioma	0.07	(0.05-0.09)	0.06	(0.05-0.08)	0.14	(0.12-0.17)	0.26	(0.23-0.30)	0.14	(0.12-0.15)	0.09	(0.08-0.10)
Mesenchymal tumors	0.06	(0.04-0.07)	0.03	(0.02-0.04)	0.03	(0.02-0.04)	0.03	(0.02-0.05)	0.04	(0.03-0.04)	0.04	(0.03-0.05)
Primary melanocytic lesions	–	–	–	–	–	–	–	–	0.01	(0.00-0.01)	–	–
Other neoplasms related to the meninges	–	–	–	–	0.03	(0.02-0.05)	0.09	(0.07-0.11)	0.03	(0.03-0.04)	0.02	(0.01-0.02)
Lymphomas and Hemopoietic Neoplasms	**–**	**–**	**0.02**	**(0.01-0.03)**	**0.02**	**(0.01-0.03)**	**0.03**	**(0.02-0.05)**	**0.02**	**(0.02-0.03)**	**0.02**	**(0.01-0.02)**
Lymphoma	–	–	–	–	–	–	0.02	(0.02-0.04)	0.02	(0.01-0.02)	0.01	(0.01-0.02)
Other hemopoietic neoplasms	–	–	–	–	–	–	–	–	0.01	(0.01-0.01)	0.01	(0.00-0.01)
Germ Cell Tumors and Cysts	**0.13**	**(0.11-0.15)**	**0.14**	**(0.11-0.16)**	**0.27**	**(0.23-0.30)**	**0.29**	**(0.26-0.32)**	**0.20**	**(0.19-0.22)**	**0.18**	**(0.16-0.19)**
Germ cell tumors, cysts and heterotopias	0.13	(0.11-0.15)	0.14	(0.11-0.16)	0.27	(0.23-0.30)	0.29	(0.26-0.32)	0.20	(0.19-0.22)	0.18	(0.16-0.19)

Continued

Table 16. *Continued*

	Age At Diagnosis								Age at Diagnosis			
	0-4		5-9		10-14		15-19		0-19[‡]		0-14[‡]	
	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Tumors of Sellar Region	**0.17**	**(0.15-0.20)**	**0.37**	**(0.33-0.41)**	**0.61**	**(0.57-0.67)**	**1.46**	**(1.39-1.53)**	**0.66**	**(0.63-0.68)**	**0.39**	**(0.37-0.41)**
Tumors of the pituitary	0.03	(0.02-0.05)	0.11	(0.09-0.13)	0.40	(0.36-0.44)	1.31	(1.24-1.38)	0.47	(0.45-0.49)	0.18	(0.17-0.20)
Craniopharyngioma	0.14	(0.12-0.16)	0.26	(0.23-0.29)	0.22	(0.19-0.25)	0.15	(0.13-0.18)	0.19	(0.18-0.21)	0.21	(0.19-0.22)
Unclassified Tumors	**0.22**	**(0.19-0.25)**	**0.18**	**(0.15-0.21)**	**0.26**	**(0.22-0.29)**	**0.36**	**(0.33-0.40)**	**0.25**	**(0.24-0.27)**	**0.22**	**(0.20-0.24)**
Hemangioma	0.05	(0.04-0.06)	0.04	(0.03-0.05)	0.08	(0.06-0.09)	0.13	(0.11-0.15)	0.07	(0.06-0.08)	0.05	(0.05-0.06)
Neoplasm, unspecified	0.17	(0.15-0.20)	0.14	(0.12-0.17)	0.18	(0.15-0.21)	0.23	(0.20-0.26)	0.18	(0.17-0.19)	0.16	(0.15-0.18)
All other	–	–	–	–	–	–	–	–	–	–	–	–
Total[§]	**5.43**	**(5.29-5.58)**	**4.70**	**(4.56-4.84)**	**4.79**	**(4.65-4.93)**	**5.63**	**(5.49-5.77)**	**5.13**	**(5.06-5.20)**	**4.97**	**(4.89-5.05)**

[†] Rates are per 100,000 and are age-adjusted to the 2000 US standard population.
[§] Refers to all brain tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported 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, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval; NOS, not otherwise specified.

Table 17. Age-Adjusted and Age-Specific Incidence Rates[†] for Childhood Brain and Central Nervous System Tumors: Malignant and Non-Malignant by International Classification of Childhood Cancer (ICCC), CBTRUS Statistical Report: NPCR and SEER, 2005–2009

