

CBTRUS

CENTRAL BRAIN TUMOR REGISTRY OF THE UNITED STATES



2004-2005

PRIMARY BRAIN TUMORS IN THE UNITED STATES
STATISTICAL REPORT

1997-2001

Years Data Collected

CBTRUS MISSION



The Central Brain Tumor Registry of the United States (CBTRUS) is a not-for-profit corporation committed to providing a resource for gathering and disseminating current epidemiologic data on all primary brain tumors, malignant and non-malignant, for the purposes of accurately describing their incidence and survival patterns, evaluating diagnosis and treatment, facilitating etiologic studies, establishing awareness of the disease, and ultimately, for the prevention of all brain tumors.

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CBTRUS has used published information from the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute, the American Cancer Society (ACS), the North American Association of Central Cancer Registries (NAACCR), the International Agency for Research on Cancer (IARC), and the World Health Organization (WHO) in the preparation of this report. CBTRUS acknowledges and appreciates the contributions of these materials to this report and to cancer surveillance in general.

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CBTRUS would appreciate your help in order to support this database. Contributions are tax deductible and can be mailed to:

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MESSAGE FROM THE PRESIDENT

This year marks a new beginning in the cancer registration of primary brain tumors in the United States. Starting on January 1, 2004, all state cancer registries officially began incorporating the collection of data on nonmalignant (benign and uncertain behavior codes) brain tumors into their routine data collection of malignant tumors. This is truly a milestone for the brain tumor research, clinical, and patient communities. It took years of work mixed with an abundance of hope and faith from many individuals and organizations, and, in the end, it took a public law, Public Law 107-260, the Benign Brain Tumor Cancer Registries



Amendment Act. The people's voice was heard, and, now, we can all equally share in the benefits of this new legislation. The system worked. Now, what next?

The CBTRUS is entering a new phase in its development. Like previous ones it is exciting and challenging. Its database has grown in breadth and now contains population-based data from seventeen states on all primary brain tumors diagnosed as far back as 1985 through 2001. It is the largest aggregation of data and the most comprehensive resource for trends analyses on the incidence of all primary brain tumors, malignant and nonmalignant, in the United States. We look forward to the future and to analyzing data collected under a Uniform Data Standard policy guided by a site and histology definition for these devastating tumors.

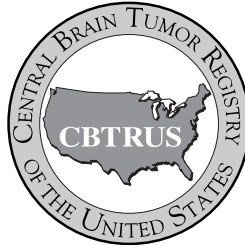
On behalf of the Board of Directors, I would like to thank our collaborating registries for providing data for this statistical report, our sponsors for providing financial support, and to all those who support our mission.

Carol Kruchko

*Carol Kruchko
President, CBTRUS*

CBTRUS

CENTRAL BRAIN TUMOR REGISTRY OF THE UNITED STATES



2004-2005

PRIMARY BRAIN TUMORS IN THE UNITED STATES

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FACT SHEET

- *Incidence rates are age-adjusted using the 2000 United States standard population unless otherwise noted.*
- *CBTRUS (Central Brain Tumor Registry of the United States) incidence rates and estimated new cases include all primary malignant and non-malignant tumors of the brain, central nervous system, pituitary and pineal glands, and olfactory tumors of the nasal cavity.*
- *SEER (Surveillance, Epidemiology, and End Results Program) incidence and survival rates extracted from the SEER Cancer Statistics Review, 1975-2001 include primary malignant tumors of the brain and central nervous system, excluding lymphomas, leukemias, tumors of the pituitary and pineal gland, and olfactory tumors of the nasal cavity.*
- *SEER (Surveillance, Epidemiology, and End Results Program) incidence and survival rates estimated using the SEER Cancer Incidence Public-Use Database, 1973-2001 include all primary malignant tumors of the brain, central nervous system, pituitary and pineal glands, and olfactory tumors of the nasal cavity, including lymphomas and leukemias.*
- *ACS (American Cancer Society) estimated new cases and deaths include primary malignant tumors of the brain and central nervous system, excluding lymphoma, leukemias, tumors of the pituitary and pineal glands, and olfactory tumors of the nasal cavity.*
- *IARC (International Agency for Research on Cancer) worldwide incidence rates include primary malignant tumors of the brain and central nervous system, excluding lymphoma, leukemias, tumors of the pituitary and pineal glands, and olfactory tumors of the nasal cavity. Global rates are age-adjusted using the world standard population.*

Incidence

- **CBTRUS:** The incidence rate of all primary non-malignant and malignant brain and central nervous system tumors is 14.1 cases per 100,000 person-years (6.8 per 100,000 person-years for benign and borderline tumors and 7.3 per 100,000 person-years for malignant tumors). The rate is higher in females (14.3 per 100,000 person-years) than males (13.9 per 100,000 person-years).^{1a}
- **CBTRUS:** An estimated 41,130 new cases of primary non-malignant and malignant brain and central nervous system tumors are expected to be diagnosed in 2004.^{1b}
- **SEER:** The incidence rate of primary malignant brain and central nervous system tumors (excluding lymphomas, leukemias, tumors of pituitary and pineal glands, and olfactory tumors of the nasal cavity) is 6.4 cases per 100,000 person-years. This rate is higher in males (7.6 per 100,000 person-years) than females (5.3 per 100,000 person-years).^{2a}
- **ACS:** An estimated 18,400 new cases of primary malignant brain and central nervous system tumors are expected to be diagnosed in 2004 (10,540 in males and 7,860 in females). This represents 1.34% of all cancers expected to be diagnosed in 2004.³
- **IARC:** The worldwide incidence rate of primary malignant brain and central nervous system tumors, age-adjusted using the world standard population, is 3.6 per 100,000 person-years in males and 2.5 per 100,000 person-years in females. The incidence rates are higher in more developed countries (males: 5.9 per 100,000 person-years; females: 4.1 per 100,000 person-years) than in less developed countries (males: 2.8 per 100,000 person-years; females: 2.0 per 100,000 person-years).⁴

Pediatric Incidence (Ages 0-19)

- **CBTRUS:** The incidence rate of childhood primary non-malignant and malignant brain and central nervous system tumors is 4.0 cases per 100,000 person-years. The rate is higher in males (4.2 per 100,000 person-years) than females (3.8 per 100,000 person-years).^{1a}
- **CBTRUS:** An estimated 3,200 new cases of childhood primary non-malignant and malignant brain and central nervous system tumors are expected to be diagnosed in 2004.^{1b} Of these 3,200 new cases, an estimated 2,430 will be in children less than 15 years of age.^{1b}

Mortality

- **ACS:** An estimated 12,690 deaths in 2004 will be attributed to primary malignant brain and central nervous system tumors.³

Lifetime Risk

- SEER: Males have a 0.67% lifetime risk of being diagnosed with a primary malignant brain/central nervous system tumor and 0.49% chance of dying from a brain/central nervous system tumor (excluding lymphomas, leukemias, tumors of pituitary and pineal glands, and olfactory tumors of the nasal cavity).^{2b}
- SEER: Females have a 0.51% lifetime risk of being diagnosed with a primary malignant brain/central nervous system tumor and a 0.39% chance of dying from a brain/central nervous system tumor (excluding lymphomas, leukemias, tumors of pituitary and pineal glands, and olfactory tumors of the nasal cavity).^{2b}

Survival

- SEER: The five-year relative survival rate following diagnosis of a primary malignant brain and central nervous system tumor (including lymphomas and leukemias, tumors of the pituitary and pineal glands, and olfactory tumors of the nasal cavity) is 27.9% for males and 30.1% for females (1973-2001 data).⁵
- SEER: Five-year relative survival rates following diagnosis of a primary malignant brain and central nervous system tumor (including lymphomas and leukemias, tumors of the pituitary and pineal glands, and olfactory tumors of the nasal cavity) by age of diagnosis (1973-2001 data):⁵

| | | | |
|------------------|-------|------------------|-------|
| Age 0-19 years: | 64.3% | Age 55-64 years: | 10.6% |
| Age 20-44 years: | 47.6% | Age 65-74 years: | 6.5% |
| Age 45-54 years: | 22.5% | Age 75 or older: | 4.7% |

Prevalence

- CBTRUS: The prevalence rate for all primary brain and central nervous system tumors was estimated to be 130.8 per 100,000. It was estimated that more than 359,000 persons were living with a diagnosis of primary brain and central nervous system tumor in the United States in 2000. The prevalence rate for primary malignant brain and central nervous system tumors was 29.5 per 100,000 and for primary benign brain and central nervous system tumors was 97.5 per 100,000. It was estimated that in the year 2000 in the United States more than 81,000 and 267,000 persons were living with a diagnosis of primary malignant brain and central nervous system tumor and primary benign brain and central nervous system tumor, respectively.⁶
- CBTRUS: The prevalence rate for all pediatric (ages 0-19) primary brain and central nervous system tumors was estimated at 9.5 per 100,000 with more than 26,000 children estimated to be living with this diagnosis in the United States in 2000. The prevalence rate for pediatric primary malignant brain and central nervous system tumors was 7.9 per 100,000 with more than 21,000 children estimated to be living with a diagnosis of primary malignant brain/central nervous system tumor in the United States in 2000.⁶

1a. Central Brain Tumor Registry of the United States data, 1997-2001.

1b. CBTRUS 1997-2001 data. United States population estimates by 5-year age group were obtained from United States census; estimates available at www.census.gov. Projections were from the middle series for July 1, 2004 with a total United States population of 285,266,000. (Internet release date: 01/13/2000). For further information on calculating expected numbers of tumors, please see Davis FG, McCarthy BJ, Jukich P, "The descriptive epidemiology of brain tumors" *Neuroimaging Clinics of North America*, V. 9, No. 4, November, 1999.

2. Ries LAG, Eisner MP, Kosary CL, Hankey BF, Miller BA, Clegg L, Mariotto A, Feuer EJ, Edwards BK (eds). SEER Cancer Statistics Review, 1975-2001. National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2001/, 2004.

2a. Tables I(4) 1997-2001 data
2b. Table III(8) 1999-2001 data.

3. Cancer Facts & Figures 2004. American Cancer Society, Inc., Surveillance Research, Atlanta, Georgia, 2004.

4. Ferlay J, Bray F, Pisani P and Parkin DM. GLOBOCAN 2000: Cancer Incidence, Mortality and Prevalence Worldwide, Version 1.0. IARC CancerBase No. 5. Lyon, IARC Press, 2001.

5. Estimated by CBTRUS using Surveillance, Epidemiology and End Results (SEER) Program public use CD-ROM (1973-2001). National Cancer Institute, DCPC, Surveillance Program, Cancer Statistics Branch, issued April 2004, based on the November 2003 submission.

6. Davis FG, Kupelian V, Freels S, McCarthy B, Surawicz T. Prevalence estimates for primary brain tumors in the United States by behavior and major histology groups. *Neuro-Oncology*. 3(3):152-158, 2001.

BACKGROUND

The CBTRUS database contains the largest aggregation of population-based data on the incidence of all primary brain and central nervous system tumors in the United States. This database has been developed by compiling data from state cancer registries that include information on both non-malignant and malignant primary brain tumors. This current report includes data from 17 state cancer registries.

CBTRUS was incorporated in 1992 following a two-year study conducted by the American Brain Tumor Association to determine the feasibility of a central registry for all brain tumor cases. Until that time, standard data reporting in the United States had been limited to malignant cases only. Benign brain tumors, however, may, and often do, impose the same costs to society in terms of medical care, case fatality and lost productivity as malignant tumors. A histologically benign tumor may produce devastating effects based on its location, while a malignant tumor may not produce visible symptoms. In addition, as molecular markers have been discovered, it has become clear that certain benign brain tumors may become malignant over time. In order to present a complete picture of this disease, CBTRUS believes non-malignant (benign and borderline) brain tumor data must be collected and reported along with malignant data.

This statistical report continues the past efforts CBTRUS has made to provide accurate, population-based incidence rates for all primary brain tumors by histology, age, gender, race and Hispanic origin. As in previous CBTRUS reports, these data have been listed in histologic groupings with improved clinical relevance. They are useful for surveillance and may serve as a baseline for comparison with regional rates. They are also important for the allocation and planning of specialty health care services, for planning programs for disease prevention and control, and in the development of research proposals including those that investigate etiology.

CBTRUS welcomes passage of the Benign Brain Tumor Cancer Registries Amendment Act (Public Law 107-260) which requires all cancer surveillance registries to expand their primary brain tumor data collection to include tumors of benign and uncertain behavior beginning in January 2004. CBTRUS believes that only by having complete data will the clues be found to investigate the causes of this terrible disease.

DISCLAIMER

The Central Brain Tumor Registry of the United States (CBTRUS) is a non-for-profit corporation that gathers and disseminates epidemiologic data on primary brain 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, expressed or implied, with respect to the accuracy or completeness of the data presented. The information provided in this publication 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 objective of this report is to provide a current overview of the descriptive epidemiology of all primary brain tumors in the United States. CBTRUS compiles data from state cancer registries that include information on all primary brain and central nervous system tumors. Incidence rates of primary malignant and non-malignant brain and central nervous system tumors from 1997-2001 were calculated by gender, age, race, and Hispanic origin. Incidence and mortality rates for malignant brain and other nervous system tumors were obtained from the North American Association of Central Cancer Registries (NAACCR). Data from the Surveillance, Epidemiology and End Results (SEER) Program of the National Cancer Institute were used to estimate survival rates for primary malignant brain and central nervous system tumors. Estimated numbers of deaths for malignant brain and nervous system tumors were obtained from the American Cancer Society (ACS).

DEFINITION OF RATES

RATES measure the occurrence of disease in a population. They are calculated by counting the observed numbers of cases of an event occurring in a defined population within a specified time period and dividing by the total population at risk within the same time period. As an example, in this report the incidence of brain tumors in a state is calculated by adding the total number of newly diagnosed cases of brain tumors within that state for the years of interest and dividing by the state populations for the same years. Rates are typically expressed in units of PERSON-TIME with each person-year reflecting one individual over one year. For cancer, rates are usually expressed per 100,000 person-years. Statistical data are commonly measured over five-year periods. Measuring data in smaller time periods, such as one-year intervals, can produce skewed statistics because small variations in the frequencies can create the appearance of dramatic shifts in rates.

INCIDENCE RATES measure the occurrence of newly diagnosed cases of disease. PREVALENCE RATES measure the number of people with a disease at a particular point in time or during a particular period of time. MORTALITY RATES quantify the number of people who have died from the disease. SURVIVAL RATES (percents) are the probability of surviving for a specified time period. OBSERVED SURVIVAL RATES are computed from life-table estimates and yield the probability of surviving a specified time period (often five years) following diagnosis. RELATIVE SURVIVAL RATES are defined as the observed probability of survival adjusted for the expected survival rate of the United States population for that age, gender, and calendar year.

The rate of disease in an entire population is the CRUDE RATE. Crude rates are frequently adjusted by age. AGE-ADJUSTING RATES to a common standard population allows for comparisons of rates across regions with different age structures. Cancer incidence rates in this report are adjusted to the YEAR 2000 U.S. STANDARD POPULATION. Rates adjusted to the Year 2000 standard

cannot be compared to those rates found in earlier statistical reports containing rates adjusted to the 1970 standard.^{1,2,3} Differences between incidence rates adjusted to Year 2000 and Year 1970 standard populations are an artifact of the aging of the population over time and should not be interpreted as an increase in brain tumor incidence.

Rates for a subset of a population are specific rates. AGE-SPECIFIC RATES that describe the rate of disease in a defined age group are presented in this report. Specific rates by race, Hispanic origin, and gender are also reported.

The variability around the estimates of incidence rates is reflected in the STANDARD ERROR. Standard error is a measure of the potential error in the incidence rates. The standard error is one of the numbers incorporated into the formula for computing the confidence interval associated with a certain rate. A CONFIDENCE INTERVAL is the computed interval with a given probability, e.g., 95 percent, that the true value of a variable such as a mean, proportion, or rate is contained within the interval. For example, the age-adjusted primary brain tumor incidence rate is 14.1 cases per 100,000 person-years. We can be 95 percent certain that the actual incidence rate is between 14.0 and 14.2 cases per 100,000 person-years.

In order to be able to compare incidence rates among statistical reports, agencies, or registries, one must determine whether the case definition, data collection, and rate calculation are similar. How is an incidence case defined? Are all primary malignant and non-malignant tumors included in the analysis? Are only malignant tumors included in the analysis? What tumor locations (primary sites) are included in the analysis? Are lymphomas and hemopoietic neoplasms included in the rates? Are the populations comparable? Are the rates age-adjusted? And if so, to which standard population are they age-adjusted? Differences in case definition, data collection, methodology, analysis, and rate computation may prevent the direct comparison of published rates between sources.

METHODS

Data Collection

CBTRUS obtained incidence data from seventeen collaborating state cancer registries that include cases of non-malignant (benign and uncertain) and malignant primary brain and central nervous system tumors. Data were requested from each registry on all cases newly diagnosed between 1997 and 2001 with a primary brain/central nervous system tumor at any of the following sites (International Classification of Diseases for Oncology (ICDO) 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 (9522-9523)].⁴ Data were received without direct personal identifiers. Population data for each state were obtained from the SEER program website, which receives yearly population estimates from the U.S. Census Bureau.⁵

Fifteen states provided non-malignant and malig-

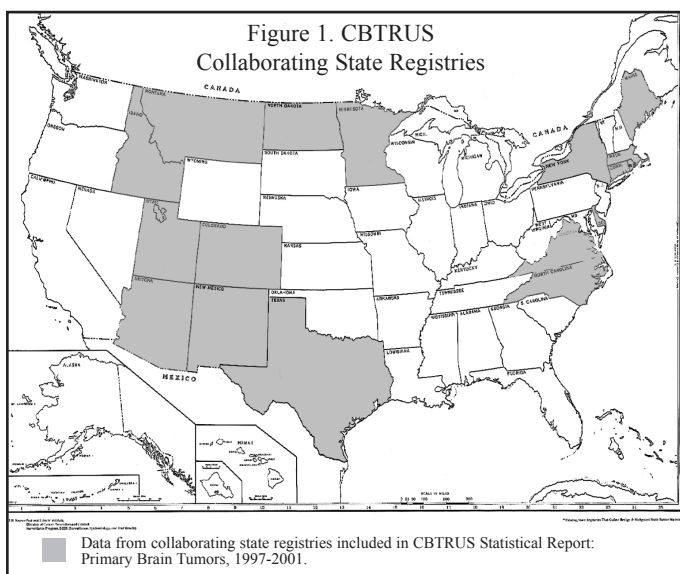
directed to the state cancer registry staff for correction or clarification.

Classification by Histology

The histology groupings used in this report were developed in collaboration with the CBTRUS consulting neuropathologist, Dr. Janet Bruner, of the University of Texas M.D. Anderson Cancer Center. These groupings are broadly based on the World Health Organization (WHO) categories for brain tumors.⁷ The list of ICDO-morphology codes included in each group is presented in Table 1. The classification scheme has been updated to reflect ICDO-3 codes⁸ and includes morphology codes that were not previously reported to CBTRUS.⁹ The CBTRUS classification scheme has also been updated to reflect any changes in the grouping of histology codes within the major histology categories compared to editions of the CBTRUS classification scheme prior to 2002.⁹ In this report, incidence rates are provided by histology and by major histology grouping. Please note, the order of appearance of the histologies listed under the Tumors of the Neuroepithelial Tissue category have changed as compared to CBTRUS statistical reports published before 2002. Astrocytomas are listed first, followed by glioblastomas, oligodendrogliomas, ependymomas, other gliomas, and other histologies included within the category.

Definition of Tumor Locations (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.¹⁰ The frontal lobe (ICDO site code 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 lesion of the brain, as well as brain sites not otherwise specified (NOS), are defined by ICDO site codes C71.8- C71.9. The cranial nerve category (C72.2-72.5) 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 lesion of the brain and central nervous system, as well as nervous system sites not otherwise specified (NOS), are defined by ICDO 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



nant incidence data for the entire five-year period (Figure 1). Rhode Island began collecting data on non-malignant tumors in 1998. North Dakota provided data on malignant tumors only for 1997-2001.

Data were edited using a modified version of the NAACCR Call for Data 2004 metafile and EDITS⁶ software that generates warnings when illogical or impossible site, morphology, and/or behavior combinations were reported. When possible, queries were

nasal cavity (C30.0) are olfactory tumors (defined by ICDO-2 morphology codes 9522-9523).