ICCC Category	0-19[‡] years			0-14[‡] years		< 1 year		1-4 years		5-9 years		10-14 years		15-19 years	
	Count	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
II Lymphomas and reticuloendothelial neoplasms	69	0.02	(0.01-0.02)	0.01	(0.01-0.02)	–	–	–	–	0.02	(0.01-0.03)	0.02	(0.01-0.03)	0.03	(0.02-0.04)
III CNS and misc intracranial and intraspinal neoplasms	17,654	4.38	(4.31-4.44)	4.32	(4.25-4.40)	4.53	(4.24-4.83)	4.82	(4.67-4.97)	4.21	(4.08-4.34)	4.03	(3.91-4.16)	4.53	(4.41-4.67)
III(a) Ependymomas and choroid plexus tumor	1,506	0.37	(0.35-0.39)	0.39	(0.37-0.41)	0.93	(0.80-1.07)	0.59	(0.54-0.64)	0.27	(0.24-0.31)	0.25	(0.22-0.29)	0.31	(0.28-0.35)
III(b) Astrocytomas	6,277	1.56	(1.52-1.60)	1.66	(1.61-1.70)	1.25	(1.10-1.41)	1.92	(1.83-2.02)	1.61	(1.53-1.69)	1.58	(1.50-1.66)	1.27	(1.21-1.34)
III(c) Intracranial and intraspinal embryonal tumors	2,408	0.60	(0.57-0.62)	0.72	(0.69-0.75)	1.19	(1.04-1.35)	1.04	(0.97-1.11)	0.73	(0.67-0.78)	0.37	(0.34-0.41)	0.23	(0.21-0.27)
III(d) Other gliomas	2,135	0.53	(0.51-0.56)	0.58	(0.55-0.61)	0.26	(0.20-0.34)	0.61	(0.56-0.67)	0.70	(0.65-0.76)	0.49	(0.44-0.53)	0.40	(0.37-0.44)
III(e) Other specified intracranial and intraspinal neoplasms	4,602	1.14	(1.11-1.17)	0.82	(0.79-0.86)	0.61	(0.51-0.73)	0.51	(0.47-0.57)	0.76	(0.70-0.81)	1.17	(1.10-1.24)	2.08	(2.00-2.17)
III(f) Unspecified intracranial and intraspinal neoplasms	726	0.18	(0.17-0.19)	0.16	(0.15-0.18)	0.29	(0.22-0.38)	0.14	(0.12-0.17)	0.14	(0.12-0.16)	0.18	(0.15-0.21)	0.23	(0.20-0.26)
IV Neuroblastoma and other peripheral nervous cell tumors	206	0.05	(0.04-0.06)	0.06	(0.05-0.07)	0.28	(0.21-0.37)	0.09	(0.07-0.11)	0.03	(0.02-0.04)	0.02	(0.02-0.04)	0.03	(0.02-0.04)
IX Soft tissue and other extraosseous sarcomas	1,667	0.41	(0.39-0.43)	0.35	(0.33-0.37)	0.56	(0.46-0.67)	0.33	(0.29-0.37)	0.28	(0.25-0.32)	0.39	(0.35-0.43)	0.60	(0.55-0.65)
X(a) Intracranial & intraspinal germ cell tumors	823	0.20	(0.19-0.22)	0.18	(0.16-0.19)	0.38	(0.30-0.48)	0.06	(0.05-0.08)	0.14	(0.11-0.16)	0.27	(0.23-0.30)	0.29	(0.26-0.32)
All other categories	290	0.07	(0.06-0.08)	0.04	(0.04-0.05)	–	–	0.04	(0.02-0.05)	0.03	(0.02-0.05)	0.06	(0.05-0.08)	0.15	(0.13-0.18)
Total[§]	**20,709**	**5.13**	**(5.06-5.20)**	**4.97**	**(4.89-5.05)**	**5.82**	**(5.49-6.16)**	**5.33**	**(5.18-5.50)**	**4.70**	**(4.56-4.84)**	**4.79**	**(4.65-4.93)**	**5.63**	**(5.49-5.77)**

[†] Rates are per 100,000 and are [‡]age adjusted to the 2000 U.S. standard population.
[§] Refers to all brain tumors including histologies not presented in this table.
- Counts and rates are not presented when fewer than 16 cases were reported 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, CDC's National Program of Cancer Registries; SEER, NCI's Surveillance, Epidemiology and End Results program; CI, confidence interval.

Table 18. Average Annual Age–Adjusted Mortality Rates[†] for Malignant Brain and Central Nervous System Cancer Overall and by State and Gender, United States, 2005–2009[‡]

State	Total			Males			Females		
	N	Rate	95% CI	N	Rate	95% CI	N	Rate	95% CI
Alabama	1,148	4.58	(4.31–4.85)	626	5.55	(5.12–6.01)	522	3.76	(3.45–4.11)
Alaska	111	4.20	(3.39–5.14)	65	4.96	(3.67–6.52)	46	3.56	(2.55–4.81)
Arizona	1,336	4.11	(3.90–4.34)	743	4.87	(4.52–5.23)	593	3.46	(3.19–3.76)
Arkansas	775	4.95	(4.60–5.31)	417	5.90	(5.34–6.50)	358	4.15	(3.73–4.62)
California	7,457	4.31	(4.21–4.41)	4,225	5.32	(5.16–5.49)	3,232	3.46	(3.34–3.58)
Colorado	1,016	4.40	(4.13–4.68)	586	5.45	(5.00–5.92)	430	3.51	(3.18–3.86)
Connecticut	809	4.22	(3.93–4.52)	436	5.07	(4.60–5.58)	373	3.52	(3.16–3.90)
Delaware	212	4.54	(3.95–5.20)	119	5.75	(4.75–6.89)	93	3.60	(2.90–4.43)
Washington DC	101	3.47	(2.82–4.23)	57	4.44	(3.33–5.78)	44	2.67	(1.93–3.60)
Florida	4,385	3.95	(3.83–4.07)	2,455	4.81	(4.62–5.01)	1,930	3.19	(3.05–3.34)
Georgia	1,671	3.87	(3.68–4.06)	913	4.67	(4.36–5.00)	758	3.22	(2.99–3.46)
Hawaii	171	2.39	(2.04–2.78)	98	2.92	(2.36–3.57)	73	1.95	(1.52–2.47)
Idaho	379	5.14	(4.63–5.69)	202	5.63	(4.87–6.48)	177	4.62	(3.96–5.36)
Illinois	2,523	3.89	(3.74–4.05)	1,387	4.74	(4.49–5.00)	1,136	3.19	(3.01–3.39)
Indiana	1,526	4.62	(4.39–4.86)	819	5.46	(5.08–5.85)	707	3.93	(3.64–4.23)
Iowa	918	5.53	(5.17–5.90)	526	6.95	(6.36–7.57)	392	4.33	(3.90–4.80)
Kansas	735	5.07	(4.70–5.45)	422	6.39	(5.79–7.03)	313	3.93	(3.50–4.40)
Kentucky	1,021	4.49	(4.21–4.77)	565	5.46	(5.01–5.94)	456	3.66	(3.33–4.02)
Louisiana	1,007	4.53	(4.25–4.82)	565	5.63	(5.17–6.13)	442	3.61	(3.28–3.96)
Maine	403	5.12	(4.63–5.66)	233	6.47	(5.65–7.38)	170	4.00	(3.41–4.67)
Maryland	1,094	3.78	(3.56–4.02)	590	4.57	(4.20–4.97)	504	3.15	(2.88–3.44)
Massachusetts	1,517	4.25	(4.03–4.47)	847	5.38	(5.02–5.76)	670	3.35	(3.10–3.62)
Michigan	2,602	4.86	(4.67–5.05)	1,458	5.99	(5.68–6.31)	1,144	3.95	(3.72–4.19)
Minnesota	1,165	4.33	(4.09–4.59)	644	5.18	(4.78–5.60)	521	3.60	(3.30–3.93)
Mississippi	693	4.67	(4.32–5.03)	362	5.50	(4.93–6.10)	331	3.99	(3.57–4.45)
Missouri	1,468	4.58	(4.35–4.82)	793	5.45	(5.07–5.84)	675	3.86	(3.57–4.17)
Montana	248	4.53	(3.97–5.14)	147	5.53	(4.66–6.52)	101	3.63	(2.94–4.43)
Nebraska	475	5.13	(4.67–5.61)	256	6.01	(5.29–6.80)	219	4.30	(3.74–4.93)
Nevada	517	4.10	(3.75–4.48)	318	5.21	(4.64–5.84)	199	3.09	(2.67–3.55)
New Hampshire	338	4.76	(4.26–5.30)	202	6.11	(5.28–7.03)	136	3.62	(3.03–4.30)
New Jersey	1,720	3.69	(3.51–3.87)	970	4.65	(4.36–4.96)	750	2.90	(2.70–3.12)
New Mexico	375	3.66	(3.30–4.05)	216	4.48	(3.89–5.13)	159	2.95	(2.50–3.45)
New York	3,861	3.70	(3.58–3.82)	2,193	4.74	(4.54–4.95)	1,668	2.87	(2.74–3.02)
North Carolina	1,893	4.05	(3.87–4.24)	1,044	5.01	(4.71–5.33)	849	3.28	(3.06–3.51)
North Dakota	174	5.02	(4.29–5.83)	89	5.63	(4.51–6.95)	85	4.42	(3.51–5.50)
Ohio	2,794	4.44	(4.27–4.61)	1,527	5.36	(5.09–5.64)	1,267	3.66	(3.46–3.88)
Oklahoma	897	4.68	(4.38–5.00)	491	5.60	(5.11–6.13)	406	3.85	(3.47–4.25)
Oregon	1,056	5.19	(4.88–5.52)	624	6.56	(6.05–7.10)	432	4.05	(3.67–4.46)
Pennsylvania	3,008	4.10	(3.95–4.25)	1,623	4.95	(4.71–5.20)	1,385	3.41	(3.23–3.60)
Rhode Island	252	4.24	(3.73–4.80)	139	5.24	(4.39–6.20)	113	3.43	(2.81–4.15)
South Carolina	1,027	4.33	(4.07–4.61)	571	5.42	(4.97–5.89)	456	3.47	(3.16–3.81)
South Dakota	210	4.93	(4.28–5.66)	113	5.66	(4.65–6.82)	97	4.32	(3.48–5.30)
Tennessee	1,644	4.99	(4.75–5.24)	897	6.03	(5.64–6.45)	747	4.14	(3.85–4.45)
Texas	4,490	4.18	(4.06–4.31)	2,409	4.89	(4.70–5.10)	2,081	3.60	(3.45–3.76)
Utah	480	4.46	(4.07–4.89)	276	5.32	(4.70–6.01)	204	3.65	(3.16–4.19)
Vermont	158	4.47	(3.79–5.25)	82	4.93	(3.90–6.16)	76	3.99	(3.13–5.03)
Virginia	1,517	3.87	(3.68–4.08)	854	4.87	(4.54–5.22)	663	3.07	(2.84–3.31)
Washington	1,707	5.12	(4.88–5.38)	1,010	6.48	(6.08–6.90)	697	3.94	(3.65–4.25)
West Virginia	498	4.57	(4.18–5.00)	266	5.31	(4.68–6.00)	232	3.99	(3.48–4.55)

Continued

Table 18. *Continued*

State	Total			Males			Females		
	N	Rate	95% CI	N	Rate	95% CI	N	Rate	95% CI
Wisconsin	1,469	4.90	(4.65–5.16)	838	6.06	(5.65–6.49)	631	3.91	(3.60–4.23)
Wyoming	121	4.40	(3.64–5.28)	66	4.94	(3.79–6.32)	55	3.91	(2.93–5.11)
United States	67,172	4.28	(4.25–4.31)	37,374	5.23	(5.18–5.29)	29,798	3.48	(3.44–3.52)

† Rates are per 100,000 and are age–adjusted to the 2000 US standard population.
‡ 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. (1969–2009) <Katrina/Rita Population Adjustment>, National Cancer Institute, DCCPS, Surveillance Research Program, Surveillance Systems Branch, released April 2012. Underlying mortality data provided by NCHS (www.cdc.gov/nchs). Database: Mortality – All COD, Aggregated With State, Total U.S. (1969–2009) <Katrina/Rita Population Adjustment>
Abbreviations: SEER, Survival, Epidemiology and End Results; NCHS, National Center for Health Statistics; CI, confidence interval.

Table 19. Brain and Central Nervous System Tumors, Estimated Number of Cases†‡ and by Behavior by State, 2012, 2013

STATE	2012 Estimated New Cases			2013 Estimated New Cases		
	Total	Malignant	Non-Malignant	Total	Malignant	Non-Malignant
Alabama	1,070	360	710	1,090	370	720
Alaska	130	50	90	140	50	90
Arizona	1,530	560	970	1,590	580	1,010
Arkansas	670	240	430	680	240	440
California	7,560	2,670	4,890	7,700	2,710	4,980
Colorado	1,090	400	690	1,120	410	710
Connecticut	810	290	520	820	290	530
Delaware	210	70	140	220	80	140
District of Columbia	130	–	90	130	–	90
Florida	4,780	1,680	3,100	4,890	1,710	3,180
Georgia	2,090	700	1,380	2,150	720	1,420
Hawaii	260	80	180	260	80	180
Idaho	350	130	220	360	130	220
Illinois	2,770	970	1,800	2,800	980	1,820
Indiana	1,430	520	910	1,450	520	930
Iowa	700	260	440	710	260	450
Kansas	620	230	390	630	230	400
Kentucky	990	360	630	1,000	360	640
Louisiana	940	320	630	950	320	630
Maine	340	120	210	340	130	220
Maryland	1,260	410	850	1,280	420	860
Massachusetts	1,510	540	970	1,520	540	980
Michigan	2,280	800	1,480	2,310	810	1,490
Minnesota	1,180	430	750	1,200	440	760
Mississippi	640	210	430	640	210	430
Missouri	1,370	490	880	1,390	500	900
Montana	240	90	150	240	90	150
Nebraska	400	150	250	400	150	260
Nevada	600	220	390	630	230	400
New Hampshire	320	120	200	330	120	210
New Jersey	1,950	680	1,280	1,970	680	1,290
New Mexico	450	160	290	460	170	290
New York	4,380	1,500	2,890	4,430	1,510	2,920
North Carolina	2,130	730	1,400	2,190	750	1,430
North Dakota	150	50	90	150	50	90