Estimation of Incidence and Mortality Rates

Incidence rates were generated using SAS, a computer based statistical analysis system.¹¹ Overall rates for benign and malignant tumors and rates for selected histology groupings by gender, race, and age were estimated using data from the fifteen regions that provided five years of non-malignant and malignant tumor data, 1997-2001. Overall rates for benign and malignant tumors and rates for selected histology groupings by Hispanic origin were estimated using data from the thirteen regions that provided complete Hispanic ethnicity data for the years 1997-2001, including the NAACCR Hispanic Identification Algorithm (NHIA) data field. Age-adjusted rates based on five-year age groupings were standardized to the Year 2000 U.S. standard population. Populations for the CBTRUS regions, 15 states combined and 13 states combined, are shown in Tables 2 and 3, respectively. The age distribution of the 2000 U.S. standard population is shown in Table 4.

State incidence and mortality rates for malignant tumors from 1997-2001 were obtained from the most current Cancer Incidence in North America (CINA) Publication on the NAACCR website.¹² These rates were adjusted using the 2000 U.S. standard population.

Differences in Brain Tumor Definition

SEER and NAACCR categorize brain tumors differently from CBTRUS using ICDO site, morphology, and behavior codes. SEER's and NAACCR's definition of brain tumors (used 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) and only includes tumors of malignant behavior (3).^{12,13} In addition, SEER and NAACCR exclude lymphoma and leukemia morphologies (9590-9989) from all brain and central nervous system sites. In contrast, the CBTRUS definition also includes tumors from the pituitary and pineal glands (C75.1-C75.3) and olfactory tumors of the nasal cavity [C30.0 (9522-9523)]. CBTRUS collects data on all tumor morphologies located within these sites including the leukemia and lymphoma morphologies (9590-9989), as well as collecting all primary tumors, including those with a behavior code of 0 (benign) and 1 (uncertain), in addition to 3 (malignant). SEER includes pilocytic astro-

cytomas, a tumor of uncertain, not malignant, behavior in their malignant brain tumor data and statistics. CBTRUS has categorized pilocytic astrocytomas in the malignant tumor category to enhance comparability of rates, especially for comparison of childhood brain tumor rates. *It is important to understand these differences in definition as they prevent the direct comparison of published rates.* Please keep in mind that statistics for lymphomas and hemopoietic neoplasms contained in this report refer only to lymphomas and hemopoietic neoplasms of the brain and central nervous system.

Even among CBTRUS collaborating registries there are differences in the requirements for reporting of benign tumors. For example, one of the collaborating registries collects data on benign tumors of the brain and meninges, but excludes benign tumors of the spinal cord and acoustic nerve.¹⁴ And a few collaborating registries do not actively collect pituitary or pineal gland tumors of benign or uncertain behavior. These reporting practices result in incidence estimates lower than in actuality. On the other hand, active collection of benign tumors is required in several states, resulting in apparently higher estimates of incidence. In addition, states that require the collection of all primary brain tumors regardless of the method of diagnosis will appear to have higher incidence rates than states that primarily collect histologically confirmed tumors. More detailed discussions of state reporting differences are available.^{14,15} Standardization of brain tumor reporting occurred with adoption of Uniform Data Standards (UDS) for benign brain tumors in July 2003 and will aid in distinguishing differences in reporting practices from true variation in the incidence of brain tumors between states. UDS were necessary for implementation of the Benign Brain Tumor Cancer Registries Amendment Act (Public Law 107-260) which required all surveillance registries to expand their primary brain tumor data collection to include tumors of benign and uncertain behavior. Public Law 107-260 went into effect January 1, 2004. These issues were recognized by CBTRUS and by the National Coordinating Council for Cancer Surveillance and were actively addressed by the Brain Tumor Working Group.

Estimation of Number of Cases and Number of Deaths

Estimated number of cases of malignant and non-malignant tumors were calculated using age-specific rates (CBTRUS 1997-2001 data). Population data (projections) for each state for 2004 were obtained from the U.S. Census Bureau website.¹⁶

Estimated number of deaths for malignant tumors were obtained from the American Cancer Society publi-

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cation, *Cancer Facts & Figures 2004*. The source for its data was the U.S. Mortality Public Use Data Tapes, 1969-2001, from the National Center for Health Statistics.¹⁷

Estimation of Survival Rates

SEER*Stat 5.2 statistical software was used to estimate one- through ten-year relative survival rates for primary malignant brain tumor cases diagnosed between 1973-2001 in nine SEER areas.¹⁸ This program utilizes life-table (actuarial) methods to compute survival estimates and accounts for current follow-up. Survival estimates were determined 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 central nervous system 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 data analyses.

RESULTS

Primary Brain Tumors: Incidence by State, Year, Behavior, and Age

Distribution

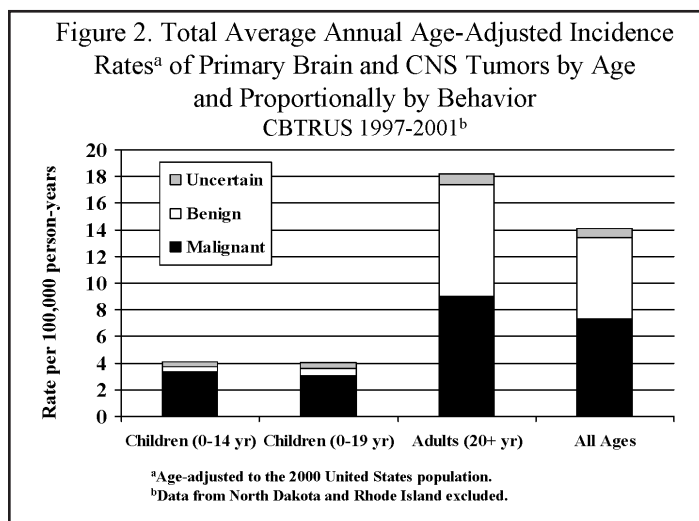
The number of reported brain tumors from the participating registries is listed by state in Table 5. Almost 60,000 tumors were reported to CBTRUS from a combined population of 88.1 million that represents approximately 30% of the U.S. population. The overall percent of benign tumors varied considerably by state (range: 26-59%). Seventy-nine percent of all tumors had a histologically confirmed diagnosis, with substantial regional variation (state range: 65-97%). Note: SEER includes pilocytic astrocytomas, a tumor of uncertain, not malignant, behavior in their malignant brain tumor data and statistics. CBTRUS has categorized pilocytic astrocytomas in the malignant tumor category to enhance comparability of rates.

Among the reported brain tumors in Table 5, males accounted for 46% of the cases and females for 54% of the cases. Nine percent of the cases were in indi-

viduals less than 20 years of age at the time of diagnosis and 91% were in individuals 20 years of age or older at the time of the diagnosis. Caucasians accounted for 88% of the cases and African-Americans accounted for 7% of the cases. Ten percent of the cases were in individuals of Hispanic origin and 90% were in individuals not of Hispanic origin.

Overall Incidence

The inclusion of state data in the incidence rates in this report (except for the incidence rates by Hispanic origin) was limited to those registries that provided non-malignant and malignant tumor data for all five years, 1997-2001. Fifteen states (Arizona, Colorado, Connecticut, Delaware, Idaho, Maine, Massachusetts, Minnesota, Montana, New Mexico, New York, North



Carolina, Texas, Utah, and Virginia) met this criterion. Among those states, almost 59,000 tumors were reported. The overall incidence rate for primary brain and central nervous system tumors was 14.1 per 100,000 person-years adjusted with the year 2000 standard (Table 6). The overall incidence rate was 4.0 per 100,000 person-years for children 0-19 years of age (4.1 per 100,000 person-years for children less than 15 years) and 18.2 per 100,000 person-years 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 2.

Overall Incidence Rates by Year

The overall incidence rates by calendar year varied slightly from 1997 through 2001 (Figure 3). The overall incidence rates were as follows: 13.5 per 100,000 person-years in 1997; 13.9 per 100,000 person-years in 1998; 14.1 per 100,000 person-years in 1999; 14.2 per 100,000 person-years in 2000; and 14.7 per 100,000

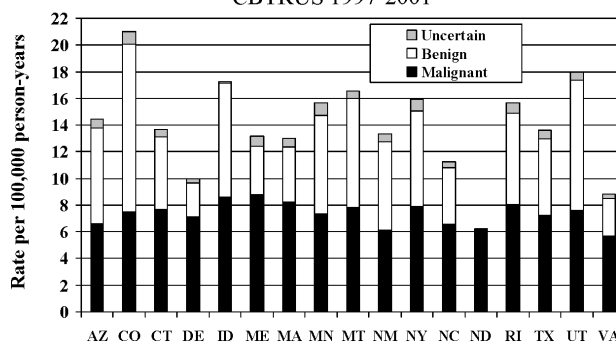
person-years in 2001. However, these differences in rates between years were not statistically significant. Slight fluctuation in the overall incidence rate on a yearly basis is to be expected and does not necessarily reflect any trends.

Incidence Rates by State, Age, and Behavior

The overall average annual incidence rate by state, age, and behavior are displayed in Table 6. Note: CBTRUS has categorized pilocytic astrocytomas in the malignant tumor category to provide continuity between SEER and CBTRUS statistics, especially for comparison of childhood brain tumor statistics. The total state incidence rates of all primary brain tumors (malignant and non-malignant) ranged from 8.8 to 21.0 per 100,000 person-years. The state incidence rates of all primary non-malignant brain tumors ranged from 2.9 to 13.5 per 100,000 person-years and the state incidence rates of all primary malignant brain tumors ranged from 5.7 to 8.8 per 100,000 person-years. The state-specific incidence rates for non-malignant tumors ranged from 3.9 to 18.4 per 100,000 person-years among adults 20 years of age and older and from 0.5 to 1.6 per 100,000 person-years among children less than 20 years of age. The state-specific incidence rates for malignant tumors ranged from 7.0 to 10.8 per 100,000 person-years among adults 20 years of age and older and from 2.3 to 3.7 per 100,000 person-years among children less than 20 years of age. There is less variation by state in malignant tumor rates as compared to rates for tumors of benign and uncertain behavior suggesting greater consistency in reporting of the malignant tumors. The variation in tumor rates

by state for children is less than that for adults for both malignant tumors and tumors of benign or uncertain behavior. Because very few benign and uncertain tumors occur in children, the lower variability in incidence suggests reporting differences in benign tumors may be driving the variability in incidence rates between states in the adults. The small magnitude of tumors in children for several of the states listed in Table 6 may produce unstable rates, and thus it is prudent to use caution when

Figure 4. Total Average Annual Age-Adjusted Incidence Rates^a of Primary Brain and CNS Tumors by State and Proportionally by Behavior
CBTRUS 1997-2001^b

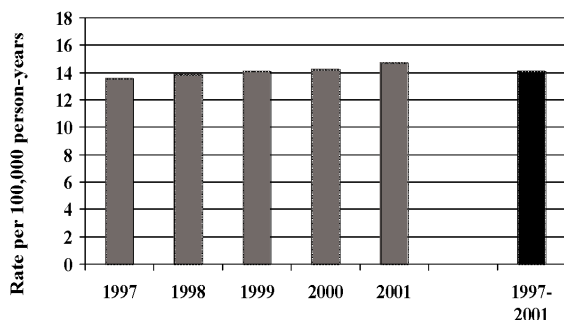


^aAge-adjusted to the 2000 United States population.
^bExcept for RI (1998-2001) and ND (malignant tumors only).

interpreting and comparing these numbers. With the passage of the Benign Brain Tumor Cancer Registries Amendment Act (Public Law 107-260), non-malignant brain tumor rates will become comparable across states.

The incidence rates by tumor behavior and state are illustrated in Figure 4. The state rates for the malignant tumors (state range: 5.7 to 8.8 per 100,000 person-years) are much less variable than the reported rates for the benign tumors (state range: 2.6 to 12.6 per 100,000 person-years). The state variation shown in these figures and tables, especially in reported incidence rates for the benign tumors, likely reflects differences in registry reporting practices including case ascertainment. An example of this is Colorado, which has the highest estimated incidence for brain tumors overall. Colorado also has the highest percentage of reported benign brain tumors, as well as the lowest percentage of histologically confirmed tumors. Colorado law requires active collection of all primary brain tumors. As many benign brain tumors are not histologically confirmed, this results in a lower percent of diagnostically confirmed tumors. A statistically significant negative correlation exists between the proportion of tumors with benign behavior and the

Figure 3. Average Annual Age-Adjusted Incidence Rates^a of Primary Brain and CNS Tumors by Year
CBTRUS 1997-2001^b



^aAge-adjusted to the 2000 United States population.
^bData from North Dakota and Rhode Island excluded.

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proportion of tumors diagnostically confirmed by state for the data presented in Table 5. In addition, the active collection of all brain tumors in Colorado results in a higher incidence rate compared to other registries, some of which do not follow these same reporting practices (see prior section, Differences in Brain Tumor Definition, for further details) (Table 5). Standardization of brain tumor reporting will aid in distinguishing differences in reporting practices from true variation in the incidence of brain tumors between states.

Primary Brain Tumors: Incidence by Histology, Gender, Race, Hispanic Origin, and Age

Figure 6. Distribution of All Primary Brain and CNS Tumors by Histology
CBTRUS 1997-2001 (n=58,907)

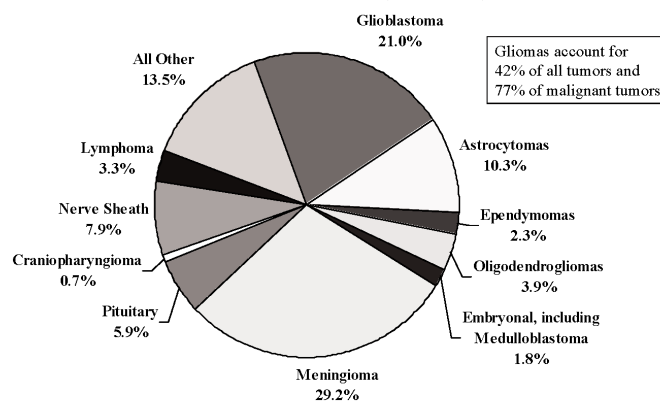
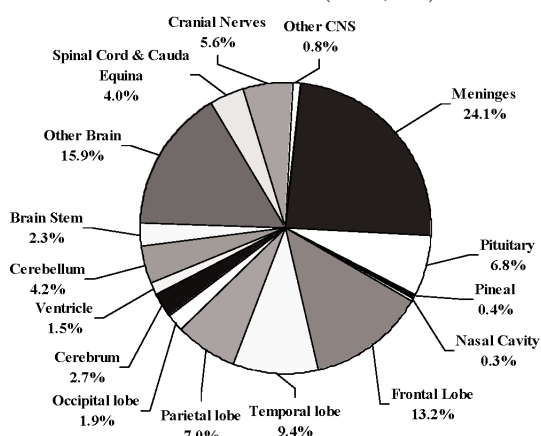


Figure 5. Distribution of All Primary Brain and CNS Tumors by Site
CBTRUS 1997-2001 (n=58,907)



Distribution of Tumors

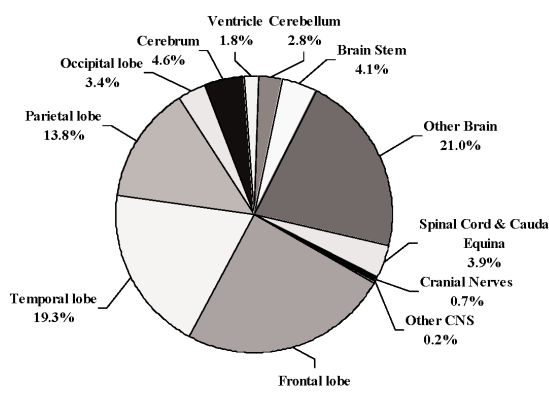
The distribution of tumors by site is shown in Figure 5. The majority of tumors (31%) are located within the frontal, temporal, parietal, and occipital lobes of the brain. Cerebrum, ventricle, cerebellum, and brain stem tumors account for 3%, 2%, 4%, and 2% of all tumors, respectively. Other tumors of the brain account for 16% of all tumors. Tumors of the meninges represent 24% of all tumors reported to CBTRUS. The cranial nerves and the spinal cord/cauda equina account for 6% and 4% of all tumors, respectively. The pituitary and pineal glands account for about 7% of

tumors. Olfactory tumors of the nasal cavity and other central nervous system tumors, NOS (not otherwise specified), each account for less than 1% of tumors reported to CBTRUS.

The distribution by histology is shown in Figure 6. The most frequently reported histology is a predominately benign tumor, meningioma, which accounts for over 29% of all tumors, followed closely by glioblastomas and astrocytomas. The predominately benign nerve sheath tumors and pituitary tumors account for 8% and 6% of all tumors, respectively. Acoustic neuromas account for 54% of all nerve sheath tumors.

Gliomas are tumors that arise from glial cells, and include astrocytomas, glioblastomas, oligodendrocytomas, ependymomas, mixed gliomas, malignant gliomas NOS, and

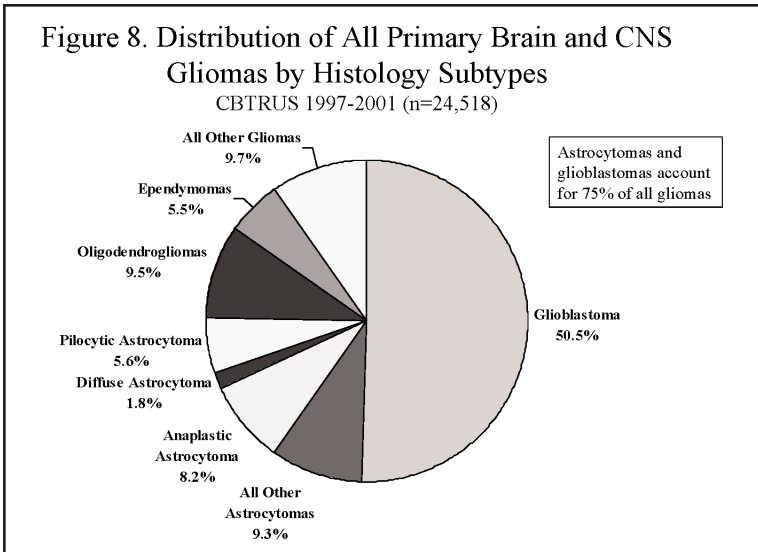
Figure 7. Distribution of All Primary Brain and CNS Gliomas by Site
CBTRUS 1997-2001 (n=24,518)



neuroepithelial tumors. The broad category glioma represents 42% of all tumors (Figure 6). The distribution of tumors by site for gliomas is shown in Figure 7. Sixty-one percent of gliomas occur in the frontal, temporal, parietal, and occipital lobes of the brain. The distribution by specific histology for gliomas is illustrated in Figure 8. Glioblastomas account for the majority of gliomas, while astrocytomas and glioblastomas account for three-quarters of gliomas.

located within the frontal, temporal, parietal, and occipital lobes of the brain. Cerebrum, ventricle, cerebellum, and brain stem tumors account for 3%, 3%, 6%, and 3% of all young adult tumors, respectively. Other tumors of the brain account for 13% of all young adult tumors. Tumors of the meninges represent 11% of all young adult tumors reported to CBTRUS. The cranial nerves and the spinal cord/cauda equina account for 6% and 5% of all young adult tumors, respectively. The pituitary and pineal glands account for about 15% of young adult tumors. Olfactory tumors of the nasal cavity and other central nervous system tumors, NOS, each account for less than 1% of young adult tumors reported to CBTRUS.

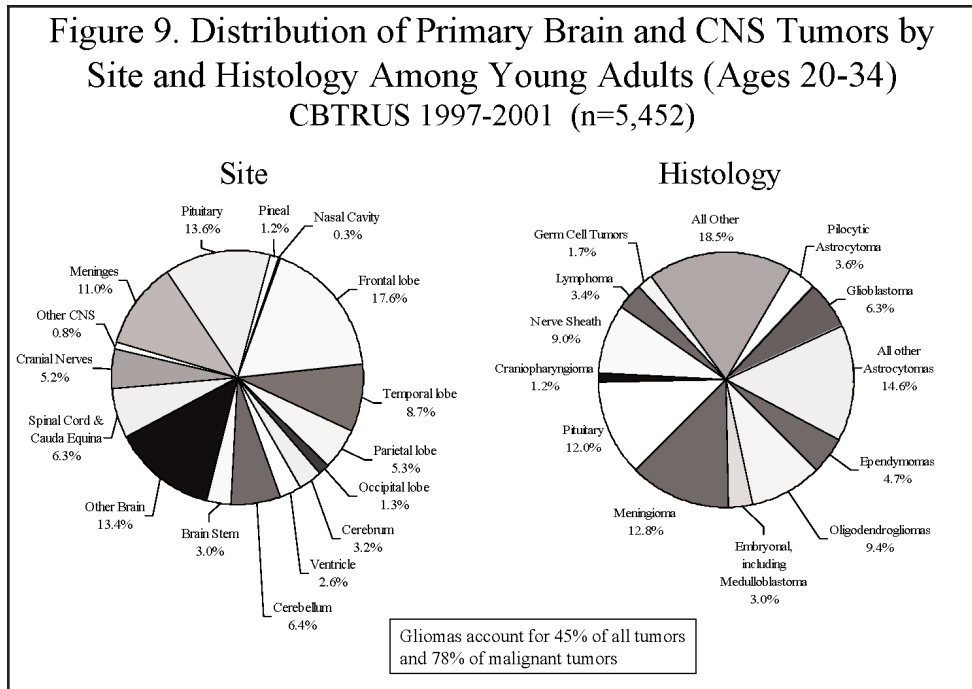
The distribution by histology for young adults (ages 20-34 years) is shown in Figure 9. The most frequently reported histologies are the predominately benign tumors meningioma (13%) and pituitary (12%). Astrocytomas as a group account for 18% of all young adult tumors. Glioblastomas account for 6%. The predominately benign nerve sheath tumors account for 9% of all young adult tumors. The broad category glioma accounts for 45% of tumors in young adults.