Continued

Table 19. *Continued*

STATE	2012 Estimated New Cases			2013 Estimated New Cases		
	Total	Malignant	Non-Malignant	Total	Malignant	Non-Malignant
Ohio	2,660	940	1,710	2,690	950	1,730
Oklahoma	800	290	520	810	290	520
Oregon	900	330	570	920	340	590
Pennsylvania	3,020	1,070	1,950	3,050	1,080	1,970
Rhode Island	250	90	160	250	90	160
South Carolina	1,070	360	710	1,100	370	730
South Dakota	190	70	120	190	70	120
Tennessee	1,450	510	940	1,480	520	960
Texas	5,070	1,830	3,240	5,200	1,880	3,330
Utah	540	210	330	550	210	340
Vermont	150	60	100	160	60	100
Virginia	1,750	600	1,150	1,780	610	1,170
Washington	1,490	540	950	1,530	560	980
West Virginia	440	160	280	450	160	280
Wisconsin	1,300	470	830	1,320	480	840
Wyoming	120	50	80	120	50	80
United States	**68,530**	**24,170**	**44,360**	**69,720**	**24,560**	**45,160**

† Source: Estimation based on CBTRUS NPCR and SEER 2005–2009 data.
‡ Rounded to the nearest 10.
- Estimated number is less than 50.

Table 20. One-, Two-, Five-, and Ten-Year Relative Survival Rates[†] for Malignant Brain and Central Nervous System Tumors by Site[‡], SEER 18 Registries, 1995-2009[§]

			1-Yr		2-Yr		5-Yr		10-Yr	
ICD-O-3 CODE	SITE[‡]	N	%	95% CI	%	95% CI	%	95% CI	%	95% CI
C71.1	Frontal lobe of the brain	13,584	60.1	(59.3-61.0)	45.4	(44.5-46.3)	34.4	(33.5-35.3)	26.1	(25.1-27.2)
C71.2	Temporal lobe of the brain	9,759	55.0	(54.0-56.0)	33.9	(32.9-34.9)	22.3	(21.4-23.3)	17.1	(16.0-18.2)
C71.3	Parietal lobe of the brain	6,655	47.5	(46.3-48.8)	28.7	(27.6-29.9)	18.8	(17.7-19.9)	12.9	(11.7-14.2)
C71.4	Occipital lobe of the brain	1,657	50.0	(47.5-52.5)	30.6	(28.3-33.0)	20.9	(18.7-23.2)	16.8	(14.3-19.4)
C71.0	Cerebrum	2,979	48.2	(46.4-50.1)	34.0	(32.2-35.8)	25.8	(24.1-27.6)	22.5	(20.6-24.4)
C71.5	Ventricle	1,069	75.4	(72.6-77.9)	67.6	(64.6-70.5)	61.9	(58.6-65.0)	57.1	(53.2-60.8)
C71.6	Cerebellum	3,380	84.6	(83.3-85.8)	78.4	(76.9-79.8)	70.8	(69.0-72.5)	65.9	(63.8-67.9)
C71.7	Brain stem	2,706	69.3	(67.5-71.1)	56.3	(54.3-58.2)	47.8	(45.7-49.9)	42.7	(40.3-45.1)
C71.8-C71.9	Other brain	13,529	42.4	(41.5-43.2)	29.8	(29.0-30.6)	21.2	(20.4-21.9)	16.5	(15.7-17.4)
C72.0-C72.1	Spinal cord and cauda equina	2,025	89.0	(87.5-90.4)	84.6	(82.8-86.2)	79.6	(77.4-81.6)	75.4	(72.3-78.2)
C72.2-C72.5	Cranial nerves	609	95.8	(93.8-97.2)	94.3	(91.9-96.0)	91.4	(88.4-93.6)	90.7	(87.2-93.4)
C72.8-C72.9	Other nervous system	581	60.0	(55.8-64.0)	50.1	(45.7-54.4)	42.5	(37.8-47.1)	36.7	(31.0-42.5)
C70.0-C70.9	Meninges (cerebral and spinal)	1,164	82.0	(79.5-84.2)	74.9	(72.0-77.6)	64.2	(60.7-67.5)	55.3	(50.5-59.9)
C75.1-C75.2	Pituitary and craniopharyngeal duct	242	84.1	(78.5-88.3)	80.6	(74.5-85.4)	71.5	(64.3-77.5)	62.9	(53.8-70.7)
C75.3	Pineal	615	87.8	(84.8-90.2)	80.4	(76.8-83.5)	73.3	(69.1-77.0)	67.1	(61.5-72.0)
C30.0 (9522-9523)	Olfactory tumors of the nasal cavity	430	90.2	(86.7-92.8)	82.7	(78.4-86.3)	75.3	(70.0-79.8)	60.8	(53.4-67.4)
All Codes	**All Sites**	**60,984**	**57.5**	**(57.1-57.9)**	**43.2**	**(42.8-43.6)**	**33.8**	**(33.3-34.2)**	**28.0**	**(27.5-28.5)**

[†] 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.
[‡] The sites referred to in this table are based on the categories and site codes defined in the SEER Site/Histology Validation List.
[§] 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 2011 Sub (1973-2009 varying) - Linked To County Attributes - Total U.S., 1969-2010 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2012, based on the November 2011 submission.
Abbreviation: SEER, Survival, Epidemiology and End Results; CI, confidence interval.

Table 21. One-, Two-, Three-, Four-, Five-, and Ten-Year Relative Survival Rates[†‡] for Selected Malignant Brain and Central Nervous System Tumors by Histology, SEER 18 Registries, 1995-2009[§]

		1-Yr		2-Yr		3-Yr		4-Yr		5-Yr		10-Yr	
Histology	**N**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**
Pilocytic astrocytoma	2,967	97.8	(97.2-98.3)	96.6	(95.9-97.3)	95.6	(94.7-96.4)	94.8	(93.8-95.6)	94.1	(93.1-95.1)	91.4	(89.8-92.8)
Diffuse astrocytoma	5,430	71.6	(70.3-72.8)	60.7	(59.4-62.1)	54.5	(53.1-56.0)	50.1	(48.6-51.5)	47.1	(45.6-48.6)	36.0	(34.2-37.8)
Anaplastic astrocytoma	3,173	60.1	(58.3-61.8)	41.5	(39.6-43.3)	33.3	(31.5-35.1)	29.1	(27.4-30.9)	25.9	(24.2-27.7)	17.6	(15.7-19.5)
Glioblastoma	25,628	35.7	(35.1-36.3)	13.6	(13.2-14.1)	7.8	(7.4-8.1)	5.7	(5.4-6.1)	4.7	(4.4-5.0)	2.3	(2.0-2.7)
Oligodendroglioma	2,978	94.2	(93.2-95.0)	89.9	(88.7-91.0)	85.7	(84.3-87.0)	82.1	(80.5-83.6)	79.1	(77.3-80.7)	63.2	(60.5-65.7)
Anaplastic oligodendroglioma	1,165	81.0	(78.6-83.3)	66.9	(64.0-69.7)	59.8	(56.7-62.8)	54.3	(51.1-57.4)	49.4	(46.1-52.6)	34.2	(29.8-38.5)
Ependymal tumors	2,264	93.7	(92.6-94.7)	89.4	(87.9-90.7)	86.2	(84.5-87.7)	83.9	(82.0-85.6)	82.5	(80.5-84.3)	77.6	(74.9-80.1)
Oligoastrocytic tumors	1,639	87.9	(86.2-89.5)	76.6	(74.4-78.8)	70.2	(67.7-72.5)	64.5	(61.8-67.1)	60.2	(57.3-63.0)	47.2	(43.5-50.9)
Glioma malignant, NOS	3,644	61.9	(60.2-63.5)	50.4	(48.7-52.1)	47.0	(45.2-48.7)	44.7	(42. 9-46.4)	43.3	(41.5-45.1)	38.3	(36.2-40.4)
Neuronal and mixed neuronal-glial tumors	523	90.6	(87.5-93.0)	82.6	(78.7-85.9)	79.1	(74.9-82.8)	75.4	(70.8-79.4)	74.6	(69.8-78.7)	60.1	(53.1-66.3)
Embryonal tumors	2,464	82.2	(80.6-83.7)	72.0	(70.1-73.8)	67.1	(65.0-69.0)	63.8	(61.7-65.8)	61.2	(59.0-63.3)	54.2	(51.7-56.6)
Lymphoma	4,142	47.8	(46.2-49.3)	38.7	(37.1-40.3)	34.0	(32.5-35.6)	30.9	(29.3-32.4)	28.4	(26.8-30.0)	21.1	(19.2-23.1)
Total: All Brain and Other Nervous System	**60,984**	**57.5**	**(57.1-57.9)**	**43.2**	**(42.8-43.6)**	**38.2**	**(37.8-38.6)**	**35.5**	**(35.1-35.9)**	**33.8**	**(33.3-34.2)**	**28.0**	**(27.5-28.5)**

[†] 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.

[‡] Rates are an estimate of the percentage of patients alive at one, two, three, four, five, and ten year, respectively.

[§] 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 2011 Sub (1973-2009 varying) - Linked To County Attributes - Total U.S., 1969-2010 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2012, based on the November 2011 submission.

Includes histologies not listed in this table.

Abbreviation: SEER, Survival, Epidemiology and End Results; CI, confidence interval; NOS, not otherwise specified.

Table 22. One-, Two-, Five-, and Ten-Year Relative Survival Rates†‡ for Selected Malignant Brain and Central Nervous System Tumor Histologys by Age Groups, SEER 18 Registries, 1995-2009§