Among young adult men ages 20-39 years, brain tumor malignancies were the second leading cause of cancer death in 1997, 1998, 1999, and 2001 and the leading cause of cancer death in 2000. Among young adult women ages 20-39 years, brain tumor malignancies were the fifth leading cause of cancer death in 1997, 1998, 1999, and 2000.^{19,20,21,22,23} Nine percent of the tumors reported to CBTRUS occurred in persons between the ages of 20-34 years. The distribution of all brain tumors by site for young adults are shown in Figure 9. The majority of tumors (33%) in young adults (ages 20-34 years) are

Incidence Rates by Site

Incidence rates by site are provided in Table 7. Rates



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were highest for tumors located in the four lobes of the brain (4.4 per 100,000 person-years), followed by tumors located in the meninges, other areas of the brain, pituitary, cranial nerves, cerebellum, spinal cord/cauda equina, cerebrum, brain stem, ventricle, other nervous system, and pineal gland. Rates were lowest for olfactory tumors of the nasal cavity (less

groupings, rates were highest for tumors of the neuroepithelial tissue (6.3 per 100,000 person-years), followed by tumors of the meninges (4.4 per 100,000 person-years), tumors of the cranial and spinal nerves (1.1 per 100,000 person-years), and tumors of the sellar region (0.9 per 100,000 person-years) (Table 8).

Incidence rates varied by specific histology (Table 8). Rates were highest for meningiomas (4.2 per 100,000 person-years), glioblastomas (3.0 per 100,000 person-years), nerve sheath tumors (1.1 per 100,000 person-years), and pituitary tumors (0.8 per 100,000 person-years).

The incidence rate of gliomas was 5.8 per 100,000 person-years, a major contributor to the magnitude of the neuroepithelial tissue rate.

Incidence Rates by Gender

Incidence rates by histology and gender are presented in Table 9. Rates for all primary brain tumors

combined are higher among females (14.3 per 100,000 person-years) than males (13.9 per 100,000 person-years). The difference between these rates is statistically significant. Rates for tumors of the neuroepithelial tissue are almost 1.5 times greater in males as compared to females, while tumors of the meninges are two times greater in females as compared to males. The incidence rate of gliomas is higher in males (7.0

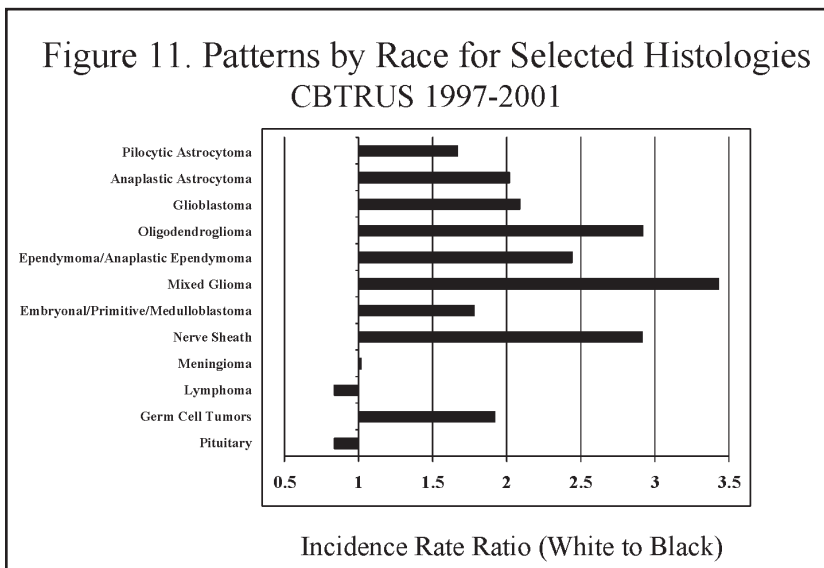
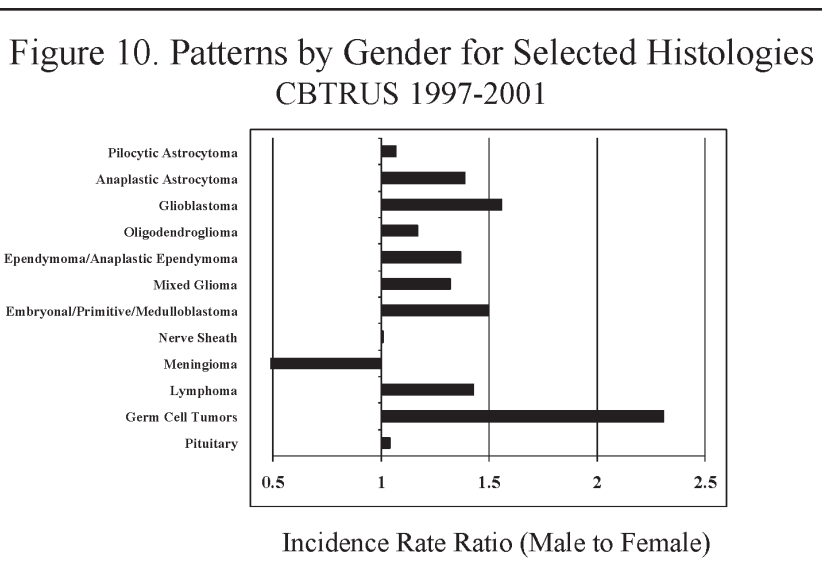
than 0.1 per 100,000 person-years). By gender, rates were higher in females than in males for tumors located in the meninges. Males had higher or similar rates compared to females for all other sites.

Median Age at Diagnosis

The median age of diagnosis for all primary brain tumors is 56 years (Table 8). The histology-specific median ages range from 9 to 70 years. Pilocytic astrocytomas, medulloblastomas, and germ cell tumors have a median age of onset under 20 years of age. Meningiomas and glioblastomas are primarily diagnosed at older ages. Unclassified tumors had a median age of 68 years, suggesting that younger individuals may receive more specific tumor identification and classification.

Incidence Rates by Major Histology Groupings and Specific Histologies

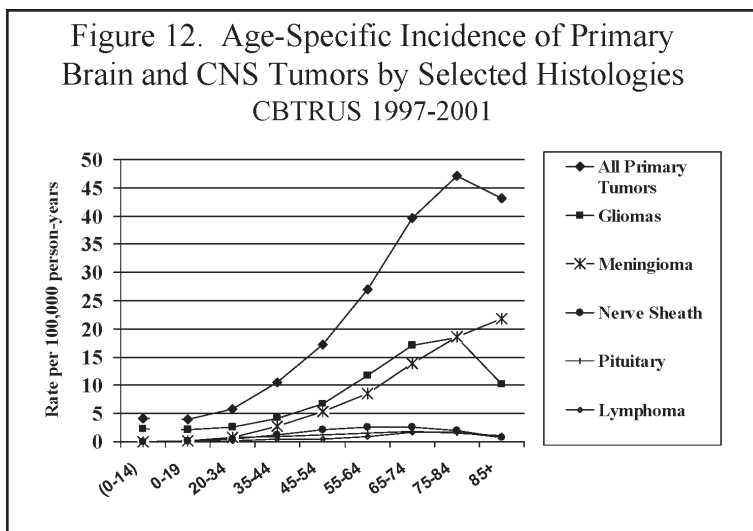
Incidence rates by major histology groupings are provided (Tables 8 - 15). Among major histology



per 100,000 person-years) than in females (4.9 per 100,000 person-years). Similar patterns were found for individual histologies, with rates higher in males, especially for glioblastomas, lymphomas, and germ cell tumors, or comparable between males and females,

Incidence Rates by Hispanic Origin

The incidence rates by Hispanic origin are based on data from 13 states that provided data for the years 1997-2001. These thirteen states include Arizona, Colorado, Delaware, Idaho, Maine, Massachusetts, Minnesota, Montana, New Mexico, New York, North Carolina, Texas, and Utah. Of the 53,482 cases reported from these 13 states, 5,670 cases (11 percent) were in persons of Hispanic origin using the North American Association of Central Cancer Registries Hispanic Identification Algorithm (NHIA) data element to indicate Hispanic ethnicity. NHIA is recorded in the cancer registries upon their utilization of the North American Association of Central Cancer Registries Hispanic Identification Algorithm. The NHIA utilizes a combination of cancer registry data fields (such as birthplace, race, and surnames) to directly



with the notable exception of meningiomas, which are twice as common in women. Incidence rate ratios (male:female) for selected histologies are shown in Figure 10.

Incidence Rates by Race

Incidence rates by histology and race are shown in Table 10. Rates for all primary brain tumors combined are higher among whites (14.4 per 100,000 person-years) than blacks (10.2 per 100,000 person-years). The difference between these rates is statistically significant. Rates for most histologies are higher in whites or comparable between whites and blacks. Rates for glioblastomas, ependymomas, mixed gliomas, nerve sheath tumors, and oligodendrogliomas are more than two times greater in whites than in blacks. In contrast, meningiomas are as common in blacks as in whites. Rates for pituitary tumors are slightly higher among blacks (0.9 per 100,000 person-years) than whites (0.8 per 100,000 person-years). Rates for lymphomas are slightly higher among blacks (0.54 per 100,000 person-years) than whites (0.45 per 100,000 person-years). Incidence rate ratios (white:black) for selected histologies are shown in Figure 11.

and indirectly classify cases as Hispanic or non-Hispanic for analytical purposes.

The overall incidence rate for primary brain and central nervous system tumors among Hispanics is 12.8 per 100,000 person-years and among non-Hispanics is 14.9 per 100,000 person-years (Table 11). The difference between these two rates is statistically significant. White non-Hispanics (15.4 per 100,000 person-years) have higher rates than white-Hispanics (12.6 per 100,000 person-years), black non-Hispanics (11.1 per 100,000 person-years), and black Hispanics (6.6 per 100,000 person-years). The differences in rates among

Figure 13. Most Common Brain and CNS Tumors by Age CBTRUS 1997-2001

| Age (yr) | Most Common Histology | Second Most Common Histology |
|----------|-------------------------------------|---|
| 0-4 | Embryonal/primitive/medulloblastoma | Piloeytic astrocytoma |
| 5-9 | Piloeytic astrocytoma | Embryonal/primitive/medulloblastoma |
| 10-14 | Piloeytic astrocytoma | Embryonal/primitive/medulloblastoma |
| 15-19 | Piloeytic astrocytoma | Embryonal/primitive/medulloblastoma & Neuronal/glial, neuronal, and mixed |
| 20-34 | Meningioma | Pituitary |
| 35-44 | Meningioma | Nerve Sheath & Glioblastoma |
| 45-54 | Meningioma | Glioblastoma |
| 55-64 | Meningioma | Glioblastoma |
| 65-74 | Meningioma | Glioblastoma |
| 75-84 | Meningioma | Glioblastoma |
| 85+ | Meningioma | Glioblastoma |

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these four race/ethnicity groups are statistically significant.

Incidence Rates by Age

The age-specific rates by histology are presented in Table 12. The incidence for all brain tumors is highest among the 75-84 year olds (47.1 per 100,000 person-years) and lowest among children less than 20 years (4.0 per 100,000 person-years). However, different histologies have different age distributions as shown in Table 12. Note: The 0-14 year age category found in Tables 12, 15, and 20, and in Figures 2, 12, and 15 is a standard age category for childhood cancer used by some cancer surveillance organizations. The incidence of pilocytic astrocytoma, germ cell tumors, and medulloblastoma are higher in the younger age groups and decrease with age. This is in contrast to the rates of meningioma, which increase progressively with age. Most other tumors, such as glioblastoma and pituitary tumors, increase with age until the incidence begins to decline again at the oldest age groups. Age-specific incidence rates for selected histologies are shown in Figure 12. The most common brain and CNS tumors by age at occurrence are shown in Figure 13. The histologic-specific differences in brain and central nervous system tumor distribution by age, gender, race, and Hispanic origin suggest that these tumors have different causes.

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

Childhood Brain Tumors

Brain tumors are the second most common malignancy among children, leukemias as a group being the most common.²⁴ Brain tumors are the most common form of solid tumor in children.²⁴ Brain tumors are the leading cause of death from solid tumors in children.²⁴ About 9% of the tumors reported to CBTRUS occurred in persons under the age of 20 years.

Distribution of Tumors

The distribution of tumors by site is shown in Figure 14. The majority of childhood tumors (19%) are located within the frontal, temporal,

parietal, and occipital lobes of the brain. Cerebrum, ventricle, cerebellum, and brain stem tumors account for 6%, 6%, 18%, and 13% of all childhood tumors, respectively. Other tumors of the brain account for 17% of all childhood tumors. Tumors of the meninges represent 3% of all childhood tumors reported to CBTRUS. The cranial nerves and the spinal cord/cauda equina account for 4% and 6% of all childhood tumors, respectively. The pituitary and pineal glands account for about 8% of all childhood tumors. Olfactory tumors of the nasal cavity account and other central nervous system tumors, NOS, each account for less than 1% of childhood tumors reported to CBTRUS.

The most common histologies in the younger age group (ages 0-14 years) include pilocytic astrocytomas and embryonal tumors (medulloblastomas), which account for 21% and 18%, respectively, of all brain tumors in children in this age group (Figure 15). The broad category glioma accounts for 56% of tumors in children less than 15 years of age. The most common histologies in adolescents ages 15-19 years include pilocytic astrocytomas and pituitary tumors, which account for 16% and 9%, respectively, of all brain tumors in that age group (Figure 15). The broad category glioma accounts for 47% of tumors in adolescents ages 15-19 years.

Overall Childhood Incidence Rates by Histology and Gender

The incidence of the most common childhood

**Figure 14. Distribution of All Childhood Primary Brain and CNS Tumors (0-19 yr) by Site
CBTRUS 1997-2001 (n=5,028)**

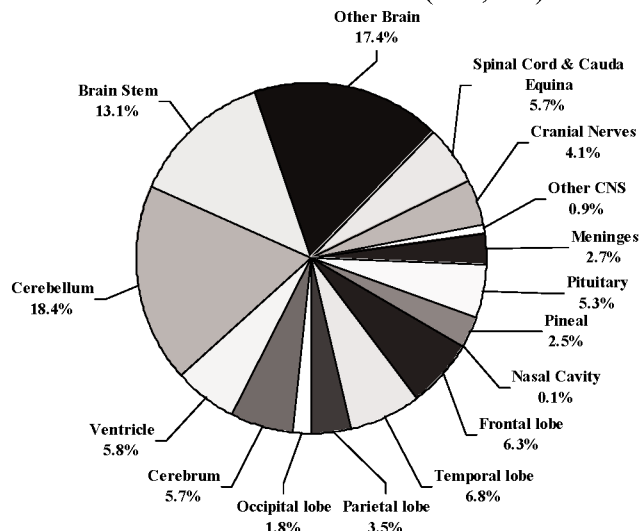
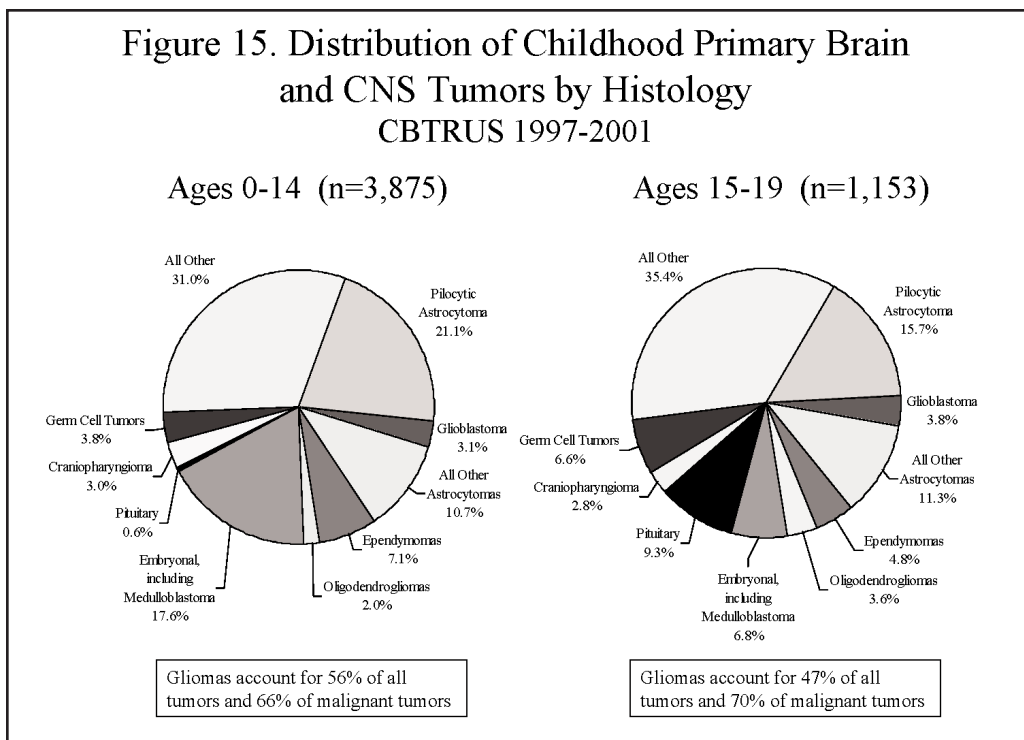


Figure 15. Distribution of Childhood Primary Brain and CNS Tumors by Histology
CBTRUS 1997-2001



Among the younger population (ages 0-19 years) brain tumors are more common in whites (4.2 per 100,000 person-years) than in blacks (2.8 per 100,000 person-years) (Table 14). This difference in rates between the two races is statistically significant. Among both whites and blacks, the rates among boys are slightly higher than the rates among girls

tumors is shown in Table 13. The overall incidence rate for childhood brain tumors (ages 0-19 years) is 4.0 per 100,000 person-years. Among major histology groupings, rates were highest for tumors of the neuroepithelial tissue (3.1 per 100,000 person-years). Pilocytic astrocytoma (0.8 per 100,000 person-years) and medulloblastoma (0.6 per 100,000 person-years) are the most common individual histologies. Note: SEER includes pilocytic astrocytomas, a tumor of uncertain, not malignant, behavior in their malignant brain tumor data and statistics. CBTRUS has categorized pilocytic astrocytomas in the malignant tumor category to provide continuity between SEER and CBTRUS statistics.

Among the younger population, brain tumors are slightly more common in boys, with tumors of the neuroepithelial slightly more common and germ cell tumors almost twice as common in boys compared to girls (Table 13). Alternatively, the incidence of pituitary tumors is twice as large in females compared to males. All of these differences in rates between boys and girls are statistically significant. The small numbers of cases for some tumors require caution when interpreting and comparing rates.

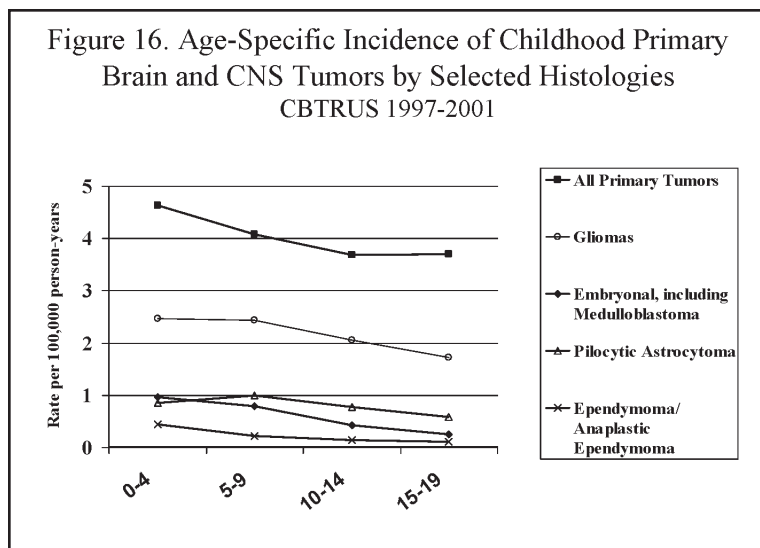
Childhood Incidence Rates by Race and Gender

(Table 14). However, these differences in rates between boys and girls are not statistically significant for whites or blacks. The small numbers of cases for some histologies require caution when interpreting and comparing rates by race and/or gender.