Histology	Age Group		1-Yr		2-Yr		5-Yr		10-Yr	
		N	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Pilocytic astrocytoma	0-14 yr	1,782	98.6	(97.9-99.1)	98.3	(97.6-98.9)	97.1	(96.1-97.9)	95.8	(94.2-96.9)
	0-19 yr	2,145	98.4	(97.8-98.9)	98.2	(97.4-98.7)	96.8	(95.8-97.5)	95.6	(94.2-96.7)
	20-44 yr	619	96.6	(94.8-97.8)	94.8	(92.6-96.3)	89.8	(86.7-92.2)	84.9	(80.3-88.4)
	45-54 yr	113	93.7	(86.7-97.1)	86.0	(77.3-91.5)	77.2	(66.6-84.8)	70.8	(57.2-80.8)
	55-64 yr	53	96.6	(84.0-99.0)	88.6	(73.7-95.3)	86.6	(71.1-94.1)	64.6	(40.3-81.0)
	65-74 yr	–	–	–	–	–	–	–	–	–
	75+ yr	–	–	–	–	–	–	–	–	–
Diffuse astrocytoma	0-14 yr	641	91.7	(89.3-93.7)	87.5	(84.5-89.9)	83.0	(79.6-86.0)	81.2	(77.1-84.6)
	0-19 yr	801	92.6	(90.5-94.3)	87.8	(85.3-90.0)	83.2	(80.1-85.8)	80.7	(77.1-83.8)
	20-44 yr	1,941	92.6	(91.3-93.7)	84.5	(82.7-86.1)	64.7	(62.2-67.1)	44.8	(41.4-48.1)
	45-54 yr	859	73.1	(69.9-76.0)	58.7	(55.1-62.1)	42.2	(38.4-45.9)	30.2	(25.5-35.1)
	55-64 yr	731	53.4	(49.6-57.1)	33.2	(29.5-36.8)	20.2	(16.9-23.7)	11.3	(7.9-15.4)
	65-74 yr	582	36.3	(32.2-40.4)	22.7	(19.1-26.5)	12.6	(9.5-16.2)	6.6	(3.2-11.7)
	75+ yr	516	20.5	(16.9-24.3)	10.4	(7.7-13.6)	4.4	(2.3-7.4)	–	–
Anaplastic astrocytoma	0-14 yr	176	58.2	(50.4-65.3)	40.0	(32.5-47.4)	29.8	(22.9-37.1)	25.0	(18.1-32.3)
	0-19 yr	240	64.3	(57.8-70.1)	42.1	(35.6-48.5)	31.2	(25.1-37.6)	26.2	(19.9-32.9)
	20-44 yr	1,030	86.9	(84.6-88.9)	71.6	(68.5-74.4)	48.8	(45.2-52.3)	33.6	(29.4-37.9)
	45-54 yr	558	69.8	(65.7-73.5)	47.2	(42.8-51.6)	28.0	(23.9-32.3)	15.6	(11.2-20.7)
	55-64 yr	544	50.0	(45.6-54.3)	24.8	(21.0-28.8)	10.2	(7.3-13.7)	6.7	(3.8-10.7)
	65-74 yr	448	30.9	(26.5-35.3)	12.7	(9.6-16.2)	4.2	(2.2-7.1)	–	–
	75+ yr	353	15.2	(11.5-19.5)	4.8	(2.7-8.0)	–	–	–	–
Glioblastoma	0-14 yr	222	50.1	(43.1-56.7)	28.5	(22.2-35.1)	21.3	(15.6-27.7)	13.7	(8.3-20.5)
	0-19 yr	322	57.1	(51.3-62.5)	31.7	(26.3-37.3)	18.2	(13.6-23.3)	11.9	(7.5-17.3)
	20-44 yr	2,543	67.1	(65.1-68.9)	35.4	(33.5-37.4)	16.6	(15.0-18.3)	9.8	(8.1-11.6)
	45-54 yr	4,559	53.7	(52.2-55.2)	20.6	(19.4-21.9)	5.8	(5.0-6.7)	2.9	(2.0-3.9)
	55-64 yr	6,584	41.6	(40.4-42.8)	14.2	(13.3-15.1)	3.9	(3.4-4.6)	0.9	(0.4-1.9)
	65-74 yr	6,279	24.0	(22.9-25.1)	6.9	(6.2-7.6)	1.6	(1.2-2.1)	0.5	(0.2-1.2)
	75+ yr	5,341	9.7	(8.8-10.5)	2.6	(2.1-3.1)	0.8	(0.5-1.2)	–	–
Oligodendroglioma	0-14 yr	136	97.0	(92.2-98.9)	96.2	(91.1-98.4)	93.6	(87.5-96.8)	90.4	(81.5-95.1)
	0-19 yr	232	97.4	(94.3-98.9)	95.6	(91.8-97.6)	92.5	(87.9-95.4)	90.0	(84.0-93.9)
	20-44 yr	1,548	98.2	(97.3-98.8)	95.7	(94.5-96.7)	85.2	(83.0-87.1)	67.8	(64.2-71.1)
	45-54 yr	648	94.4	(92.2-96.0)	89.4	(86.5-91.7)	77.8	(73.8-81.3)	58.8	(52.4-64.7)
	55-64 yr	330	87.5	(83.1-90.8)	78.3	(73.0-82.8)	64.3	(57.6-70.2)	47.2	(38.2-55.7)
	65-74 yr	139	77.1	(68.7-83.5)	69.1	(59.9-76.6)	47.1	(36.7-56.8)	34.2	(19.5-49.4)
	75+ yr	81	61.3	(48.9-71.5)	45.7	(33.0-57.5)	36.6	(22.0-51.4)	–	–
Anaplastic oligodendroglioma	0-14 yr	–	–	–	–	–	–	–	–	–
	0-19 yr	–	–	–	–	–	–	–	–	–
	20-44 yr	465	93.6	(90.9-95.5)	82.2	(78.2-85.5)	65.2	(60.1-69.8)	45.3	(38.0-52.3)
	45-54 yr	281	83.5	(78.4-87.4)	70.1	(64.0-75.3)	53.8	(46.9-60.1)	40.1	(32.2-47.9)
	55-64 yr	225	74.8	(68.3-80.2)	58.3	(51.0-65.0)	37.5	(30.0-45.0)	22.6	(13.3-33.3)
	65-74 yr	116	52.6	(42.7-61.5)	33.9	(24.9-43.2)	15.0	(8.4-23.5)	–	–
	75+ yr	–	–	–	–	–	–	–	–	–

Continued

Table 22. *Continued*

Histology	Age Group		1-Yr		2-Yr		5-Yr		10-Yr	
		N	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Ependymal tumors	0-14 yr	540	93.2	(90.7-95.1)	85.6	(82.2-88.5)	71.2	(66.7-75.3)	62.5	(56.8-67.6)
	0-19 yr	645	93.7	(91.5-95.4)	86.7	(83.6-89.2)	73.8	(69.7-77.4)	64.4	(59.2-69.2)
	20-44 yr	736	96.1	(94.3-97.3)	94.9	(93.0-96.4)	91.3	(88.6-93.4)	88.2	(84.4-91.1)
	45-54 yr	404	94.3	(91.3-96.2)	90.6	(87.0-93.3)	84.3	(79.4-88.1)	82.7	(77.4-86.9)
	55-64 yr	280	92.2	(88.0-95.0)	87.8	(82.7-91.5)	83.8	(77.2-88.6)	83.7	(76.2-89.0)
	65-74 yr	132	89.6	(82.0-94.1)	79.5	(70.0-86.3)	75.1	(64.6-82.9)	66.4	(50.4-78.3)
	75+ yr	67	77.3	(64.2-86.1)	72.2	(57.0-82.7)	65.3	(47.7-78.2)	30.2	(9.0-55.1)
Oligoastrocytic tumors	0-14 yr	69	93.8	(84.2-97.7)	84.5	(72.0-91.7)	79.9	(66.3-88.5)	72.3	(54.8-84.0)
	0-19 yr	114	92.7	(85.8-96.3)	85.2	(76.6-90.9)	82.8	(73.6-89.0)	76.2	(63.7-84.9)
	20-44 yr	892	96.2	(94.6-97.3)	89.1	(86.7-91.1)	70.3	(66.5-73.8)	55.3	(50.1-60.2)
	45-54 yr	322	88.2	(83.9-91.3)	75.0	(69.4-79.6)	58.3	(51.6-64.4)	41.2	(31.3-50.7)
	55-64 yr	173	71.4	(63.6-77.8)	47.4	(39.0-55.2)	28.3	(20.4-36.8)	21.8	(13.1-31.9)
	65-74 yr	94	63.3	(52.2-72.5)	36.7	(26.4-47.0)	23.6	(14.5-34.0)	–	–
	75+ yr	–	–	–	–	–	–	–	–	–
Glioma malignant, NOS	0-14 yr	1,191	75.1	(72.5-77.6)	61.6	(58.6-64.4)	57.6	(54.5-60.5)	56.3	(53.1-59.3)
	0-19 yr	1,319	76.6	(74.1-78.8)	63.5	(60.6-66.1)	59.0	(56.1-61.8)	57.5	(54.5-60.5)
	20-44 yr	700	87.6	(84.9-89.9)	77.8	(74.3-80.9)	64.6	(60.3-68.5)	50.0	(44.4-55.3)
	45-54 yr	371	71.4	(66.4-75.8)	56.9	(51.4-62.0)	46.1	(40.3-51.8)	39.1	(32.0-46.1)
	55-64 yr	311	50.5	(44.7-56.1)	33.8	(28.2-39.4)	24.2	(18.9-30.0)	21.3	(14.8-28.7)
	65-74 yr	341	33.2	(28.1-38.4)	21.6	(17.0-26.5)	15.8	(11.5-20.7)	11.8	(7.0-17.9)
	75+ yr	602	14.9	(12.0-18.0)	9.8	(7.4-12.7)	6.2	(3.8-9.3)	4.1	(1.5-8.8)
Neuronal and mixed neuronal-glial tumors	0-14 yr	–	–	–	–	–	–	–	–	–
	0-19 yr	57	92.5	(81.0-97.1)	81.9	(67.9-90.2)	81.9	(67.9-90.2)	68.5	(35.5-87.2)
	20-44 yr	138	96.4	(91.3-98.5)	91.8	(85.4-95.4)	80.6	(71.7-87.0)	68.3	(56.2-77.7)
	45-54 yr	131	93.4	(87.2-96.6)	90.3	(83.2-94.5)	77.9	(68.1-85.1)	63.4	(49.7-74.3)
	55-64 yr	103	90.4	(82.1-94.9)	75.2	(64.4-83.1)	64.4	(52.3-74.2)	53.1	(38.2-66.0)
	65-74 yr	51	75.7	(60.5-85.7)	68.4	(52.2-80.1)	67.0	(50.2-79.3)	38.5	(18.3-58.5)
	75+ yr	–	–	–	–	–	–	–	–	–
Embryonal tumors	0-14 yr	1,644	80.8	(78.8-82.7)	70.3	(68.0-72.6)	61.9	(59.2-64.4)	55.5	(52.5-58.4)
	0-19 yr	1,810	81.8	(79.9-83.6)	71.1	(68.9-73.2)	61.9	(59.4-64.3)	56.0	(53.2-58.8)
	20-44 yr	514	86.9	(83.5-89.5)	79.8	(75.8-83.1)	64.5	(59.6-68.9)	55.4	(49.6-60.9)
	45-54 yr	68	78.6	(66.2-86.8)	65.0	(51.4-75.6)	52.3	(36.6-65.8)	29.5	(13.2-47.9)
	55-64 yr	–	–	–	–	–	–	–	–	–
	65-74 yr	–	–	–	–	–	–	–	–	–
	75+ yr	–	–	–	–	–	–	–	–	–
Lymphoma	0-14 yr	–	–	–	–	–	–	–	–	–
	0-19 yr	60	83.0	(70.6-90.5)	77.3	(64.0-86.2)	73.2	(59.2-83.0)	61.8	(40.7-77.3)
	20-44 yr	1,013	39.4	(36.3-42.4)	33.1	(30.2-36.1)	27.9	(25.0-30.9)	21.7	(18.4-25.2)
	45-54 yr	678	56.8	(52.9-60.5)	48.4	(44.4-52.2)	37.9	(33.8-42.0)	28.5	(23.5-33.7)
	55-64 yr	771	60.3	(56.6-63.7)	50.0	(46.2-53.6)	36.2	(32.3-40.1)	27.0	(22.6-31.7)
	65-74 yr	878	47.6	(44.1-51.0)	37.4	(33.9-40.9)	22.3	(19.0-25.9)	12.4	(8.3-17.3)
	75+ yr	742	34.8	(31.1-38.4)	23.1	(19.7-26.6)	13.2	(10.0-16.8)	9.7	(6.5-13.6)

Continued

Table 22. *Continued*

Histology	Age Group		1-Yr		2-Yr		5-Yr		10-Yr	
		N	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Total: All Brain and CNS	0-14 yr	7,183	85.7	(84.8-86.5)	78.1	(77.1-79.1)	72.2	(71.1-73.3)	68.1	(66.8-69.4)
	0-19 yr	8,778	86.9	(86.1-87.6)	79.3	(78.4-80.1)	73.0	(72.0-74.0)	69.0	(67.8-70.2)
	20-44 yr	13,023	83.4	(82.8-84.1)	71.9	(71.1-72.7)	57.7	(56.7-58.6)	45.7	(44.5-46.9)
	45-54 yr	9,506	66.4	(65.4-67.3)	45.1	(44.0-46.1)	31.7	(30.6-32.8)	24.4	(23.1-25.7)
	55-64 yr	10,709	50.7	(49.7-51.7)	28.4	(27.5-29.3)	17.6	(16.8-18.5)	12.9	(11.9-13.9)
	65-74 yr	9,737	32.4	(31.4-33.4)	17.2	(16.4-18.0)	10.0	(9.3-10.7)	7.0	(6.1-7.9)
	75+ yr	9,231	16.6	(15.8-17.4)	9.0	(8.4-9.7)	5.7	(5.1-6.4)	3.8	(3.0-4.8)

[†] 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.
[‡] 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.
[§] 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 2011 Sub (1973-2009 varying) - Linked To County Attributes - Total U.S., 1969-2010 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2012, based on the November 2011 submission.
Includes histologies not listed in this table
Abbreviation: SEER, Survival, Epidemiology and End Results; CI, confidence interval; NOS, not otherwise specified.