Childhood Incidence Rates by Age

The age-specific rates by histology for children are displayed in Table 15. The incidence for all brain tumors is highest among 0-4 year olds (4.6 per 100,000 person-years) and lowest among 10-14 year olds and 15-19 year olds (3.7 per 100,000 person-years).

Figure 16. Age-Specific Incidence of Childhood Primary Brain and CNS Tumors by Selected Histologies
CBTRUS 1997-2001



However, the different histologies have different age distributions as shown in Table 15. The incidence of ependymoma and medulloblastoma in children decreases with age. The rate of pilocytic astrocytoma peaks among children 5-9 years and then decreases among children 10-19 years. The incidence of germ cell tumors among children increases with age. Age-specific incidence rates for selected histologies are shown in Figure 16. The most common childhood brain and CNS tumors by age at occurrence are shown in Figure 13. The histologic-specific differences in brain and central nervous system tumor distribution by age, gender, and race suggest that these childhood tumors have different causes.

Primary Brain Tumors: Trends in Incidence

A recent study utilizing ten years of CBTRUS data (1985-1994) provided by six collaborating state registries examined the trends in incidence of primary brain and central nervous system tumors.²⁵ Trends were expressed as average annual percentage change (AAPC). Overall, it was concluded that there was a slight statistically significant increase in brain tumor incidence rates over the study period (AAPC = 0.9%). The result was not statistically significant when brain lymphomas were excluded from the analysis (AAPC = 0.5%).

Increases in the incidence rates for specific histologies were observed: brain lymphomas (AAPC = 11.4%), especially in males over the age of 20; pilocytic astrocytomas in persons less than 20 years of age (AAPC = 13.8%); nerve sheath tumors in males (AAPC = 5.9%), and pituitary tumors in females (AAPC = 5.9%). Increases were also noted for glioblastoma (AAPC = 2.3%); oligodendrogliomas (AAPC = 6.6%); ependymomas (AAPC = 6.9); and astrocytomas, excluding NOS tumors (AAPC = 5.9%). Decreases were noted for NOS tumors (AAPC = -8.6%), astrocytoma NOS (AAPC = -5.7%), and glioma NOS (AAPC = -5.7%).

It was conjectured that advances in diagnostic technologies and changes in tumor classification and coding were likely to be responsible for the decreases seen in the incidence of NOS subgroups and the corresponding increases in glioma subgroups. It was noted that the increasing incidence of lymphoma was consistent with previously published studies. However, it was posited that the increases in ependymomas, nerve sheath tumors, and pituitary tumors were less likely to be caused by diagnostic advancements and changes in tumor classification.

Primary Malignant Brain Tumor Rates: Incidence, Mortality, Estimated Cases and Deaths, and Survival

Incidence and Mortality Rates for Malignant Brain Tumors by State and Gender

Incidence and mortality rates for primary malignant brain tumors by state were obtained from the most recent NAACCR Cancer Incidence in North America publication¹² and are shown in Table 16. These rates are adjusted using the 2000 U.S. standard population. The 1997-2001 mortality rates by gender are available for all 50 states and the District of Columbia. Incidence rates for malignant brain tumors were available for most states from the same time period with a few exceptions. Incidence statistics for the United States as a whole includes data from 34 central cancer registries (28 states, 5 metropolitan areas, and the District of Columbia) covering 55% of the United States population.

Estimated Numbers of Cases of All Primary Brain Tumors by State

The estimated numbers of cases of all primary brain tumors and of all malignant brain tumors by state for 2004 are shown in Table 17. The estimated number of cases of malignant and non-malignant tumors by state were calculated using CBTRUS age-specific incidence rates (1997-2001) and population projections for each state. The total number of new cases of primary brain tumors for all 50 states and the District of Columbia in 2004 is estimated to be 41,130. The total number of new cases of primary malignant brain tumors for all 50 states and the District of Columbia in 2004 is estimated to be 21,220.

Because reported state rates for malignant brain tumors are much less variable than the reported rates for benign brain tumors, the estimated number of cases of all brain tumors is less stable than the estimated number of cases of malignant tumors. The age-specific rates used to compute the estimated number of all (non-malignant and malignant) brain tumor cases are based on CBTRUS 1997-2001 data, which has acknowledged variation in case ascertainment of benign tumors by collaborating states. Thus, the estimated cases of all brain tumors presented in Table 17 may be underestimated for states that have more complete reporting of brain tumors and overestimated for states that have less complete reporting of brain tumors.

Estimated Numbers of Deaths for Malignant Brain

Tumors by State

The estimated numbers of deaths for primary malignant brain tumors by state for 2004 are shown in Table 17. The estimated number of deaths for malignant tumors were obtained from the American Cancer Society publication, *Cancer Facts & Figures 2004*.¹⁷ The source for these data was the U.S. Mortality Public Use Data Tapes, 1969-2001, from the National Center for Health Statistics. The total number of primary malignant brain tumor deaths for all 50 states and the District of Columbia in 2004 is estimated to be 12,690.

Survival Rates for Malignant Brain Tumors by Tumor Location (Site) and Gender

Survival estimates by tumor location (site) and gender are presented in Tables 18. Patients with tumors in the cerebrum, the frontal, temporal, parietal, and occipital lobes of the brain, and other brain have five-year survival rates less than 23%. Patients with tumors in the cranial nerves, spinal cord/cauda equina, pituitary and pineal glands, nasal cavity, and cerebellum have five-year survival rates greater than 64%. For most tumor locations, females have slightly better survival, although survival is much higher in females with tumors of the meninges than males. Males have slightly better five-year survival for tumors of the brain stem, cranial nerves, spinal cord/cauda equina, and pineal glands.

Survival Rates for Malignant Brain Tumors by Histology and Age

Survival estimates for malignant brain tumors by histology and age at diagnosis are presented in Tables 19 and 20. The one- through ten-year relative survival rates by histology are shown in Table 19. The estimated five- and ten-year relative survival rates for malignant brain tumors are 29% and 25% respectively. However, there is a large variation in survival estimates between tumor histologies (Table 19). Five-year survival rates exceed 90% for pilocytic astrocytomas but are less than 4% for glioblastomas. Survival generally decreases with older age at diagnosis (Table 20). Children and young adults have better survival for most histologies.

Histology-Specific Summary Information

The information presented in these tables can be synthesized to describe specific histologies. As an example we have chosen the two most common histologies, meningiomas and glioblastomas.

Meningiomas are the most frequently reported tumor and account for more than 29% of tumors reported to CBTRUS (Table 8). Over 93% of meningiomas reported to CBTRUS had a benign behavior code. Meningiomas are more common in older adults (median age at diagnosis is 64 years) (Table 8) 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 and older (Table 12). Meningiomas are twice as common in females as compared to males (Table 9). The incidence in meningiomas is similar between whites and African Americans (Table 10). Only malignant meningiomas are reported in the SEER database and survival estimates were not generated. Information about meningioma survival estimates was previously estimated using data reported to the National Cancer Data Base and showed the overall five-year survival rate for meningioma to be 69%.²⁶ Those individuals with benign meningiomas had an overall five-year survival rate of 70%, whereas those with a malignant meningioma had an overall five-year survival rate of 55%.²⁶

Glioblastomas (GBMs) are the second most frequently reported histology and the most common malignancy. They account for 21% of all primary brain tumors (Table 8). Glioblastomas are more common in older adults (median age at diagnosis is 64 years) (Table 8) and are uncommon in children. Glioblastomas comprise less than 4% of all tumors reported among 0-19 year olds (Table 13). The incidence of glioblastomas increases with increasing age. The rates for glioblastomas are highest in 75 to 84 years olds (Table 12). Glioblastomas are 1.6 times more common in males (Table 9). Glioblastomas are over two times higher among whites as compared to blacks (Table 10). The relative survival estimates for glioblastoma are quite low; less than 4% of patients survived five years post diagnosis (Table 19). Glioblastoma survival estimates are somewhat higher for the small number of patients who are diagnosed under age 20 (Table 20).

SUMMARY

These data present an updated summary (1997-2001) of the incidence of all primary malignant and non-malignant brain tumors and incidence, mortality and survival for all primary malignant brain tumors in the United States. We hope that these data are useful to clinicians, researchers, and patient families.

BRAIN TUMOR STATISTICS REPORT AND FIGURES

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TABLE 1: CBTRUS BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR HISTOLOGY GROUPINGS, 2004 REVISION

| HISTOLOGY | ICDO-3 ^a HISTOLOGY CODE |
|---|--|
| <u>TUMORS OF NEUROEPITHELIAL TISSUE</u> | |
| Pilocytic astrocytoma | 9421 |
| Diffuse astrocytoma (protoplasmic, fibrillary) | 9410, 9420 |
| Anaplastic astrocytoma | 9401, 9411 |
| Unique astrocytoma variants | 9383, 9384, 9424 |
| Astrocytoma, NOS | 9400 |
| Glioblastoma | 9440, 9441, 9442/3 ^c |
| Oligodendroglioma | 9450 |
| Anaplastic oligodendroglioma | 9451, 9460 |
| Ependymoma/anaplastic ependymoma | 9391, 9392, 9393 |
| Ependymoma variants | 9394 |
| Mixed glioma | 9382 |
| Glioma malignant, NOS | 9380 |
| Choroid plexus | 9390 |
| Neuroepithelial | 9381, 9423, 9430, 9444 ^b |
| Benign and malignant neuronal/glial, neuronal and mixed | 8680, 9412 ^b , 9413 ^b , 9442/1 ^{b,d} , 9490, 9492 ^b , 9493 ^b , 9500, 9505, 9506, 9522, 9523 |
| Pineal parenchymal | 9360, 9361, 9362 |
| Embryonal/primitive/medulloblastoma | 9470, 9471, 9472, 9473, 9474 ^b , 9501, 9502, 9503, 9508 ^b |
| <u>TUMORS OF CRANIAL AND SPINAL NERVES</u> | |
| Nerve sheath, benign and malignant | 9540, 9541, 9550, 9560, 9561, 9570, 9571 ^b |
| Other tumors of cranial and spinal nerves | 9562 |
| <u>TUMORS OF MENINGES</u> | |
| Meningioma | 9530, 9531, 9532, 9533, 9534, 9537, 9538, 9539 |
| Other mesenchymal, benign and malignant | 8728 ^b , 8800, 8801, 8802, 8803, 8804, 8805 ^b , 8806 ^b , 8810, 8815 ^b , 8850, 8851, 8861, 8890, 8897, 8900, 8910, 8920, 9150, 9260, 9480 |
| Hemangioblastoma | 9161 |
| <u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u> | |
| Lymphoma | 9590, 9591, 9596 ^b , 9650, 9651 ^b , 9652, 9653, 9654, 9655, 9659, 9661, 9662, 9663, 9664, 9665, 9667, 9670, 9671, 9673, 9675, 9680, 9684, 9687, 9690, 9691, 9695, 9698, 9699 ^b , 9701, 9702, 9705, 9714, 9719 ^b , 9727 ^b , 9728 ^b , 9729 ^b , 9731, 9734 ^b , 9740, 9741, 9750 ^b , 9755 ^b , 9756 ^b , 9757 ^b , 9758 ^b , 9827, 9861, 9930 |
| <u>GERM CELL TUMORS AND CYSTS</u> | |
| Germ cell tumors, cysts and heterotopias | 9060, 9064, 9065 ^b , 9070, 9071, 9072, 9080, 9081, 9082, 9083, 9084, 9085, 9100 |
| <u>TUMORS OF SELLAR REGION</u> | |
| Pituitary | 8140, 8146, 8260, 8270, 8271, 8272 ^b , 8280, 8281, 8290, 8300, 8310, 8320 ^b , 8323 |
| Craniopharyngioma | 9350, 9351 ^b , 9352 ^b |
| <u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u> | |
| Chordoma/chondrosarcoma | 9240, 9370, 9371 ^b , 9372 ^b |
| <u>UNCLASSIFIED TUMORS</u> | |
| Hemangioma | 9120, 9121, 9122, 9130, 9131, 9140 |
| Neoplasm, unspecified | 8000, 8001, 8002, 8003, 8004, 8005 ^b , 8010 |
| All other | 8720, 9580, 9754 ^b |

^aInternational Classification of Diseases for Oncology, Third Edition, 2000. World Health Organization, Geneva, Switzerland.

^bHistology regrouped in the 2004 revision of the CBTRUS histology grouping scheme as compared to the previous version of the CBTRUS histology grouping scheme.

^cMorphology 9442/3 only.

^dMorphology 9442/1 only.

Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; ICDO, International Classification of Diseases for Oncology; NOS, not otherwise specified.

TABLES

TABLE 2: ANNUAL POPULATIONS^a AVERAGED OVER 1997-2001 FOR CBTRUS, 15 STATES COMBINED, BY AGE, GENDER AND RACE^b

| Age Group | MALES | | | FEMALES | | |
|--------------|-------------------|-------------------|------------------|-------------------|-------------------|------------------|
| | Total | Whites | Blacks | Total | Whites | Blacks |
| 0-4 | 3,121,191 | 2,507,080 | 449,721 | 2,980,751 | 2,383,076 | 436,122 |
| 5-9 | 3,259,011 | 2,593,576 | 499,201 | 3,108,697 | 2,465,005 | 483,656 |
| 10-14 | 3,225,634 | 2,592,489 | 469,552 | 3,075,011 | 2,461,422 | 456,399 |
| 15-19 | 3,195,289 | 2,584,625 | 445,566 | 3,020,113 | 2,426,963 | 433,637 |
| 20-24 | 3,035,762 | 2,462,595 | 397,905 | 2,898,402 | 2,312,560 | 412,064 |
| 25-29 | 3,149,666 | 2,565,632 | 386,816 | 3,091,342 | 2,466,246 | 425,231 |
| 30-34 | 3,322,659 | 2,733,806 | 404,068 | 3,297,847 | 2,658,823 | 449,515 |
| 35-39 | 3,557,213 | 2,962,408 | 419,548 | 3,578,722 | 2,926,115 | 470,369 |
| 40-44 | 3,397,181 | 2,858,698 | 383,114 | 3,461,790 | 2,865,598 | 431,357 |
| 45-49 | 2,976,299 | 2,537,584 | 312,300 | 3,084,676 | 2,585,027 | 359,390 |
| 50-54 | 2,544,919 | 2,205,014 | 240,160 | 2,673,297 | 2,277,007 | 285,343 |
| 55-59 | 1,920,048 | 1,675,686 | 175,179 | 2,065,902 | 1,770,870 | 218,697 |
| 60-64 | 1,523,323 | 1,332,525 | 137,690 | 1,689,240 | 1,451,750 | 178,812 |
| 65-69 | 1,322,089 | 1,173,059 | 111,806 | 1,541,652 | 1,342,944 | 153,142 |
| 70-74 | 1,131,905 | 1,024,060 | 82,371 | 1,448,121 | 1,286,512 | 127,957 |
| 75-79 | 860,212 | 785,109 | 58,802 | 1,244,680 | 1,121,583 | 100,941 |
| 80-84 | 518,453 | 477,990 | 31,812 | 892,803 | 813,499 | 66,560 |
| 85+ | 343,677 | 314,843 | 23,017 | 872,678 | 797,748 | 64,509 |
| TOTAL | 42,404,532 | 35,386,778 | 5,028,628 | 44,025,724 | 36,412,747 | 5,553,701 |

^aPopulation data source: SEER program website, which receives population estimates from the U.S. Census Bureau.

^bThe average annual population combined for the fifteen states for which rates were calculated by race, gender and age: Arizona, Colorado, Connecticut, Delaware, Idaho, Maine, Massachusetts, Minnesota, Montana, New Mexico, New York, North Carolina, Texas, Utah, and Virginia. Abbreviation: SEER, Surveillance, Epidemiology, and End Results.

TABLE 3: ANNUAL POPULATIONS^a AVERAGED OVER 1997-2001 FOR CBTRUS, 13 STATES COMBINED, BY AGE, GENDER, RACE, AND HISPANIC ORIGIN^b

| MALES | | | | | | |
|--------------|------------------|------------------|----------------|-------------------|-------------------|------------------|
| AGE GROUP | HISPANIC | WHITE | BLACK | NON-HISPANIC | WHITE | BLACK |
| | | HISPANIC | HISPANIC | | NON-HISPANIC | NON-HISPANIC |
| 0-4 | 713,371 | 656,069 | 40,254 | 2,057,254 | 1,587,285 | 337,869 |
| 5-9 | 666,135 | 609,203 | 39,532 | 2,215,764 | 1,701,743 | 379,490 |
| 10-14 | 610,502 | 561,293 | 33,688 | 2,245,277 | 1,752,514 | 358,783 |
| 15-19 | 633,144 | 585,591 | 32,108 | 2,206,627 | 1,731,504 | 340,237 |
| 20-24 | 671,198 | 624,033 | 31,490 | 2,023,511 | 1,580,446 | 300,255 |
| 25-29 | 650,672 | 605,739 | 29,903 | 2,141,765 | 1,685,137 | 294,626 |
| 30-34 | 602,497 | 560,453 | 29,102 | 2,318,914 | 1,859,466 | 307,179 |
| 35-39 | 538,106 | 500,178 | 25,890 | 2,575,644 | 2,108,398 | 322,238 |
| 40-44 | 437,192 | 406,171 | 21,195 | 2,534,765 | 2,108,864 | 295,814 |
| 45-49 | 335,931 | 311,606 | 17,188 | 2,266,147 | 1,918,251 | 241,074 |
| 50-54 | 256,530 | 238,669 | 12,747 | 1,957,744 | 1,686,940 | 186,560 |
| 55-59 | 178,342 | 166,353 | 8,850 | 1,491,010 | 1,295,940 | 136,576 |
| 60-64 | 137,211 | 128,297 | 6,570 | 1,195,932 | 1,043,207 | 107,557 |
| 65-69 | 105,199 | 98,787 | 4,801 | 1,055,434 | 936,429 | 87,017 |
| 70-74 | 79,145 | 74,961 | 3,133 | 915,353 | 829,271 | 63,987 |
| 75-79 | 51,315 | 48,793 | 1,879 | 703,092 | 643,184 | 45,596 |
| 80-84 | 26,800 | 25,427 | 1,018 | 427,883 | 395,462 | 24,815 |
| 85+ | 19,558 | 18,620 | 680 | 283,973 | 260,452 | 18,336 |
| TOTAL | 6,712,848 | 6,220,245 | 340,028 | 30,616,088 | 25,124,493 | 3,848,010 |

| FEMALES | | | | | | |
|--------------|------------------|------------------|----------------|-------------------|-------------------|------------------|
| AGE GROUP | HISPANIC | WHITE | BLACK | NON-HISPANIC | WHITE | BLACK |
| | | HISPANIC | HISPANIC | | NON-HISPANIC | NON-HISPANIC |
| 0-4 | 682,674 | 627,720 | 38,344 | 1,962,579 | 1,504,681 | 328,053 |
| 5-9 | 640,757 | 585,573 | 38,351 | 2,107,233 | 1,610,830 | 366,869 |
| 10-14 | 584,585 | 536,660 | 32,684 | 2,136,714 | 1,659,764 | 348,543 |
| 15-19 | 571,961 | 526,748 | 30,901 | 2,111,887 | 1,649,509 | 331,278 |
| 20-24 | 577,952 | 530,696 | 33,625 | 1,999,214 | 1,543,523 | 312,449 |
| 25-29 | 578,311 | 531,577 | 33,840 | 2,159,386 | 1,669,060 | 324,583 |
| 30-34 | 548,355 | 504,270 | 32,183 | 2,342,773 | 1,842,106 | 342,424 |
| 35-39 | 506,484 | 465,774 | 29,145 | 2,619,188 | 2,106,861 | 360,974 |
| 40-44 | 428,685 | 394,308 | 24,826 | 2,593,694 | 2,123,689 | 332,415 |
| 45-49 | 344,564 | 317,613 | 19,697 | 2,348,492 | 1,952,194 | 278,964 |
| 50-54 | 273,911 | 253,476 | 15,195 | 2,051,218 | 1,735,076 | 222,883 |
| 55-59 | 199,908 | 185,709 | 10,689 | 1,600,620 | 1,364,081 | 172,188 |
| 60-64 | 160,753 | 149,491 | 8,678 | 1,320,843 | 1,130,201 | 140,518 |
| 65-69 | 132,642 | 124,057 | 6,582 | 1,219,674 | 1,060,408 | 120,313 |
| 70-74 | 107,079 | 100,488 | 5,049 | 1,161,935 | 1,032,264 | 100,728 |
| 75-79 | 75,222 | 70,745 | 3,529 | 1,012,236 | 913,551 | 79,452 |
| 80-84 | 44,572 | 41,955 | 2,124 | 734,847 | 671,122 | 52,552 |
| 85+ | 39,589 | 37,304 | 1,809 | 724,664 | 663,841 | 51,653 |
| TOTAL | 6,498,004 | 5,984,164 | 367,252 | 32,207,198 | 26,232,760 | 4,266,837 |

^aPopulation data source: SEER program website, which receives population estimates from the U.S. Census Bureau.

^bThe average annual population combined for the thirteen states for which rates were calculated by Hispanic origin: Arizona, Colorado, Delaware, Idaho, Maine, Massachusetts, Minnesota, Montana, New Mexico, New York, North Carolina, Texas, and Utah. Abbreviation: SEER, Surveillance, Epidemiology, and End Results.

TABLES

TABLE 4: 2000 U.S. STANDARD POPULATION

| AGE GROUP | 2000 U.S. | AGE GROUP | 2000 U.S. | AGE GROUP | 2000 U.S. |
|-----------|-----------|-----------|-----------|-----------|-----------|
| 0-4 | 69,135 | 45-49 | 72,118 | Total | 1,000,000 |
| 5-9 | 72,533 | 50-54 | 62,716 | | |
| 10-14 | 73,032 | 55-59 | 48,454 | | |
| 15-19 | 72,169 | 60-64 | 38,793 | | |
| 20-24 | 66,478 | 65-69 | 34,264 | | |
| 25-29 | 64,529 | 70-74 | 31,773 | | |
| 30-34 | 71,044 | 75-79 | 26,999 | | |
| 35-39 | 80,762 | 80-84 | 17,842 | | |
| 40-44 | 81,851 | 85+ | 15,508 | | |

TABLE 5: CHARACTERISTICS OF PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMORS^a IN PARTICIPATING REGISTRIES, CBTRUS 1997-2001

| STATE | YEARS OF DATA | NO. OF NEWLY DIAGNOSED BRAIN & CNS TUMORS | PERCENT BENIGN TUMORS | PERCENT HISTOLOGICALLY CONFIRMED | 1999 POPULATION ^b |
|----------------|---------------|---|-----------------------|----------------------------------|------------------------------|
| Arizona | 1997-2001 | 3,593 | 49.2 | 73.8 | 5,023,823 |
| Colorado | 1997-2001 | 4,036 | 59.3 | 65.4 | 4,226,018 |
| Connecticut | 1997-2001 | 2,419 | 40.0 | 84.9 | 3,386,401 |
| Delaware | 1997-2001 | 391 | 25.8 | 83.9 | 774,990 |
| Idaho | 1997-2001 | 1,038 | 49.1 | 79.5 | 1,275,674 |
| Maine | 1997-2001 | 887 | 28.0 | 81.2 | 1,266,808 |
| Massachusetts | 1997-2001 | 4,219 | 31.7 | 85.5 | 6,317,345 |
| Minnesota | 1997-2001 | 3,725 | 47.1 | 97.4 | 4,873,481 |
| Montana | 1997-2001 | 770 | 49.6 | 74.6 | 897,507 |
| New Mexico | 1997-2001 | 1,151 | 49.7 | 78.1 | 1,808,082 |
| New York | 1997-2001 | 15,185 | 45.2 | 75.5 | 18,882,725 |
| North Carolina | 1997-2001 | 4,420 | 37.5 | 85.7 | 7,949,361 |
| North Dakota | 1997-2001 | 206 | c | 84.0 | 644,259 |
| Rhode Island | 1998-2001 | 691 | 44.4 | 78.7 | 1,040,402 |
| Texas | 1997-2001 | 12,464 | 40.7 | 74.9 | 20,558,220 |
| Utah | 1997-2001 | 1,603 | 52.4 | 78.9 | 2,203,482 |
| Virginia | 1997-2001 | 3,006 | 31.5 | 89.4 | 7,000,174 |
| TOTAL | | 59,804 | 43.0 | 78.9 | 88,128,752 |

^aSome variation in state counts and rates is due to differences in reporting criteria. Certain states that require the reporting of benign brain tumors may have more complete reporting.

^b1999 population data estimates were obtained from the census data provided to the SEER program.

^cData were available for malignant tumors only.

Abbreviation: CBTRUS, Central Brain Tumor Registry of the United States.

TABLE 6: PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES^{a,b} BY AGE, STATE, AND BEHAVIOR, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1997-2001^c

| STATE | 0-19 YEARS | | 20+ YEARS | | ALL AGES | | |
|---------------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|
| | MALIGNANT | BENIGN & UNCERTAIN | MALIGNANT | BENIGN & UNCERTAIN | MALIGNANT | BENIGN & UNCERTAIN | ALL TUMORS |
| Arizona | 2.73 | 0.68 | 8.19 | 10.72 | 6.62 | 7.84 | 14.46 |
| Colorado | 2.67 | 1.37 | 9.42 | 18.40 | 7.48 | 13.51 | 20.99 |
| Connecticut | 3.34 | 0.71 | 9.43 | 8.13 | 7.68 | 6.01 | 13.69 |
| Delaware | 3.29 | 0.19 | 8.64 | 3.92 | 7.11 | 2.85 | 9.96 |
| Idaho | 3.74 | 1.11 | 10.55 | 11.69 | 8.60 | 8.66 | 17.25 |
| Maine | 3.73 | 0.81 | 10.76 | 5.86 | 8.75 | 4.41 | 13.16 |
| Massachusetts | 3.45 | 0.75 | 10.16 | 6.38 | 8.24 | 4.77 | 13.01 |
| Minnesota | 3.25 | 1.55 | 9.00 | 11.02 | 7.35 | 8.30 | 15.65 |
| Montana | 2.76 | 0.79 | 9.90 | 11.87 | 7.85 | 8.69 | 16.55 |
| New Mexico | 2.32 | 0.84 | 7.63 | 9.77 | 6.11 | 7.21 | 13.31 |
| New York | 3.29 | 1.13 | 9.70 | 10.88 | 7.87 | 8.09 | 15.95 |
| North Carolina | 2.82 | 0.76 | 8.08 | 6.24 | 6.57 | 4.66 | 11.23 |
| North Dakota ^d | 2.60 ^d | d | 7.72 ^d | d | 6.25 ^d | d | 6.25 ^d |
| Rhode Island ^e | 3.48 | 1.46 | 9.89 | 10.06 | 8.05 | 7.59 | 15.64 |
| Texas | 3.13 | 0.93 | 8.91 | 8.55 | 7.25 | 6.37 | 13.62 |
| Utah | 3.11 | 1.14 | 9.42 | 14.09 | 7.61 | 10.37 | 17.99 |
| Virginia | 2.47 | 0.49 | 7.00 | 4.20 | 5.70 | 3.14 | 8.84 |
| TOTAL^e | 3.07 | 0.95 | 9.01 | 9.15 | 7.31 | 6.80 | 14.10 |

^aRates are per 100,000 person-years.

^bSome variation in state counts and rates is due to differences in reporting criteria. Certain states that required the reporting of all benign brain and central nervous system tumors may have had more complete reporting.

^cCounts and rates based on 1997-2001 data except for Rhode Island (1998-2001).

^dData were available for malignant tumors only.

^eIncludes data from 15 of the 17 registries listed above; North Dakota and Rhode Island are excluded.

Abbreviation: CBTRUS, Central Brain Tumor Registry of the United States.

TABLES

TABLE 7: PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES^a BY SITE^b AND GENDER, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1997-2001^c

| ICDO CODE | SITE ^b | MALES | | FEMALES | | TOTAL | |
|-------------------|---|---------------|---------------|---------------|---------------|---------------|---------------|
| | | N | ADJUSTED RATE | N | ADJUSTED RATE | N | ADJUSTED RATE |
| C71.1-C71.4 | Frontal, temporal, parietal, and occipital lobes of the brain | 9,731 | 5.08 | 8,788 | 3.91 | 18,520 | 4.44 |
| C71.0 | Cerebrum | 862 | 0.43 | 748 | 0.33 | 1,610 | 0.38 |
| C71.5 | Ventricle | 451 | 0.22 | 418 | 0.19 | 869 | 0.20 |
| C71.6 | Cerebellum | 1,280 | 0.61 | 1,191 | 0.54 | 2,472 | 0.58 |
| C71.7 | Brain Stem | 703 | 0.33 | 626 | 0.29 | 1,329 | 0.31 |
| C71.8-C71.9 | Other brain | 4,703 | 2.50 | 4,665 | 2.05 | 9,368 | 2.26 |
| C72.0-C72.1 | Spinal cord and cauda equina | 1,273 | 0.62 | 1,092 | 0.49 | 2,365 | 0.56 |
| C72.2-C72.5 | Cranial nerves | 1,530 | 0.77 | 1,740 | 0.79 | 3,270 | 0.78 |
| C72.8-C72.9 | Other nervous system | 256 | 0.13 | 230 | 0.10 | 486 | 0.12 |
| C70.0-C70.9 | Meninges (cerebral and spinal) | 3,838 | 2.12 | 10,377 | 4.59 | 14,217 | 3.45 |
| C75.1-C75.2 | Pituitary | 1,916 | 0.97 | 2,069 | 0.93 | 3,986 | 0.94 |
| C75.3 | Pineal | 186 | 0.09 | 79 | 0.04 | 265 | 0.06 |
| C30.0 (9522-9523) | Olfactory tumors of the nasal cavity | 95 | 0.05 | 55 | 0.02 | 150 | 0.04 |
| TOTAL | | 26,824 | 13.92 | 32,078 | 14.27 | 58,907 | 14.10 |

^aRates are per 100,000 person-years.

^bThe sites referred to in this table are loosely based on the categories and site codes defined in the SEER Site/Histology Validation List.

^cIncludes data from 15 of the 17 registries listed in Table 5; North Dakota and Rhode Island are excluded.

Abbreviation: CBTRUS, Central Brain Tumor Registry of the United States.

TABLE 8: DISTRIBUTION AND INCIDENCE RATES^a OF PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMORS BY MAJOR HISTOLOGY GROUPINGS AND HISTOLOGY, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1997-2001^b

| HISTOLOGY | TOTAL N | % OF ALL REPORTED BRAIN TUMORS | MEDIAN AGE AT DIAGNOSIS | ADJUSTED RATE (S.E.) |
|--|---------------|--------------------------------------|-------------------------------|-------------------------|
| <u>TUMORS OF NEUROEPITHELIAL TISSUE</u> | 26,660 | 45.3 | 54 | 6.34 (0.04) |
| Pilocytic astrocytoma | 1,378 | 2.3 | 12 | 0.32 (0.01) |
| Diffuse astrocytoma (protoplasmic, fibrillary) | 436 | 0.7 | 45 | 0.10 (0.00) |
| Anaplastic astrocytoma | 2,002 | 3.4 | 51 | 0.47 (0.01) |
| Unique astrocytoma variants | 297 | 0.5 | 39 | 0.07 (0.00) |
| Astrocytoma, NOS | 1,983 | 3.4 | 46 | 0.47 (0.01) |
| Glioblastoma | 12,377 | 21.0 | 64 | 3.01 (0.03) |
| Oligodendroglioma | 1,585 | 2.7 | 41 | 0.37 (0.01) |
| Anaplastic oligodendroglioma | 738 | 1.3 | 48 | 0.17 (0.01) |
| Ependymoma/anaplastic ependymoma | 1,083 | 1.8 | 39 | 0.25 (0.01) |
| Ependymoma variants | 272 | 0.5 | 38 | 0.06 (0.00) |
| Mixed glioma | 643 | 1.1 | 42 | 0.15 (0.01) |
| Glioma malignant, NOS | 1,597 | 2.7 | 46 | 0.38 (0.01) |
| Choroid plexus | 172 | 0.3 | 20 | 0.04 (0.00) |
| Neuroepithelial | 70 | 0.1 | 48 | 0.02 (0.00) |
| Benign and malignant neuronal/glial, neuronal and mixed | 869 | 1.5 | 28 | 0.20 (0.01) |
| Pineal parenchymal | 98 | 0.2 | 22 | 0.02 (0.00) |
| Embryonal/primitive/medulloblastoma | 1,060 | 1.8 | 9 | 0.24 (0.01) |
| <u>TUMORS OF CRANIAL AND SPINAL NERVES</u> | 4,672 | 7.9 | 52 | 1.11 (0.02) |
| Nerve sheath, benign and malignant | 4,669 | 7.9 | 52 | 1.11 (0.02) |
| <u>TUMORS OF MENINGES</u> | 17,956 | 30.5 | 63 | 4.36 (0.03) |
| Meningioma | 17,204 | 29.2 | 64 | 4.18 (0.03) |
| Other mesenchymal, benign and malignant | 236 | 0.4 | 45 | 0.06 (0.00) |
| Hemangioblastoma | 516 | 0.9 | 46 | 0.12 (0.01) |
| <u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u> | 1,966 | 3.3 | 59 | 0.47 (0.01) |
| Lymphoma | 1,966 | 3.3 | 59 | 0.47 (0.01) |
| <u>GERM CELL TUMORS AND CYSTS</u> | 361 | 0.6 | 17 | 0.08 (0.00) |
| Germ cell tumors, cysts and heterotopias | 361 | 0.6 | 17 | 0.08 (0.00) |
| <u>TUMORS OF SELLAR REGION</u> | 3,908 | 6.6 | 48 | 0.92 (0.01) |
| Pituitary | 3,484 | 5.9 | 49 | 0.82 (0.01) |
| Craniopharyngioma | 424 | 0.7 | 34 | 0.10 (0.00) |
| <u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u> | 115 | 0.2 | 44 | 0.03 (0.00) |
| Chordoma/chondrosarcoma | 115 | 0.2 | 44 | 0.03 (0.00) |
| <u>UNCLASSIFIED TUMORS</u> | 3,269 | 5.6 | 68 | 0.79 (0.01) |
| Hemangioma | 299 | 0.5 | 42 | 0.07 (0.00) |
| Neoplasm, unspecified | 2,942 | 5.0 | 70 | 0.72 (0.01) |
| All other | 28 | 0.1 | 48 | 0.01 (0.00) |
| TOTAL^c | 58,907 | 100.0 | 56 | 14.10 (0.07) |

^aRates are per 100,000 person-years.

^bIncludes data from 15 of the 17 registries listed in Table 5; North Dakota and Rhode Island are excluded.

^cRefers to all brain tumors including histologies not presented in this table.

Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NOS, not otherwise specified; SE, standard error.

TABLES

TABLE 9: PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES^a BY MAJOR HISTOLOGY GROUPINGS, HISTOLOGY AND GENDER, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1997-2001^b

| HISTOLOGY | MALES | | FEMALES | |
|---|---------------|---------------|---------------|---------------|
| | N | ADJUSTED RATE | N | ADJUSTED RATE |
| <u>TUMORS OF NEUROEPITHELIAL TISSUE</u> | 14,786 | 7.53 | 11,873 | 5.32 |
| Pilocytic astrocytoma | 721 | 0.33 | 657 | 0.31 |
| Diffuse astrocytoma (protoplasmic, fibrillary) | 250 | 0.12 | 186 | 0.08 |
| Anaplastic astrocytoma | 1,110 | 0.56 | 892 | 0.40 |
| Unique astrocytoma variants | 183 | 0.09 | 114 | 0.05 |
| Astrocytoma, NOS | 1,116 | 0.56 | 866 | 0.39 |
| Glioblastoma | 6,953 | 3.75 | 5,424 | 2.40 |
| Oligodendroglioma | 839 | 0.40 | 746 | 0.34 |
| Anaplastic oligodendroglioma | 388 | 0.19 | 350 | 0.16 |
| Ependymoma/anaplastic ependymoma | 602 | 0.29 | 481 | 0.22 |
| Ependymoma variants | 166 | 0.08 | 106 | 0.05 |
| Mixed glioma | 356 | 0.17 | 287 | 0.13 |
| Glioma malignant, NOS | 807 | 0.41 | 790 | 0.35 |
| Choroid plexus | 82 | 0.04 | 90 | 0.04 |
| Neuroepithelial | 43 | 0.02 | 27 | 0.01 |
| Benign and malignant neuronal/glial, neuronal and mixed | 479 | 0.22 | 390 | 0.18 |
| Pineal parenchymal | 48 | 0.02 | 50 | 0.02 |
| Embryonal/primitive/medulloblastoma | 643 | 0.29 | 417 | 0.19 |
| <u>TUMORS OF CRANIAL AND SPINAL NERVES</u> | 2,233 | 1.12 | 2,438 | 1.11 |
| Nerve sheath, benign and malignant | 2,231 | 1.12 | 2,437 | 1.11 |
| <u>TUMORS OF MENINGES</u> | 5,017 | 2.76 | 12,937 | 5.72 |
| Meningioma | 4,617 | 2.57 | 12,585 | 5.56 |
| Other mesenchymal, benign and malignant | 121 | 0.06 | 115 | 0.05 |
| Hemangioblastoma | 279 | 0.14 | 237 | 0.11 |
| <u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u> | 1,087 | 0.56 | 879 | 0.39 |
| Lymphoma | 1,087 | 0.56 | 879 | 0.39 |
| <u>GERM CELL TUMORS AND CYSTS</u> | 255 | 0.11 | 106 | 0.05 |
| Germ cell tumors, cysts and heterotopias | 255 | 0.11 | 106 | 0.05 |
| <u>TUMORS OF SELLAR REGION</u> | 1,881 | 0.95 | 2,026 | 0.91 |
| Pituitary | 1,668 | 0.85 | 1,815 | 0.82 |
| Craniopharyngioma | 213 | 0.10 | 211 | 0.10 |
| <u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u> | 63 | 0.03 | 52 | 0.02 |
| Chordoma/chondrosarcoma | 63 | 0.03 | 52 | 0.02 |
| <u>UNCLASSIFIED TUMORS</u> | 1,502 | 0.85 | 1,767 | 0.75 |
| Hemangioma | 130 | 0.06 | 169 | 0.08 |
| Neoplasm, unspecified | 1,357 | 0.78 | 1,585 | 0.67 |
| All other | 15 | 0.01 | 13 | 0.01 |
| TOTAL^c | 26,824 | 13.92 | 32,078 | 14.27 |

^aRates are per 100,000 person-years.

^bIncludes data from 15 of the 17 registries listed in Table 5; North Dakota and Rhode Island are excluded.

^cRefers to all brain tumors including histologies not presented in this table.

Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NOS, not otherwise specified.

TABLE 10: PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES^a BY MAJOR HISTOLOGY GROUPINGS, HISTOLOGY AND RACE, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1997-2001^b

| HISTOLOGY | WHITES | | BLACKS | |
|---|---------------|---------------|--------------|---------------|
| | N | ADJUSTED RATE | N | ADJUSTED RATE |
| <u>TUMORS OF NEUROEPITHELIAL TISSUE</u> | 24,281 | 6.76 | 1,578 | 3.39 |
| Pilocytic astrocytoma | 1,185 | 0.34 | 126 | 0.20 |
| Diffuse astrocytoma (protoplasmic, fibrillary) | 402 | 0.11 | 20 | 0.04 |
| Anaplastic astrocytoma | 1,842 | 0.51 | 115 | 0.25 |
| Unique astrocytoma variants | 257 | 0.07 | 25 | 0.05 |
| Astrocytoma, NOS | 1,796 | 0.50 | 129 | 0.27 |
| Glioblastoma | 11,537 | 3.21 | 613 | 1.53 |
| Oligodendroglioma | 1,447 | 0.40 | 70 | 0.14 |
| Anaplastic oligodendroglioma | 662 | 0.18 | 42 | 0.09 |
| Ependymoma/anaplastic ependymoma | 973 | 0.27 | 63 | 0.12 |
| Ependymoma variants | 249 | 0.07 | 10 | 0.02 |
| Mixed glioma | 601 | 0.17 | 21 | 0.05 |
| Glioma malignant, NOS | 1,370 | 0.38 | 143 | 0.28 |
| Choroid plexus | 152 | 0.04 | 11 | 0.02 |
| Neuroepithelial | 60 | 0.02 | 8 | - |
| Benign and malignant neuronal/glial, neuronal and mixed | 756 | 0.21 | 73 | 0.14 |
| Pineal parenchymal | 72 | 0.02 | 20 | 0.03 |
| Embryonal/primitive/medulloblastoma | 920 | 0.26 | 89 | 0.15 |
| <u>TUMORS OF CRANIAL AND SPINAL NERVES</u> | 4,151 | 1.15 | 177 | 0.40 |
| Nerve sheath, benign and malignant | 4,149 | 1.15 | 176 | 0.40 |
| <u>TUMORS OF MENINGES</u> | 15,436 | 4.29 | 1,622 | 4.16 |
| Meningioma | 14,787 | 4.11 | 1,570 | 4.05 |
| Other mesenchymal, benign and malignant | 205 | 0.06 | 17 | 0.04 |
| Hemangioblastoma | 444 | 0.12 | 35 | 0.07 |
| <u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u> | 1,632 | 0.45 | 258 | 0.54 |
| Lymphoma | 1,632 | 0.45 | 258 | 0.54 |
| <u>GERM CELL TUMORS AND CYSTS</u> | 306 | 0.09 | 27 | 0.04 |
| Germ cell tumors, cysts and heterotopias | 306 | 0.09 | 27 | 0.04 |
| <u>TUMORS OF SELLAR REGION</u> | 3,128 | 0.87 | 455 | 1.03 |
| Pituitary | 2,785 | 0.77 | 400 | 0.92 |
| Craniopharyngioma | 343 | 0.10 | 55 | 0.11 |
| <u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u> | 102 | 0.03 | 7 | - |
| Chordoma/chondrosarcoma | 102 | 0.03 | 7 | - |
| <u>UNCLASSIFIED TUMORS</u> | 2,890 | 0.80 | 266 | 0.67 |
| Hemangioma | 275 | 0.08 | 15 | 0.03 |
| Neoplasm, unspecified | 2,591 | 0.72 | 248 | 0.64 |
| All other | 24 | 0.01 | - | - |
| TOTAL^c | 51,926 | 14.44 | 4,390 | 10.24 |

^aRates are per 100,000 person-years.

^bIncludes data from 15 of the 17 registries listed in Table 5; North Dakota and Rhode Island are excluded.

^cRefers to all brain tumors including histologies not presented in this table.

- Counts are not presented when fewer than 6 cases were reported for the specific histology category and rates are not presented when fewer than 10 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; NOS, not otherwise specified.

TABLES

TABLE 11: PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES^a BY MAJOR HISTOLOGY GROUPINGS, HISTOLOGY, RACE, AND HISPANIC ETHNICITY, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1997-2001, 13 REGISTRIES^b

| HISTOLOGY | HISPANICS ^c (OF ANY RACE) | | WHITE HISPANICS | | BLACK HISPANICS | |
|---|---|------------------|--------------------|------------------|--------------------|------------------|
| | N | ADJUSTED RATE | N | ADJUSTED RATE | N | ADJUSTED RATE |
| <u>TUMORS OF NEUROEPITHELIAL TISSUE</u> | 2,438 | 4.96 | 2,273 | 5.01 | 56 | 2.28 |
| Pilocytic astrocytoma | 168 | 0.22 | 154 | 0.21 | - | - |
| Diffuse astrocytoma | 37 | 0.06 | 35 | 0.06 | - | - |
| Anaplastic astrocytoma | 172 | 0.35 | 162 | 0.35 | - | - |
| Unique astrocytoma variants | 35 | 0.06 | 31 | 0.06 | - | - |
| Astrocytoma, NOS | 201 | 0.38 | 191 | 0.40 | - | - |
| Glioblastoma | 820 | 2.27 | 783 | 2.33 | 23 | 1.16 |
| Oligodendroglioma | 163 | 0.29 | 149 | 0.29 | - | - |
| Anaplastic oligodendroglioma | 54 | 0.11 | 45 | 0.10 | - | - |
| Ependymoma/anaplastic ependymoma | 152 | 0.24 | 140 | 0.24 | - | - |
| Ependymoma variants | 26 | 0.05 | 24 | 0.05 | - | - |
| Mixed glioma | 57 | 0.11 | 52 | 0.10 | - | - |
| Glioma malignant, NOS | 182 | 0.33 | 166 | 0.33 | - | - |
| Choroid plexus | 40 | 0.05 | 39 | 0.05 | - | - |
| Neuroepithelial | 8 | - | 6 | - | - | - |
| Benign and malignant neuronal/glial, neuronal and mixed | 93 | 0.14 | 81 | 0.13 | - | - |
| Pineal parenchymal | 15 | 0.03 | 13 | 0.03 | - | - |
| Embryonal/primitive/medulloblastoma | 215 | 0.26 | 202 | 0.26 | - | - |
| <u>TUMORS OF CRANIAL AND SPINAL NERVES</u> | 369 | 0.80 | 332 | 0.78 | 7 | - |
| Nerve sheath, benign and malignant | 369 | 0.80 | 332 | 0.78 | 7 | - |
| <u>TUMORS OF MENINGES</u> | 1,660 | 4.50 | 1,500 | 4.35 | 37 | 2.17 |
| Meningioma | 1,580 | 4.34 | 1,427 | 4.20 | 37 | 2.17 |
| Other mesenchymal, benign and malignant | 29 | 0.06 | 28 | 0.06 | - | - |
| Hemangioblastoma | 51 | 0.10 | 45 | 0.09 | - | - |
| <u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u> | 288 | 0.63 | 256 | 0.60 | 14 | 0.54 |
| Lymphoma | 288 | 0.63 | 256 | 0.60 | 14 | 0.54 |
| <u>GERM CELL TUMORS</u> | 79 | 0.10 | 76 | 0.10 | - | - |
| Germ cell tumors, cysts, and heterotopias | 79 | 0.10 | 76 | 0.10 | - | - |
| <u>TUMORS OF SELLAR REGION</u> | 443 | 0.85 | 382 | 0.78 | 15 | 0.65 |
| Pituitary | 385 | 0.75 | 328 | 0.69 | 14 | 0.63 |
| Craniopharyngioma | 58 | 0.09 | 54 | 0.09 | - | - |
| <u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u> | 18 | 0.03 | 18 | 0.03 | - | - |
| Chordoma/chondrosarcoma | 18 | 0.03 | 18 | 0.03 | - | - |
| <u>UNCLASSIFIED TUMORS</u> | 375 | 0.97 | 352 | 0.97 | 8 | - |
| Hemangioma | 43 | 0.07 | 43 | 0.07 | - | - |
| Neoplasm, unspecified | 328 | 0.90 | 305 | 0.89 | 8 | - |
| All other | - | - | - | - | - | - |
| TOTAL^d | 5,670 | 12.83 | 5,189 | 12.64 | 137 | 6.56 |

TABLE 11 (CONTINUED)

| HISTOLOGY | NON-HISPANICS ^c (OF ANY RACE) | | WHITE NON-HISPANICS | | BLACK NON-HISPANICS | |
|--|---|------------------|------------------------|------------------|------------------------|------------------|
| | N | ADJUSTED RATE | N | ADJUSTED RATE | N | ADJUSTED RATE |
| <u>TUMORS OF NEUROEPITHELIAL TISSUE</u> | 21,244 | 6.66 | 19,340 | 7.17 | 1,272 | 3.51 |
| Pilocytic astrocytoma | 1,063 | 0.35 | 912 | 0.38 | 102 | 0.21 |
| Diffuse astrocytoma | 366 | 0.11 | 338 | 0.13 | 17 | 0.04 |
| Anaplastic astrocytoma | 1,619 | 0.50 | 1,484 | 0.55 | 97 | 0.27 |
| Unique astrocytoma variants | 233 | 0.07 | 200 | 0.08 | 22 | 0.05 |
| Astrocytoma, NOS | 1,528 | 0.48 | 1,380 | 0.52 | 108 | 0.29 |
| Glioblastoma | 10,104 | 3.13 | 9,424 | 3.35 | 487 | 1.56 |
| Oligodendroglioma | 1,234 | 0.39 | 1,127 | 0.43 | 53 | 0.13 |
| Anaplastic oligodendroglioma | 610 | 0.19 | 548 | 0.20 | 34 | 0.10 |
| Ependymoma/anaplastic ependymoma | 802 | 0.25 | 723 | 0.28 | 45 | 0.11 |
| Ependymoma variants | 231 | 0.07 | 211 | 0.08 | 10 | 0.02 |
| Mixed glioma | 516 | 0.16 | 486 | 0.18 | 15 | 0.04 |
| Glioma malignant, NOS | 1,238 | 0.39 | 1,053 | 0.40 | 118 | 0.30 |
| Choroid plexus | 114 | 0.04 | 97 | 0.04 | 10 | 0.02 |
| Neuroepithelial | 56 | 0.02 | 49 | 0.02 | 6 | - |
| Benign and malignant neuronal/gliol, neuronal and mixed | 716 | 0.23 | 624 | 0.25 | 61 | 0.15 |
| Pineal parenchymal | 71 | 0.02 | 51 | 0.02 | 15 | 0.03 |
| Embryonal/primitive/medulloblastoma | 743 | 0.25 | 633 | 0.27 | 72 | 0.16 |
| <u>TUMORS OF CRANIAL AND SPINAL NERVES</u> | 3,904 | 1.22 | 3,474 | 1.28 | 140 | 0.40 |
| Nerve sheath, benign and malignant | 3,901 | 1.22 | 3,472 | 1.28 | 139 | 0.40 |
| <u>TUMORS OF MENINGES</u> | 14,757 | 4.58 | 12,658 | 4.51 | 1,377 | 4.53 |
| Meningioma | 14,160 | 4.39 | 12,137 | 4.32 | 1,341 | 4.43 |
| Other mesenchymal, benign and malignant | 189 | 0.06 | 164 | 0.06 | 13 | 0.03 |
| Hemangioblastoma | 408 | 0.13 | 357 | 0.13 | 23 | 0.06 |
| <u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u> | 1,470 | 0.46 | 1,205 | 0.43 | 212 | 0.57 |
| Lymphoma | 1,470 | 0.46 | 1,205 | 0.43 | 212 | 0.57 |
| <u>GERM CELL TUMORS</u> | 252 | 0.08 | 208 | 0.09 | 22 | 0.05 |
| Germ cell tumors, cysts, and heterotopias | 252 | 0.08 | 208 | 0.09 | 22 | 0.05 |
| <u>TUMORS OF SELLAR REGION</u> | 3,328 | 1.04 | 2,648 | 0.99 | 410 | 1.20 |
| Pituitary | 2,991 | 0.93 | 2,380 | 0.88 | 363 | 1.08 |
| Craniopharyngioma | 337 | 0.11 | 268 | 0.11 | 47 | 0.12 |
| <u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u> | 85 | 0.03 | 73 | 0.03 | 6 | - |
| Chordoma/chondrosarcoma | 85 | 0.03 | 73 | 0.03 | 6 | - |
| <u>UNCLASSIFIED TUMORS</u> | 2,772 | 0.86 | 2,425 | 0.87 | 250 | 0.80 |
| Hemangioma | 240 | 0.08 | 218 | 0.08 | 14 | 0.03 |
| Neoplasm, unspecified | 2,511 | 0.78 | 2,190 | 0.78 | 233 | 0.77 |
| All other | 21 | 0.01 | 17 | 0.01 | - | - |
| TOTAL^d | 47,812 | 14.92 | 42,031 | 15.35 | 3,689 | 11.08 |

^aRates are per 100,000 person-years.

^bIncludes data from 13 of the 17 registries listed in Table 5; Connecticut, North Dakota, Rhode Island, and Virginia are excluded.

^cHispanic is not mutually exclusive of race.

^dRefers to all brain tumors including histologies not presented in this table.

- Counts are not presented when fewer than 6 cases were reported for the specific histology category and rates are not presented when fewer than 10 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; NOS, not otherwise specified.

TABLES

TABLE 12: SELECTED PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR AGE-SPECIFIC INCIDENCE RATES^a BY AGE AT DIAGNOSIS, CBTRUS 1997-2001^b

| HISTOLOGY | AGE AT DIAGNOSIS | | | | | | | | |
|---|------------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | 0-14 | 0-19 | 20-34 | 35-44 | 45-54 | 55-64 | 65-74 | 75-84 | 85+ |
| <u>TUMORS OF NEUROEPITHELIAL TISSUE</u> | 3.40 | 3.12 | 3.02 | 4.39 | 6.99 | 11.96 | 17.34 | 18.58 | 10.24 |
| Pilocytic astrocytoma | 0.87 | 0.80 | 0.21 | 0.12 | 0.11 | 0.07 | 0.05 | 0.03 | - |
| Diffuse astrocytoma | 0.05 | 0.05 | 0.08 | 0.11 | 0.12 | 0.16 | 0.23 | 0.19 | 0.03 |
| Anaplastic astrocytoma | 0.08 | 0.08 | 0.36 | 0.48 | 0.63 | 0.95 | 1.11 | 1.14 | 0.43 |
| Unique astrocytoma variants | 0.07 | 0.07 | 0.05 | 0.05 | 0.08 | 0.11 | 0.10 | 0.07 | 0.03 |
| Astrocytoma, NOS | 0.25 | 0.23 | 0.35 | 0.45 | 0.47 | 0.60 | 1.03 | 1.38 | 0.62 |
| Glioblastoma | 0.13 | 0.13 | 0.36 | 1.20 | 3.60 | 7.87 | 12.58 | 13.15 | 7.15 |
| Oligodendroglioma | 0.07 | 0.08 | 0.41 | 0.66 | 0.52 | 0.53 | 0.38 | 0.26 | 0.12 |
| Anaplastic oligodendroglioma | 0.01 | 0.02 | 0.14 | 0.25 | 0.30 | 0.32 | 0.30 | 0.27 | 0.02 |
| Ependymoma/anaplastic ependymoma | 0.27 | 0.23 | 0.19 | 0.25 | 0.35 | 0.31 | 0.29 | 0.28 | 0.15 |
| Ependymoma variants | 0.03 | 0.04 | 0.08 | 0.07 | 0.08 | 0.09 | 0.06 | 0.04 | 0.03 |
| Mixed glioma | 0.02 | 0.03 | 0.18 | 0.21 | 0.22 | 0.27 | 0.17 | 0.12 | 0.05 |
| Glioma malignant, NOS | 0.45 | 0.39 | 0.17 | 0.21 | 0.25 | 0.36 | 0.76 | 1.39 | 1.48 |
| Embryonal/primitive/medulloblastoma | 0.73 | 0.61 | 0.17 | 0.11 | 0.05 | 0.06 | 0.02 | 0.05 | 0.02 |
| <u>TUMORS OF CRANIAL AND SPINAL NERVES</u> | 0.07 | 0.11 | 0.52 | 1.20 | 2.07 | 2.64 | 2.58 | 1.95 | 0.79 |
| Nerve sheath, benign and malignant | 0.07 | 0.11 | 0.52 | 1.20 | 2.07 | 2.63 | 2.58 | 1.95 | 0.79 |
| <u>TUMORS OF MENINGES</u> | 0.12 | 0.17 | 0.89 | 2.91 | 5.68 | 8.78 | 14.16 | 18.88 | 22.03 |
| Meningioma | 0.07 | 0.12 | 0.74 | 2.69 | 5.41 | 8.49 | 13.83 | 18.67 | 21.77 |
| Hemangioblastoma | 0.01 | 0.02 | 0.12 | 0.16 | 0.20 | 0.19 | 0.22 | 0.15 | 0.13 |
| <u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u> | 0.02 | 0.02 | 0.20 | 0.48 | 0.52 | 0.89 | 1.67 | 1.73 | 0.71 |
| Lymphoma | 0.02 | 0.02 | 0.20 | 0.48 | 0.52 | 0.89 | 1.67 | 1.73 | 0.71 |
| <u>GERM CELL TUMORS</u> | 0.16 | 0.18 | 0.10 | 0.02 | 0.02 | 0.02 | 0.04 | 0.01 | - |
| Germ cell | 0.16 | 0.18 | 0.10 | 0.02 | 0.02 | 0.02 | 0.04 | 0.01 | - |
| <u>TUMORS OF SELLAR REGION</u> | 0.15 | 0.22 | 0.77 | 1.00 | 1.31 | 1.69 | 1.90 | 1.59 | 1.07 |
| Pituitary | 0.03 | 0.11 | 0.70 | 0.91 | 1.22 | 1.56 | 1.76 | 1.52 | 1.00 |
| Craniopharyngioma | 0.12 | 0.12 | 0.07 | 0.08 | 0.10 | 0.13 | 0.13 | 0.07 | 0.07 |
| <u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u> | 0.01 | 0.01 | 0.02 | 0.04 | 0.03 | 0.05 | 0.05 | 0.04 | 0.02 |
| <u>UNCLASSIFIED TUMORS</u> | 0.20 | 0.20 | 0.29 | 0.43 | 0.55 | 0.98 | 1.95 | 4.26 | 8.32 |
| TOTAL^c | 4.13 | 4.02 | 5.80 | 10.46 | 17.18 | 27.01 | 39.67 | 47.05 | 43.18 |

^aRates are per 100,000 person-years.

^bIncludes data from 15 of the 17 registries listed in Table 5; North Dakota and Rhode Island are excluded.

^cRefers to all brain tumors including histologies not presented in this table.

- Rates are not presented when fewer than 10 cases were reported for the specific histology category. The suppressed cases are included in the rates for Totals.

Abbreviations: CBTRUS, Central Brain Tumor Registry of the United States; NOS, not otherwise specified.

TABLE 13: SELECTED CHILDHOOD PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES^a BY MAJOR HISTOLOGY GROUPINGS, HISTOLOGY AND GENDER (AGES 0-19), AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1997-2001^b

| HISTOLOGY | MALES | | FEMALES | | TOTAL | |
|---|--------------|---------------|--------------|---------------|--------------|---------------|
| | N | ADJUSTED RATE | N | ADJUSTED RATE | N | ADJUSTED RATE |
| <u>TUMORS OF NEUROEPITHELIAL TISSUE</u> | 2,116 | 3.30 | 1,776 | 2.91 | 3,892 | 3.11 |
| Pilocytic astrocytoma | 520 | 0.81 | 479 | 0.78 | 999 | 0.80 |
| Anaplastic astrocytoma | 49 | 0.08 | 56 | 0.09 | 105 | 0.08 |
| Astrocytoma, NOS | 158 | 0.25 | 135 | 0.22 | 293 | 0.23 |
| Glioblastoma | 95 | 0.15 | 69 | 0.11 | 164 | 0.13 |
| Ependymoma/anaplastic ependymoma | 156 | 0.24 | 130 | 0.21 | 286 | 0.23 |
| Glioma malignant, NOS | 234 | 0.36 | 250 | 0.41 | 484 | 0.39 |
| Benign and malignant neuronal/glial, neuronal and mixed | 171 | 0.27 | 143 | 0.23 | 314 | 0.25 |
| Embryonal/primitive/medulloblastoma | 464 | 0.72 | 296 | 0.48 | 760 | 0.61 |
| <u>TUMORS OF CRANIAL AND SPINAL NERVES</u> | 75 | 0.12 | 58 | 0.10 | 133 | 0.11 |
| <u>TUMORS OF MENINGES</u> | 109 | 0.17 | 98 | 0.16 | 207 | 0.17 |
| <u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u> | 16 | 0.03 | 14 | 0.02 | 30 | 0.02 |
| <u>GERM CELL TUMORS AND CYSTS</u> | 148 | 0.23 | 75 | 0.12 | 223 | 0.18 |
| <u>TUMORS OF SELLAR REGION</u> | 91 | 0.14 | 187 | 0.31 | 278 | 0.22 |
| Craniopharyngioma | 67 | 0.10 | 80 | 0.13 | 147 | 0.12 |
| <u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u> | 7 | - | 10 | 0.02 | 17 | 0.01 |
| <u>UNCLASSIFIED TUMORS</u> | 145 | 0.23 | 103 | 0.17 | 248 | 0.20 |
| TOTAL^c | 2,707 | 4.23 | 2,321 | 3.81 | 5,028 | 4.02 |

^aRates are per 100,000 person-years.

^bIncludes data from 15 of the 17 registries listed in Table 5; North Dakota and Rhode Island are excluded.

^cRefers to all childhood brain tumors, including histologies not presented in this table.

- Counts are not presented when fewer than 6 cases were reported for the specific histology category and rates are not presented when fewer than 10 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; NOS, not otherwise specified.

TABLES

TABLE 14: CHILDHOOD PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES^a BY MAJOR HISTOLOGY GROUPINGS AND RACE (AGES 0-19), AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1997-2001^b

| HISTOLOGY GROUPING | WHITES | | BLACKS | |
|---------------------------------------|--------------|---------------|------------|---------------|
| | N | ADJUSTED RATE | N | ADJUSTED RATE |
| Tumors of Neuroepithelial Tissue | 3,267 | 3.26 | 408 | 2.20 |
| Tumors of Cranial and Spinal Nerves | 117 | 0.12 | 6 | - |
| Tumors of the Meninges | 167 | 0.17 | 22 | 0.12 |
| Lymphomas and Hemopoietic Neoplasms | 26 | 0.03 | - | - |
| Germ Cell Tumors and Cysts | 183 | 0.18 | 17 | 0.09 |
| Tumors of the Sellar Region | 224 | 0.22 | 30 | 0.17 |
| Local Extensions from Regional Tumors | 14 | 0.01 | - | - |
| Unclassified Tumors | 201 | 0.20 | 31 | 0.17 |
| TOTAL | 4,199 | 4.19 | 518 | 2.82 |
| MALES | 2,246 | 4.37 | 294 | 3.15 |
| FEMALES | 1,953 | 4.01 | 224 | 2.47 |

^aRates are per 100,000 person-years.

^bIncludes data from 15 of the 17 registries listed in Table 5; North Dakota and Rhode Island are excluded.

- Counts are not presented when fewer than 6 cases were reported for the specific histology category and rates are not presented when fewer than 10 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; NOS, not otherwise specified.

TABLE 15: SELECTED CHILDHOOD PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR AGE-SPECIFIC INCIDENCE RATES^a (AGES 0-19), BY AGE AT DIAGNOSIS, CBTRUS 1997-2001^b

| HISTOLOGY | Age at Diagnosis | | | | | | | | 0-19 | | 0-14 | |
|---|------------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|
| | 0-4 | | 5-9 | | 10-14 | | 15-19 | | N | RATE | N | RATE |
| TUMORS OF | 1,225 | 4.02 | 1,099 | 3.45 | 867 | 2.75 | 701 | 2.26 | 3,892 | 3.12 | 3,191 | 3.40 |
| NEUROEPITHELIAL TISSUE | | | | | | | | | | | | |
| Pilocytic astrocytoma | 260 | 0.85 | 316 | 0.99 | 242 | 0.77 | 181 | 0.58 | 999 | 0.80 | 818 | 0.87 |
| Anaplastic astrocytoma | 18 | 0.06 | 31 | 0.10 | 23 | 0.07 | 33 | 0.11 | 105 | 0.08 | 72 | 0.08 |
| Astrocytoma, NOS | 76 | 0.25 | 79 | 0.25 | 75 | 0.24 | 63 | 0.20 | 293 | 0.23 | 230 | 0.25 |
| Glioblastoma | 31 | 0.10 | 38 | 0.12 | 51 | 0.16 | 44 | 0.14 | 164 | 0.13 | 120 | 0.13 |
| Ependymoma/anaplastic ependymoma | 134 | 0.44 | 69 | 0.22 | 48 | 0.15 | 35 | 0.11 | 286 | 0.23 | 251 | 0.27 |
| Glioma malignant, NOS | 168 | 0.55 | 158 | 0.50 | 100 | 0.32 | 58 | 0.19 | 484 | 0.39 | 426 | 0.45 |
| Benign and malignant neuronal/glial, neuronal and mixed | 104 | 0.34 | 52 | 0.16 | 79 | 0.25 | 79 | 0.25 | 314 | 0.25 | 235 | 0.25 |
| Embryonal/primitive/medulloblastoma | 296 | 0.97 | 253 | 0.79 | 133 | 0.42 | 78 | 0.25 | 760 | 0.61 | 682 | 0.73 |
| TUMORS OF CRANIAL AND SPINAL NERVES | 10 | 0.03 | 24 | 0.08 | 32 | 0.10 | 67 | 0.22 | 133 | 0.11 | 66 | 0.07 |
| TUMORS OF MENINGES | 38 | 0.12 | 28 | 0.09 | 44 | 0.14 | 97 | 0.31 | 207 | 0.17 | 110 | 0.12 |
| LYMPHOMAS AND HEMOPOIETIC NEOPLASMS | 6 | - | - | - | 12 | 0.04 | 8 | - | 30 | 0.02 | 22 | 0.02 |
| GERM CELL TUMORS | 33 | 0.11 | 39 | 0.12 | 75 | 0.24 | 76 | 0.24 | 223 | 0.18 | 147 | 0.16 |
| TUMORS OF SELLAR REGION | 24 | 0.08 | 55 | 0.17 | 60 | 0.19 | 139 | 0.45 | 278 | 0.22 | 139 | 0.15 |
| Craniopharyngioma | 24 | 0.08 | 51 | 0.16 | 40 | 0.13 | 32 | 0.10 | 147 | 0.12 | 115 | 0.12 |
| LOCAL EXTENSIONS FROM REGIONAL TUMORS | - | - | - | - | - | - | 7 | - | 17 | 0.01 | 10 | 0.01 |
| UNCLASSIFIED TUMORS | 77 | 0.25 | 45 | 0.14 | 68 | 0.22 | 58 | 0.19 | 248 | 0.20 | 190 | 0.20 |
| TOTAL^c | 1,414 | 4.63 | 1,298 | 4.08 | 1,163 | 3.69 | 1,153 | 3.71 | 5,028 | 4.02 | 3,875 | 4.13 |

^aRates are per 100,000 person-years.

^bIncludes data from 15 of the 17 registries listed in Table 5; North Dakota and Rhode Island are excluded.

^cRefers to all childhood brain tumors, including histologies not presented in this table.

- Counts are not presented when fewer than 6 cases were reported for the specific histology category and rates are not presented when fewer than 10 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; NOS, not otherwise specified.

TABLES

TABLE 16: PRIMARY MALIGNANT BRAIN AND OTHER NERVOUS SYSTEM TUMOR INCIDENCE AND MORTALITY RATES^a BY STATE, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION^b

| STATE | INCIDENCE | | | | | MORTALITY | | | | |
|----------------------|-----------|---------------------|------------------|---------------------|------------------|-----------|--------|------|---------|------|
| | YEARS | MALES | | FEMALES | | YEARS | MALES | | FEMALES | |
| | | N | RATE | N | RATE | | N | RATE | N | RATE |
| Alabama | 1997-01 | 750 | 7.4 | 653 | 5.3 | 1997-01 | 554 | 5.6 | 493 | 3.9 |
| Alaska | 1997-01 | 88 | 6.8 | 72 | 5.9 | 1997-01 | 51 | 4.9 | 35 | 3.1 |
| Arizona | 1997-01 | 830 | 6.9 | 702 | 5.4 | 1997-01 | 570 | 4.9 | 490 | 3.7 |
| Arkansas | 1997-01 | 495 | 7.8 | 421 | 5.8 | 1997-01 | 433 | 6.9 | 363 | 4.7 |
| California | 1997-01 | 5,389 | 7.4 | 4,290 | 5.2 | 1997-01 | 3,898 | 5.7 | 3,050 | 3.8 |
| Colorado | 1997-01 | 770 | 8.3 | 576 | 5.7 | 1997-01 | 462 | 5.4 | 359 | 3.6 |
| Connecticut | 1997-01 | 703 | 8.8 | 558 | 5.8 | 1997-01 | 419 | 5.4 | 348 | 3.4 |
| Delaware | 1997-01 | 136 | 7.6 | 133 | 6.3 | 1997-01 | 90 | 5.1 | 86 | 4.0 |
| District of Columbia | 1997-01 | 103 | 8.2 | 76 | 5.0 | 1997-01 | 57 | 5.0 | 36 | 2.2 |
| Florida | 1997-01 | 3,325 | 8.0 | 2,703 | 5.7 | 1997-01 | 2,468 | 5.8 | 1,886 | 3.7 |
| Georgia | 1997-01 | 1,199 | 7.0 | 1,004 | 5.1 | 1997-01 | 788 | 5.0 | 630 | 3.3 |
| Hawaii | 1997-01 | 160 | 5.4 | 123 | 3.9 | 1997-01 | 92 | 3.1 | 73 | 2.3 |
| Idaho | 1997-01 | 294 | 10.0 | 193 | 6.2 | 1997-01 | 204 | 7.3 | 131 | 4.3 |
| Illinois | 1997-01 | 2,106 | 7.7 | 1,726 | 5.3 | 1997-01 | 1,425 | 5.4 | 1,137 | 3.4 |
| Indiana | 1997-01 | 1,035 | 7.5 | 895 | 5.6 | 1997-01 | 774 | 5.8 | 646 | 3.9 |
| Iowa | 1997-01 | 600 | 8.5 | 489 | 5.9 | 1997-01 | 456 | 6.5 | 374 | 4.2 |
| Kansas | | - | - | - | - | 1997-01 | 368 | 6.1 | 304 | 4.1 |
| Kentucky | 1997-01 | 694 | 7.5 | 626 | 5.8 | 1997-01 | 553 | 6.2 | 454 | 4.1 |
| Louisiana | 1997-01 | 699 | 7.3 | 604 | 5.2 | 1997-01 | 520 | 5.6 | 441 | 3.8 |
| Maine | 1997-01 | 308 | 9.9 | 242 | 6.7 | 1997-01 | 196 | 6.2 | 172 | 4.5 |
| Maryland | 1997-01 | 877 | 7.5 | 716 | 5.2 | 1997-01 | 599 | 5.3 | 455 | 3.3 |
| Massachusetts | 1997-01 | 1,302 | 9.0 | 1,124 | 6.4 | 1997-01 | 804 | 5.6 | 660 | 3.6 |
| Michigan | 1997-01 | 1,913 | 8.5 | 1,522 | 5.8 | 1997-01 | 1,316 | 6.0 | 1,043 | 3.9 |
| Minnesota | 1997-01 | 928 | 8.2 | 674 | 5.4 | 1997-01 | 699 | 6.5 | 504 | 3.9 |
| Mississippi | | - | - | - | - | 1997-01 | 425 | 7.2 | 334 | 4.4 |
| Missouri | 1997-01 | 1,103 | 8.5 | 922 | 6.0 | 1997-01 | 746 | 5.8 | 656 | 4.1 |
| Montana | 1997-01 | 177 | 7.9 | 155 | 6.4 | 1997-01 | 123 | 5.5 | 109 | 4.4 |
| Nebraska | 1997-01 | 343 | 8.6 | 264 | 5.6 | 1997-01 | 245 | 6.2 | 218 | 4.5 |
| Nevada | 1997-01 | 328 | 7.2 | 243 | 5.1 | 1997-01 | 212 | 4.8 | 137 | 3.0 |
| New Hampshire | 1997-01 | 247 | 8.7 | 191 | 6.0 | 1997-01 | 177 | 6.4 | 129 | 4.0 |
| New Jersey | 1997-01 | 1,606 | 8.3 | 1,396 | 6.0 | 1997-01 | 906 | 4.8 | 806 | 3.4 |
| New Mexico | 1997-01 | 264 | 6.5 | 216 | 4.7 | 1997-01 | 174 | 4.4 | 148 | 3.2 |
| New York | 1997-01 | 3,535 | 8.2 | 3,192 | 6.1 | 1997-01 | 1,942 | 4.6 | 1,739 | 3.2 |
| North Carolina | 1997-01 | 1,294 | 7.2 | 1,146 | 5.4 | 1997-01 | 966 | 5.6 | 878 | 4.1 |
| North Dakota | 1997-01 | 103 | 6.6 | 95 | 5.5 | 1997-01 | 98 | 6.3 | 99 | 5.5 |
| Ohio | 1997-01 | 2,124 | 8.1 | 1,799 | 5.8 | 1997-01 | 1,485 | 5.8 | 1,166 | 3.6 |
| Oklahoma | 1997-01 | 651 | 8.2 | 524 | 5.7 | 1997-01 | 457 | 5.8 | 351 | 3.7 |
| Oregon | 1997-01 | 703 | 8.7 | 508 | 5.6 | 1997-01 | 515 | 6.4 | 387 | 4.2 |
| Pennsylvania | | - | - | - | - | 1997-01 | 1,615 | 5.4 | 1,426 | 3.7 |
| Rhode Island | 1997-01 | 202 | 8.2 | 194 | 6.4 | 1997-01 | 142 | 5.8 | 142 | 4.3 |
| South Carolina | 1997-01 | 630 | 7.0 | 536 | 5.0 | 1997-01 | 533 | 6.1 | 440 | 4.1 |
| South Dakota | 2001 | 26 | 7.1 | 14 | 3.4 | 1997-01 | 118 | 6.6 | 117 | 5.3 |
| Tennessee | | - | - | - | - | 1997-01 | 813 | 6.5 | 674 | 4.3 |
| Texas | 1997-00 | 2,660 | 7.8 | 2,264 | 5.8 | 1997-01 | 2,267 | 5.7 | 1,920 | 4.0 |
| Utah | 1997-01 | 353 | 8.2 | 300 | 6.2 | 1997-01 | 210 | 5.4 | 157 | 3.6 |
| Vermont | | - | - | - | - | 1997-01 | 77 | 5.4 | 59 | 3.5 |
| Virginia | 1997-01 | 1,062 | 6.7 | 846 | 4.7 | 1997-01 | 743 | 4.9 | 635 | 3.5 |
| Washington | 1997-01 | 1,199 | 9.0 | 902 | 6.1 | 1997-01 | 903 | 7.1 | 690 | 4.7 |
| West Virginia | 1997-01 | 339 | 7.5 | 306 | 5.8 | 1997-01 | 221 | 4.8 | 213 | 3.7 |
| Wisconsin | 1997-01 | 1,083 | 8.7 | 927 | 6.4 | 1997-01 | 729 | 5.9 | 620 | 4.2 |
| Wyoming | 1997-01 | 104 | 8.8 | 66 | 5.4 | 1997-01 | 64 | 5.5 | 47 | 3.8 |
| United States | 1997-01 | 28,085 ^c | 8.0 ^c | 23,187 ^c | 5.7 ^c | 1997-01 | 34,702 | 5.6 | 28,467 | 3.8 |

^aRates are per 100,000 person years.

^bSource: Cancer Incidence in North America, 1997-2001. Volumes One, Two, and Three. North American Association of Central Cancer Registries, April 2004.

^cIncludes data from 34 central registries (28 states, 5 metropolitan areas, and the District of Columbia) covering 55% of the total United States population.

- Not available

TABLE 17: PRIMARY BRAIN AND OTHER NERVOUS SYSTEM TUMORS, ESTIMATED NUMBER OF CASES^{a,b} BY STATE, 2004; PRIMARY MALIGNANT BRAIN AND OTHER NERVOUS SYSTEM TUMORS, ESTIMATED NUMBER OF CASES^{a,b} AND DEATHS^{b,c} BY STATE, 2004

| STATE | YEAR | All Brain Tumors | Malignant Brain Tumors | |
|----------------------|------|------------------|------------------------|------------------|
| | | ESTIMATED CASES | ESTIMATED CASES | ESTIMATED DEATHS |
| Alabama | 2004 | 680 | 350 | 200 |
| Alaska | 2004 | 80 | 40 | - |
| Arizona | 2004 | 750 | 390 | 240 |
| Arkansas | 2004 | 420 | 220 | 160 |
| California | 2004 | 4,400 | 2,300 | 1,440 |
| Colorado | 2004 | 620 | 320 | 180 |
| Connecticut | 2004 | 500 | 260 | 150 |
| Delaware | 2004 | 120 | 60 | - |
| District of Columbia | 2004 | 70 | 40 | - |
| Florida | 2004 | 2,700 | 1,380 | 980 |
| Georgia | 2004 | 1,120 | 580 | 260 |
| Hawaii | 2004 | 190 | 100 | - |
| Idaho | 2004 | 200 | 110 | 70 |
| Illinois | 2004 | 1,730 | 890 | 490 |
| Indiana | 2004 | 900 | 460 | 280 |
| Iowa | 2004 | 460 | 230 | 160 |
| Kansas | 2004 | 400 | 210 | 120 |
| Kentucky | 2004 | 610 | 310 | 160 |
| Louisiana | 2004 | 630 | 330 | 190 |
| Maine | 2004 | 200 | 100 | 80 |
| Maryland | 2004 | 760 | 390 | 210 |
| Massachusetts | 2004 | 920 | 470 | 280 |
| Michigan | 2004 | 1,400 | 720 | 450 |
| Minnesota | 2004 | 710 | 370 | 250 |
| Mississippi | 2004 | 410 | 210 | 160 |
| Missouri | 2004 | 840 | 430 | 270 |
| Montana | 2004 | 150 | 80 | - |
| Nebraska | 2004 | 260 | 130 | 90 |
| Nevada | 2004 | 300 | 160 | 80 |
| New Hampshire | 2004 | 180 | 90 | 70 |
| New Jersey | 2004 | 1,230 | 630 | 320 |
| New Mexico | 2004 | 270 | 140 | 70 |
| New York | 2004 | 2,640 | 1,360 | 690 |
| North Carolina | 2004 | 1,210 | 620 | 320 |
| North Dakota | 2004 | 100 | 50 | - |
| Ohio | 2004 | 1,690 | 870 | 520 |
| Oklahoma | 2004 | 520 | 270 | 160 |
| Oregon | 2004 | 560 | 280 | 160 |
| Pennsylvania | 2004 | 1,920 | 990 | 570 |
| Rhode Island | 2004 | 150 | 80 | - |
| South Carolina | 2004 | 590 | 300 | 200 |
| South Dakota | 2004 | 120 | 60 | - |
| Tennessee | 2004 | 870 | 450 | 300 |
| Texas | 2004 | 2,820 | 1,470 | 940 |
| Utah | 2004 | 290 | 150 | 80 |
| Vermont | 2004 | 90 | 50 | - |
| Virginia | 2004 | 1,030 | 530 | 290 |
| Washington | 2004 | 890 | 460 | 340 |
| West Virginia | 2004 | 300 | 150 | 90 |
| Wisconsin | 2004 | 800 | 410 | 260 |
| Wyoming | 2004 | 80 | 40 | - |
| United States | 2004 | 41,130 | 21,220 | 12,690 |

^aSource: CBTRUS, 1997-2001 data.

^bRounded to the nearest 10.

^cSource: Cancer Facts & Figures 2004. American Cancer Society, 2004.

- Estimate is 50 or fewer deaths.

TABLES

TABLE 18: FIVE-YEAR RELATIVE SURVIVAL RATES FOR MALIGNANT BRAIN AND CENTRAL NERVOUS SYSTEM TUMORS BY SITE^a AND GENDER, SEER 1973-2001

| ICDO CODE | SITE ^{a,b} | MALES | | FEMALES | | TOTAL | |
|-------------------|---|--------|------|---------|------|--------|------|
| | | N | % | N | % | N | % |
| C71.1-C71.4 | Frontal, temporal, parietal, and occipital lobes of the brain | 11,261 | 22.0 | 8,329 | 23.7 | 19,590 | 22.7 |
| C71.0 | Cerebrum | 1,286 | 19.6 | 985 | 22.5 | 2,271 | 20.8 |
| C71.5 | Ventricle | 435 | 49.2 | 302 | 51.9 | 737 | 50.3 |
| C71.6 | Cerebellum | 1,365 | 62.4 | 1,002 | 67.9 | 2,367 | 64.7 |
| C71.7 | Brain stem | 849 | 40.1 | 748 | 38.0 | 1,597 | 39.1 |
| C71.8-C71.9 | Other brain | 5,872 | 17.5 | 4,476 | 20.4 | 10,348 | 18.8 |
| C72.0-C72.1 | Spinal cord and cauda equina | 663 | 71.9 | 514 | 69.7 | 1,177 | 70.9 |
| C72.2-C72.5 | Cranial nerves | 161 | 84.8 | 149 | 83.2 | 310 | 84.0 |
| C72.8-C72.9 | Other nervous system | 261 | 25.6 | 148 | 37.1 | 409 | 29.6 |
| C70.0-C70.9 | Meninges (cerebral and spinal) | 295 | 49.3 | 330 | 63.8 | 625 | 56.9 |
| C75.1-C75.2 | Pituitary | 64 | 78.4 | 78 | 79.5 | 142 | 78.9 |
| C75.3 | Pineal | 256 | 66.7 | 68 | 57.8 | 324 | 64.8 |
| C30.0 (9522:9523) | Olfactory tumors of the nasal cavity | 77 | 74.5 | 67 | 77.5 | 144 | 77.0 |

^aThe sites referred to in this table are loosely based on the categories and site codes defined in the SEER Site/Histology Validation List.

^bIn contrast to survival estimates reported in previous editions of the CBTRUS statistical report, brain lymphomas are included.

Abbreviation: SEER, Surveillance, Epidemiology, and End Results.

TABLE 19: ONE-, TWO-, THREE-, FOUR-, FIVE-, AND TEN-YEAR RELATIVE SURVIVAL RATES^a FOR SELECTED MALIGNANT BRAIN AND CENTRAL NERVOUS SYSTEM TUMORS^b, SEER 1973-2001

| HISTOLOGY | NO. OF CASES | 1-YR | 2-YR | 3-YR | 4-YR | 5-YR | 10-YR |
|---|---------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Pilocytic astrocytoma | 1,086 | 95.4 | 93.9 | 93.0 | 91.5 | 90.8 | 88.8 |
| Diffuse astrocytoma | 708 | 73.7 | 61.5 | 54.8 | 50.5 | 46.9 | 38.8 |
| Anaplastic astrocytoma | 2,183 | 60.1 | 44.2 | 37.4 | 32.8 | 29.7 | 22.3 |
| Astrocytoma, NOS | 7,186 | 59.5 | 47.0 | 42.3 | 39.4 | 36.9 | 30.8 |
| Glioblastoma | 15,098 | 29.1 | 8.8 | 5.2 | 4.0 | 3.4 | 2.4 |
| Oligodendroglioma | 1,748 | 89.4 | 82.7 | 78.3 | 73.2 | 69.6 | 53.2 |
| Anaplastic oligodendroglioma | 340 | 76.7 | 60.1 | 54.7 | 48.0 | 41.9 | 29.6 |
| Ependymoma/anaplastic ependymoma | 1,170 | 87.2 | 80.7 | 74.6 | 71.9 | 69.7 | 61.4 |
| Mixed glioma | 754 | 84.0 | 73.0 | 65.8 | 59.7 | 55.9 | 43.1 |
| Glioma malignant, NOS | 2,573 | 49.0 | 36.7 | 33.6 | 31.6 | 30.0 | 26.2 |
| Neuroepithelial | 238 | 60.2 | 48.7 | 43.5 | 40.8 | 39.9 | 33.3 |
| Malignant neuronal/gliial, neuronal and mixed | 307 | 83.8 | 71.8 | 67.6 | 64.0 | 62.8 | 54.4 |
| Embryonal/primitive/medulloblastoma | 1,383 | 80.9 | 71.1 | 64.9 | 59.2 | 55.3 | 47.1 |
| Lymphoma | 2,414 | 36.2 | 26.4 | 21.7 | 18.8 | 16.4 | 10.9 |
| TOTAL: ALL BRAIN AND CNS^{b,c} | 40,041 | 51.1 | 36.9 | 32.8 | 30.4 | 28.8 | 24.9 |

^aRates are an estimate of the percentage of patients alive at one, two, three, four, five, and ten years, respectively.

^bIn contrast to survival estimates reported in previous editions of the CBTRUS statistical report, brain lymphomas, olfactory tumors of the nasal cavity, and malignant tumors of the pituitary and pineal glands are included.

^cIncludes histologies not listed in this table.

Abbreviations: SEER, Surveillance, Epidemiology, and End Results; NOS, not otherwise specified.

TABLE 20: ONE-, TWO-, THREE-, FOUR-, FIVE, AND TEN-YEAR RELATIVE SURVIVAL RATES^a FOR SELECTED MALIGNANT BRAIN AND CENTRAL NERVOUS SYSTEM TUMORS^b BY AGE GROUPS, SEER 1973-2001

| HISTOLOGY | AGE GROUP | # CASES | 1-YR | 2-YR | 3-YR | 4-YR | 5-YR | 10-YR |
|------------------------|--------------|---------------|------|------|------|------|------|-------|
| Pilocytic astrocytoma | 0-14 | 633 | 97.4 | 96.5 | 96.1 | 94.5 | 93.8 | 92.0 |
| | 0-19 | 762 | 97.2 | 96.4 | 96.0 | 94.5 | 93.7 | 92.3 |
| | 20-44 | 245 | 93.7 | 91.0 | 89.0 | 87.5 | 87.0 | 82.7 |
| | 45-54 | 43 | 90.4 | 87.9 | 82.1 | 79.3 | 76.0 | 66.8 |
| | 55-64 | 16 | 93.7 | 83.8 | c | c | c | c |
| | 65-74 | 13 | c | c | c | c | c | c |
| | 75+ | 7 | c | c | c | c | c | c |
| | Total | 1,086 | | | | | | |
| Diffuse astrocytoma | 0-14 | 106 | 92.4 | 85.4 | 82.2 | 82.2 | 81.2 | 80.0 |
| | 0-19 | 134 | 92.5 | 86.9 | 83.6 | 83.6 | 82.8 | 82.0 |
| | 20-44 | 288 | 89.9 | 82.0 | 73.3 | 63.7 | 57.5 | 39.3 |
| | 45-54 | 92 | 71.6 | 49.8 | 40.1 | 37.7 | 35.1 | 19.1 |
| | 55-64 | 85 | 46.5 | 21.8 | 16.0 | 13.7 | 10.2 | 7.6 |
| | 65-74 | 82 | 30.5 | 16.4 | 9.9 | 8.7 | 7.2 | c |
| | 75+ | 27 | 27.8 | 8.9 | 4.7 | c | c | c |
| | Total | 708 | | | | | | |
| Anaplastic astrocytoma | 0-14 | 129 | 72.3 | 58.0 | 52.8 | 49.1 | 49.1 | 46.8 |
| | 0-19 | 172 | 76.3 | 60.1 | 55.6 | 51.6 | 51.6 | 46.9 |
| | 20-44 | 840 | 85.2 | 71.7 | 62.3 | 54.7 | 48.3 | 32.1 |
| | 45-54 | 348 | 63.2 | 43.6 | 32.3 | 26.8 | 25.4 | 18.2 |
| | 55-64 | 309 | 44.3 | 20.1 | 13.9 | 10.5 | 5.9 | 3.7 |
| | 65-74 | 338 | 23.7 | 6.5 | 3.8 | 3.2 | 3.2 | 1.3 |
| | 75+ | 176 | 12.5 | 4.5 | 2.5 | 1.8 | c | c |
| | Total | 2,183 | | | | | | |
| Astrocytoma, NOS | 0-14 | 881 | 87.5 | 82.3 | 80.2 | 78.5 | 78.0 | 74.4 |
| | 0-19 | 1,150 | 87.7 | 81.8 | 79.2 | 77.7 | 76.7 | 73.2 |
| | 20-44 | 2,121 | 86.6 | 75.6 | 68.3 | 61.5 | 54.8 | 38.1 |
| | 45-54 | 951 | 62.6 | 41.0 | 33.0 | 29.0 | 26.7 | 17.6 |
| | 55-64 | 1,178 | 40.0 | 20.1 | 15.1 | 12.9 | 11.1 | 6.5 |
| | 65-74 | 1,186 | 22.3 | 9.1 | 6.2 | 5.6 | 5.0 | 2.3 |
| | 75+ | 600 | 12.4 | 5.5 | 4.2 | 3.8 | 3.5 | c |
| | Total | 7,186 | | | | | | |
| Glioblastoma | 0-14 | 176 | 47.2 | 23.9 | 19.6 | 18.3 | 17.0 | 15.5 |
| | 0-19 | 265 | 50.5 | 27.7 | 21.3 | 19.6 | 18.8 | 16.2 |
| | 20-44 | 1,787 | 59.4 | 30.0 | 21.1 | 16.5 | 13.6 | 8.9 |
| | 45-54 | 2,517 | 41.9 | 11.7 | 6.0 | 3.9 | 3.5 | 1.7 |
| | 55-64 | 3,918 | 31.1 | 5.9 | 2.6 | 1.7 | 1.4 | 0.5 |
| | 65-74 | 4,125 | 16.6 | 2.6 | 1.0 | 0.6 | 0.4 | 0.2 |
| | 75+ | 2,486 | 7.9 | 1.4 | 0.6 | 0.4 | 0.4 | 0.2 |
| | Total | 15,098 | | | | | | |
| Oligodendroglioma | 0-14 | 109 | 93.4 | 90.4 | 89.4 | 88.3 | 87.1 | 79.7 |
| | 0-19 | 175 | 92.9 | 87.9 | 85.9 | 85.2 | 84.4 | 79.7 |
| | 20-44 | 886 | 95.7 | 91.9 | 88.3 | 84.4 | 80.8 | 62.6 |
| | 45-54 | 313 | 91.2 | 82.5 | 76.1 | 69.4 | 64.4 | 38.1 |
| | 55-64 | 212 | 81.8 | 67.3 | 58.1 | 47.0 | 44.1 | 29.2 |
| | 65-74 | 118 | 61.7 | 50.9 | 50.3 | 41.6 | 35.0 | 11.8 |
| | 75+ | 44 | 45.5 | 32.2 | 19.0 | c | c | c |
| | Total | 1,748 | | | | | | |

TABLES

TABLE 20 (CONTINUED)

| HISTOLOGY | AGE GROUP | # CASES | 1-YR | 2-YR | 3-YR | 4-YR | 5-YR | 10-YR |
|--|--------------|--------------|------|------|------|------|------|-------|
| Anaplastic oligodendroglioma | 0-14 | 7 | c | c | c | c | c | c |
| | 0-19 | 10 | c | c | c | c | c | c |
| | 20-44 | 140 | 91.1 | 75.9 | 71.1 | 64.2 | 55.8 | 37.2 |
| | 45-54 | 73 | 82.0 | 62.6 | 58.1 | 43.5 | 43.5 | 35.5 |
| | 55-64 | 56 | 67.1 | 52.6 | 43.7 | 35.7 | 27.2 | c |
| | 65-74 | 38 | 49.9 | 35.3 | 32.4 | 32.4 | 19.3 | c |
| | 75+ | 23 | 32.7 | c | c | c | c | c |
| | Total | 340 | | | | | | |
| Ependymoma/ anaplastic ependymoma | 0-14 | 369 | 84.6 | 70.4 | 61.3 | 54.6 | 50.7 | 45.5 |
| | 0-19 | 414 | 85.8 | 73.0 | 63.8 | 57.9 | 54.5 | 47.1 |
| | 20-44 | 403 | 91.3 | 89.3 | 85.4 | 84.3 | 84.1 | 77.2 |
| | 45-54 | 149 | 91.3 | 86.2 | 79.6 | 79.2 | 75.7 | 67.8 |
| | 55-64 | 117 | 80.9 | 76.2 | 72.9 | 71.7 | 66.4 | 50.4 |
| | 65-74 | 69 | 78.3 | 75.6 | 72.5 | 71.2 | 71.2 | 43.7 |
| | 75+ | 18 | 63.5 | c | c | c | c | c |
| | Total | 1,170 | | | | | | |
| Mixed glioma | 0-14 | 76 | 88.1 | 80.1 | 76.0 | 70.5 | 69.1 | 62.9 |
| | 0-19 | 108 | 86.9 | 80.1 | 77.1 | 72.0 | 71.0 | 65.5 |
| | 20-44 | 374 | 92.3 | 84.9 | 79.2 | 72.7 | 68.3 | 49.3 |
| | 45-54 | 118 | 78.9 | 64.7 | 53.1 | 45.9 | 39.3 | 30.6 |
| | 55-64 | 89 | 78.1 | 52.4 | 38.6 | 33.3 | 30.6 | 15.2 |
| | 65-74 | 53 | 50.9 | 37.1 | 27.1 | 17.8 | 15.4 | 6.7 |
| | 75+ | 12 | c | c | c | c | c | c |
| | Total | 754 | | | | | | |
| Glioma malignant, NOS | 0-14 | 578 | 68.3 | 49.7 | 46.3 | 45.5 | 44.1 | 41.0 |
| | 0-19 | 653 | 69.9 | 52.7 | 49.1 | 48.2 | 46.8 | 42.7 |
| | 20-44 | 455 | 80.3 | 67.7 | 61.9 | 56.2 | 51.1 | 36.6 |
| | 45-54 | 250 | 55.2 | 37.5 | 31.0 | 29.7 | 28.3 | 20.0 |
| | 55-64 | 329 | 42.0 | 26.2 | 21.6 | 19.1 | 16.8 | 11.6 |
| | 65-74 | 430 | 23.7 | 13.1 | 11.9 | 8.4 | 7.5 | 5.0 |
| | 75+ | 456 | 10.4 | 6.6 | 5.6 | 4.2 | 3.3 | 2.9 |
| | Total | 2,573 | | | | | | |
| Neuroepithelial | 0-14 | 47 | 85.1 | 74.2 | 67.7 | 63.3 | 59.0 | 56.8 |
| | 0-19 | 63 | 87.3 | 77.6 | 72.6 | 69.3 | 66.0 | 64.3 |
| | 20-44 | 65 | 77.1 | 64.7 | 58.5 | 53.9 | 52.4 | 32.7 |
| | 45-54 | 34 | 53.3 | 32.8 | 24.1 | 21.0 | 21.0 | 11.1 |
| | 55-64 | 31 | 36.1 | 20.0 | 16.9 | c | c | c |
| | 65-74 | 30 | 20.7 | 14.2 | 11.1 | c | c | c |
| | 75+ | 15 | c | c | c | c | c | c |
| | Total | 238 | | | | | | |
| Malignant neuronal/glioma, neuronal and mixed | 0-14 | 108 | 75.0 | 63.5 | 57.5 | 54.4 | 54.4 | 52.0 |
| | 0-19 | 122 | 75.5 | 65.3 | 58.3 | 54.7 | 52.7 | 50.5 |
| | 20-44 | 63 | 93.8 | 79.4 | 77.8 | 74.1 | 72.2 | 63.1 |
| | 45-54 | 48 | 89.3 | 87.3 | 85.1 | 76.2 | 73.1 | 50.2 |
| | 55-64 | 44 | 89.6 | 68.2 | 66.3 | 64.2 | 64.2 | 53.8 |
| | 65-74 | 15 | c | c | c | c | c | c |
| | 75+ | 15 | c | c | c | c | c | c |
| | Total | 307 | | | | | | |

TABLE 20 (CONTINUED)

| HISTOLOGY | AGE GROUP | # CASES | 1-YR | 2-YR | 3-YR | 4-YR | 5-YR | 10-YR |
|---|------------------|----------------|-------------|-------------|-------------|-------------|-------------|--------------|
| Embryonal/primitive/ medulloblastoma | 0-14 | 919 | 78.9 | 68.4 | 62.6 | 56.7 | 54.0 | 47.2 |
| | 0-19 | 1,013 | 80.0 | 69.8 | 64.0 | 58.0 | 54.8 | 47.6 |
| | 20-44 | 305 | 86.4 | 76.8 | 68.8 | 63.0 | 57.1 | 46.7 |
| | 45-54 | 38 | 81.5 | 76.1 | 76.1 | 73.6 | 63.0 | 45.2 |
| | 55-64 | 16 | c | c | c | c | c | c |
| | 65-74 | 5 | c | c | c | c | c | c |
| | 75+ | 6 | c | c | c | c | c | c |
| | Total | 1,383 | | | | | | |
| Lymphoma | 0-14 | 18 | 56.3 | 48.2 | 40.2 | c | c | c |
| | 0-19 | 35 | 66.7 | 60.1 | 56.8 | 49.7 | c | c |
| | 20-44 | 910 | 22.5 | 16.3 | 14.1 | 12.7 | 11.2 | 9.3 |
| | 45-54 | 365 | 41.9 | 34.2 | 31.1 | 28.4 | 25.7 | 16.1 |
| | 55-64 | 363 | 53.8 | 40.9 | 31.4 | 26.6 | 21.8 | 12.4 |
| | 65-74 | 461 | 44.6 | 29.9 | 22.7 | 18.3 | 15.3 | 8.2 |
| | 75+ | 280 | 33.7 | 20.7 | 15.5 | 12.7 | 11.1 | 2.6 |
| | Total | 2,414 | | | | | | |
| TOTAL: ALL BRAIN AND CNS^{b,d} | 0-14 | 4,541 | 81.0 | 71.4 | 67.3 | 64.3 | 62.9 | 58.8 |
| | 0-19 | 5,628 | 82.2 | 72.9 | 68.8 | 65.9 | 64.3 | 59.9 |
| | 20-44 | 9,403 | 76.2 | 63.4 | 57.0 | 51.9 | 47.6 | 35.7 |
| | 45-54 | 5,636 | 55.8 | 33.7 | 27.3 | 24.2 | 22.5 | 15.4 |
| | 55-64 | 7,146 | 40.2 | 18.7 | 14.1 | 12.1 | 10.6 | 6.9 |
| | 65-74 | 7,443 | 24.3 | 11.1 | 8.6 | 7.3 | 6.5 | 4.0 |
| | 75+ | 4,785 | 14.5 | 7.6 | 6.0 | 5.2 | 4.7 | 3.3 |
| | Total | 40,041 | | | | | | |

^aRates are an estimate of the percentage of patients alive at one, two, three, four, five, and ten years, respectively.

^bIn contrast to survival estimates reported in previous editions of the CBTRUS statistical report, brain lymphomas, olfactory tumors of the nasal cavity, and malignant tumors of the pituitary and pineal glands are included.

^cToo few cases to estimate.

^dIncludes histologies not listed in this table.

Abbreviations: SEER, Surveillance, Epidemiology, and End Results; NOS, not otherwise specified.

PROCEDURE FOR REQUESTING ADDITIONAL DATA

CBTRUS serves as a resource for gathering and disseminating current epidemiological data on all primary brain tumors. CBTRUS data are available to assist in research projects that intend to describe incidence and survival patterns of brain tumor cases, to evaluate diagnosis and treatment, and to conduct etiologic studies.

The CBTRUS incidence database consists of epidemiologic data on all brain tumors, malignant and non-malignant, consolidated from fifteen population-based cancer registries. These data include cases newly diagnosed between 1997 and 2001 with ICDO codes C70.0–C70.9, C71.0–C71.9, C72.0–C72.9, C75.1– C75.3, and C30.0 (9522-9523). In addition, CBTRUS will assist in accessing mortality, survival and treatment information using other databases.

This Report (1997-2001 data), including tables of descriptive brain tumor statistics, is available on the world-wide web at <http://www.cbtrus.org>.

To obtain more information regarding CBTRUS and related databases, please contact the Central Brain Tumor Registry of the United States. To obtain additional data, please complete the application form on the following page.

DATA REQUEST FORM

CENTRAL BRAIN TUMOR REGISTRY OF THE UNITED STATES
APPLICATION FOR DATA ACCESS

1. TITLE OF PROJECT:

2. PRINCIPAL INVESTIGATOR/ PROGRAM DIRECTOR: (Attach Current Resume)
NAME DEGREE(S) SSN

3. POSITION TITLE:

4. DEPARTMENT, SERVICE, LABORATORY OR EQUIVALENT:

5. TELEPHONE: FAX:

6. E-MAIL ADDRESS:

7. NAME AND ADDRESS OF APPLICANT ORGANIZATION:

8. TYPE OF ORGANIZATION (circle one):

PUBLIC PRIVATE NOT-FOR-PROFIT FOR PROFIT

9. SOURCE OF FUNDING (if different from #7 above):

10. PROJECT DESCRIPTION: State the applicant's broad, long-term objectives and specific aims. Describe concisely the research design and methods for achieving these goals. (Attach additional pages if necessary.)

11. DATES OF ENTIRE PROPOSED PROJECT:

FROM: TO:

12. PERFORMANCE SITES: (ORGANIZATIONS AND ADDRESSES)

13. FORMAT OF DATA: (Diskette; Computer printout; Other, Specify)

14. SIGNATURE OF PRINCIPAL INVESTIGATOR:



PUBLISHED

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NOTES

THE CENTRAL BRAIN TUMOR REGISTRY OF THE US (CBTRUS)



- CBTRUS is a not-for-profit 501(C)3 corporation committed to collecting and disseminating high quality incidence and survival data on all primary brain tumors.
- CBTRUS analyzes the largest aggregation of databases on primary brain tumors from population-based registries in the United States participating in the *Surveillance, Epidemiology, and End Results* (SEER) program of the *National Cancer Institute* and the *National Program of Cancer Registries* (NPCR) of the *Centers for Disease Control*.
- CBTRUS serves as consultant on brain tumor data classification, coding and collection to national and international organizations including the *International Agency for Research on Cancer* of the *World Health Organization* and the *National Coordinating Council for Cancer Surveillance* in the United States.
- CBTRUS analyzes and disseminates brain tumor information from the *National Cancer Data Base* (NCDB) of the *American College of Surgeons Commission on Cancer* with their permission.
- CBTRUS provides a resource for the neuroscience community that does not exist elsewhere and is recognized by the Joint Section on Tumors of the *Congress of Neurological Surgeons / American Association of Neurological Surgeons*.
- CBTRUS is guided by experts in the field of brain tumor research.
- CBTRUS presents data in histologic groupings with improved clinical relevance that were previously unavailable.
- CBTRUS conducts specialized data analysis in response to specific questions.
- CBTRUS investigates patterns of brain tumor incidence including trends over time and patterns by geographical area.
- CBTRUS can assist in planning studies of brain tumors by providing:
 - sources of collaboration to obtain cases for case control studies
 - sources of collaboration for rare tumor studies
 - estimates of expected cases
- CBTRUS provides an incidence standard against which other data can be compared, including
 - hospital case series
 - physician/physician group case series
 - cluster investigations
- CBTRUS encourages all cancer registries to collect data on all primary brain tumors.
- CBTRUS promotes awareness of the disease of brain tumors through presentation of descriptive statistics.



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*Additional copies of this report can be obtained by contacting
the Central Brain Tumor Registry of the United States.*