Appendix

Appendix A. 2000 U.S. 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[†] for 2005–2009, By Age, Gender and Race

Age Group	White	Black	AIAN	API	Total
Male					
0-4	8,037,698	1,622,527	159,258	566,834	10,386,317
5-9	7,793,666	1,544,900	139,946	509,083	9,987,595
10-14	7,888,319	1,627,045	139,972	479,511	10,134,847
15-19	8,338,842	1,715,900	153,160	486,529	10,694,432
20-24	8,410,996	1,576,574	151,010	519,412	10,657,993
25-29	8,228,350	1,428,057	137,050	594,488	10,387,945
30-34	7,691,310	1,233,338	117,988	633,887	9,676,522
35-39	8,218,599	1,248,410	113,550	616,955	10,197,514
40-44	8,663,105	1,268,913	113,563	545,955	10,591,536
45-49	9,048,219	1,247,998	110,007	492,833	10,899,056
50-54	8,355,171	1,071,350	94,187	426,708	9,947,415
55-59	7,320,322	847,538	76,093	355,164	8,599,117
60-64	5,772,849	579,643	54,121	257,295	6,663,908
65-69	4,288,055	419,179	37,341	191,508	4,936,083
70-74	3,336,984	321,809	25,633	140,338	3,824,763
75-79	2,737,962	230,861	17,366	98,399	3,084,587
80-84	1,963,511	144,799	10,494	64,648	2,183,452
85+	1,444,483	88,929	7,413	49,597	1,590,423
Total	**117,538,441**	**18,217,770**	**1,658,152**	**7,029,142**	**144,443,505**
Female					
0-4	7,662,890	1,567,047	154,968	546,376	9,931,281
5-9	7,416,719	1,496,348	135,425	494,935	9,543,427
10-14	7,484,741	1,576,475	135,679	461,321	9,658,217
15-19	7,865,425	1,667,329	148,312	460,551	10,141,617
20-24	7,830,296	1,533,923	142,567	503,546	10,010,332
25-29	7,725,919	1,475,962	126,944	621,460	9,950,284
30-34	7,280,280	1,350,815	109,913	664,590	9,405,598
35-39	7,905,500	1,393,178	108,591	649,284	10,056,553
40-44	8,501,828	1,436,436	113,580	583,877	10,635,721
45-49	9,052,206	1,435,380	115,242	539,788	11,142,615
50-54	8,501,688	1,260,910	100,959	484,785	10,348,341
55-59	7,595,609	1,029,493	81,966	415,962	9,123,030
60-64	6,170,532	739,907	59,158	301,314	7,270,911
65-69	4,800,958	568,866	41,640	223,716	5,635,180
70-74	3,985,644	464,588	30,806	176,326	4,657,364
75-79	3,606,677	375,056	22,573	138,650	4,142,956
80-84	3,039,413	275,902	15,663	96,536	3,427,514
85 +	3,181,222	241,124	15,156	84,328	3,521,830
Total	**119,607,548**	**19,888,738**	**1,659,141**	**7,447,345**	**148,602,772**

[†] Population data source for 49 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.

Appendix C. Average Annual Populations† for 2005–2009 By Age, Gender, and Hispanic Ethnicity

Age Group	Hispanic	Non-Hispanic	Total
Male			
0-4	2,591,526	7,794,790	10,386,317
5-9	2,206,575	7,781,020	9,987,595
10-14	1,994,101	8,140,746	10,134,847
15-19	1,937,795	8,756,636	10,694,432
20-24	2,015,006	8,642,987	10,657,993
25-29	2,191,048	8,196,897	10,387,945
30-34	2,071,604	7,604,918	9,676,522
35-39	1,872,881	8,324,633	10,197,514
40-44	1,630,191	8,961,346	10,591,536
45-49	1,339,787	9,559,269	10,899,056
50-54	1,013,168	8,934,247	9,947,415
55-59	748,483	7,850,634	8,599,117
60-64	520,940	6,142,969	6,663,908
65-69	366,071	4,570,012	4,936,083
70-74	271,035	3,553,729	3,824,763
75-79	199,994	2,884,594	3,084,587
80-84	128,533	2,054,919	2,183,452
85 +	92,899	1,497,524	1,590,423
Total	**23,191,636**	**121,251,869**	**144,443,505**
Female			
0-4	2,485,956	7,445,325	9,931,281
5-9	2,106,961	7,436,465	9,543,427
10-14	1,900,666	7,757,551	9,658,217
15-19	1,799,832	8,341,785	10,141,617
20-24	1,732,051	8,278,281	10,010,332
25-29	1,778,951	8,171,333	9,950,284
30-34	1,724,996	7,680,602	9,405,598
35-39	1,621,039	8,435,514	10,056,553
40-44	1,464,772	9,170,949	10,635,721
45-49	1,265,587	9,877,029	11,142,615
50-54	1,007,437	9,340,904	10,348,341
55-59	786,589	8,336,441	9,123,030
60-64	581,503	6,689,407	7,270,911
65-69	434,780	5,200,400	5,635,180
70-74	344,316	4,313,047	4,657,364
75-79	272,247	3,870,710	4,142,956
80-84	191,020	3,236,494	3,427,514
85 +	176,572	3,345,258	3,521,830
Total	**21,675,276**	**126,927,496**	**148,602,772**

† Population data source for 49 population-based geographic regions: Estimates from the U.S. Census Bureau. <http://seer.cancer.gov/popdata/index.html>.

Disclaimer

The Central Brain Tumor Registry of the United States (CBTRUS) is a not-for-profit corporation which gathers and disseminates epidemiologic data on primary brain and central nervous system tumors in order to facilitate research and establish awareness of the disease. CBTRUS makes no representations or warranties, and gives no other assurances or guarantees, express or implied, with respect to the accuracy or completeness of the data presented. The information provided in this report is not intended to assist in the evaluation, diagnosis or treatment of individual diseases. Persons with questions regarding individual diseases should contact their own physician to obtain medical assistance. The contents in this report are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention.