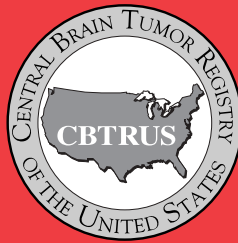


# CBTRUS

CENTRAL BRAIN TUMOR REGISTRY OF THE UNITED STATES



2002-2003

PRIMARY BRAIN TUMORS IN THE UNITED STATES

STATISTICAL REPORT

1995-1999

*Years Data Collected*

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## 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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## ACKNOWLEDGMENTS

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The CBTRUS data presented in this report are provided through the efforts of the following collaborators and their staff:

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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, the North American Association of Central Cancer Registries (NAACCR), the International Agency for Research on Cancer (IARC), and the International Classification of Diseases for Oncology 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

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*As this publication went to press, I learned that the House of Representatives had passed the Benign Brain Tumor Registry Act. After a rather visceral reaction, I thought of all the individuals and organizations that worked so hard to make the collection of benign brain tumors part of routine cancer surveillance in our country. Since this has been one of the founding objectives of CBTRUS, my message is one filled with thank-yous.*

*On behalf of the Board of Directors, I would like to thank the collaborating state cancer registries for providing data for this and for previous reports. Their efforts demonstrated that the collection of population-based incidence data on benign brain tumors is feasible. Three of these registries are our original collaborators: Connecticut, Massachusetts and Utah, and deserve special mention. They are the original CBTRUS. Teasing apart the chicken and the egg of CBTRUS is very difficult. Certainly, the data and the funding fall into this category. Almost one hundred percent of the early funding for CBTRUS came from the Pediatric Brain Tumor Foundation of the United States. We thank them for their sustained commitment. We also thank the American Brain Tumor Association for inspiring the idea for collecting data on benign brain tumors, for guiding the founding of CBTRUS, and for its funding commitment. These two organizations are the other “originals”.*



*It has been ten years since the time of our “originals”. CBTRUS celebrated its tenth anniversary on July 28, 2002. Our collaborators have increased in number, and our funds have grown. Our role in the brain tumor community has brought us additional responsibilities and many new friends and colleagues. I wish that I could single out every organization and individual in this message of thanks.*

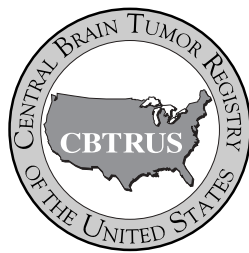
*Together with our research team at the University of Illinois at Chicago we will continue to help the cancer registry organizations implement the collection of data on benign brain tumors. We will continue to provide incidence data on all primary brain tumors in our publications and on our website until this is achieved. We look forward to using this transition time to reposition CBTRUS for its future role in the surveillance and research community. It is, indeed, a very exciting time for CBTRUS.*

*Carol Kruchko*

*Carol Kruchko  
President, CBTRUS*

# CBTRUS

CENTRAL BRAIN TUMOR REGISTRY OF THE UNITED STATES



2002-2003

PRIMARY BRAIN TUMORS IN THE UNITED STATES

1995-1999

*YEARS DATA COLLECTED*

- ◆ *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 include primary malignant tumors of the brain and central nervous system, excluding lymphomas and leukemias.*
  - ◆ *ACS (American Cancer Society) estimated new cases and deaths include primary malignant tumors of the brain and central nervous system, excluding lymphomas and leukemias.*
  - ◆ *IARC (International Agency for Research on Cancer) worldwide incidence rates include primary malignant tumors of the brain and central nervous system, excluding lymphomas and leukemias. Global rates are age-adjusted using the world standard population.*
- 

### Incidence

- CBTRUS: The incidence rate of all primary benign and malignant brain tumors is 14.0 cases per 100,000 person-years (5.7 per 100,000 person-years for benign tumors and 7.7 per 100,000 person-years for malignant tumors). The rate is higher in males (14.2 per 100,000 person-years) than females (13.9 per 100,000 person-years).<sup>1a</sup>
- CBTRUS: An estimated 39,550 new cases of primary benign and malignant brain tumors are expected to be diagnosed in 2002.<sup>1b</sup>
- SEER: The incidence rate of primary malignant brain tumors is 6.4 cases per 100,000 person-years. This rate is higher in males (7.6 per 100,000 person-years) than females (5.4 per 100,000 person-years).<sup>2a</sup>
- ACS: An estimated 17,000 new cases of primary malignant brain tumors are expected to be diagnosed in 2002 (9,600 in males and 7,400 in females). This represents 1.32% of all cancers expected to be diagnosed in 2002.<sup>3</sup>
- IARC: The worldwide incidence rate of primary malignant brain 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).<sup>4</sup>

### Pediatric Incidence (Ages 0-19)

- CBTRUS: The incidence rate of childhood primary benign and malignant brain tumors is 3.9 cases per 100,000 person-years. The rate is higher in males (4.1 per 100,000 person-years) than females (3.8 per 100,000 person-years).<sup>1a</sup>
- CBTRUS: An estimated 3,110 new cases of childhood primary benign and malignant brain tumors are expected to be diagnosed in 2002.<sup>1b</sup> Of these 3,110 new cases, an estimated 2,330 will be in children less than 15 years of age.<sup>1b</sup>

### Mortality

- ACS: An estimated 13,100 deaths in 2002 will be attributed to primary malignant brain tumors.<sup>3</sup>

**Lifetime Risk**

- SEER: Males have a 0.66% lifetime risk of being diagnosed with a primary malignant brain tumor and a 0.50% chance of dying from a brain tumor.<sup>2b</sup>
- SEER: Females have a 0.54% lifetime risk of being diagnosed with a primary malignant brain tumor and a 0.41% chance of dying from a brain tumor.<sup>2b</sup>

**Survival**

- SEER: The five-year relative survival rate following diagnosis of a primary malignant brain tumor (excluding lymphoma) is 32.7% for males and 31.6% for females.<sup>2c</sup>
- SEER: Five-year relative survival rates following diagnosis of a primary malignant brain tumor by age of diagnosis (1973-1999 data):<sup>5</sup>

Age 0-19 years:	63.1%	Age 45-64 years:	14.2%
Age 20-44 years:	50.4%	Age 65 or older:	4.9%

**Prevalence**

- CBTRUS: The prevalence rate for all primary brain tumors is 130.8 per 100,000. It is estimated that more than 359,000 persons were living with a diagnosis of primary brain tumor in the United States in 2000. The prevalence rate for primary malignant brain tumors is 29.5 per 100,000 and for primary benign brain tumors is 97.5 per 100,000. It is 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 tumor and primary benign brain tumor, respectively.<sup>6</sup>
- CBTRUS: The prevalence rate for all pediatric (ages 0-19) primary brain tumors is 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 tumors is 7.9 per 100,000 with more than 21,000 children estimated to be living with a diagnosis of primary malignant brain tumor in the United States in 2000.<sup>6</sup>

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1a. Central Brain Tumor Registry of the United States data, 1995-1999.

1b. CBTRUS 1995-1999 data. United States population estimates by 5-year age group were obtained from United States census estimates available at [www.census.gov](http://www.census.gov). Projections were from the middle series for July 1, 2002 with a total United States population of 280,306,000. (Internet release date: 01/13/2002). 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, Edwards BK (eds.) *Seer Cancer Statistics Review, 1973-1999*: National Cancer Institute, Bethesda, MD, 2002.  
2a. Tables I(4) 1995-1999 data; 2b: Table III(8) 1997-1999 data; 2c: Table I(4) 1992-1998 data.

3. *Cancer Facts & Figures 2002*. American Cancer Society, Inc., Surveillance Research, Atlanta, Georgia, 2002.

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 (1973-1999). National Cancer Institute, DCPC, Surveillance Program, Cancer Statistics Branch, issued April 2002, based on the November 2001 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

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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 benign and malignant primary brain tumors. This current report includes data from 16 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) 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 encourages all surveillance registries to expand their primary brain tumor data collection to include tumors of benign and uncertain behavior and 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 1995-1999 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.*

### 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 is 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.<sup>1,2,3</sup> 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 and gender are also reported.

The variability around the estimates of incidence rates is reflected in the STANDARD ERROR.

*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 incident case defined? Are all primary malignant and non-malignant tumors included in the analysis? Or 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

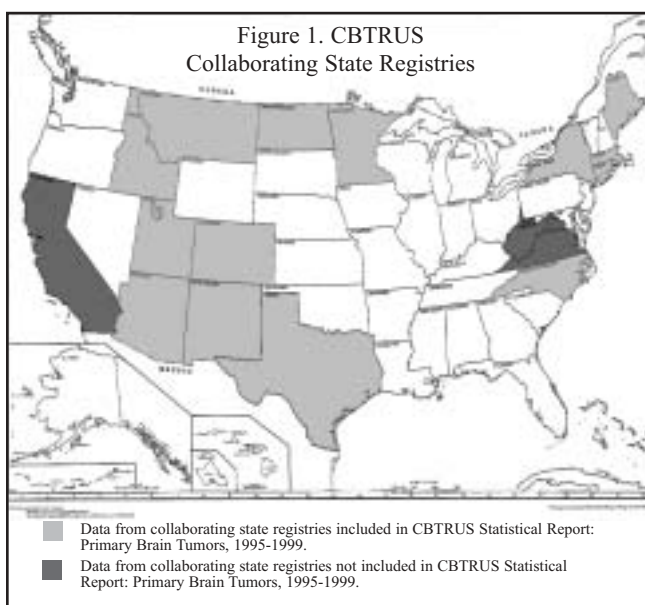
#### **Data Collection**

CBTRUS obtained incidence data from sixteen collaborating state cancer registries that include cases of non-malignant (benign) and malignant primary brain tumors. Data were requested from each registry on all cases newly diagnosed between 1995 and 1999 with a primary brain 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-

## BRAIN TUMOR STATISTICS REPORT AND FIGURES

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)].<sup>4</sup> Data were received without 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.<sup>5</sup>

Twelve states provided incidence data for the entire five-year period (Figure 1). New Mexico and Rhode Island began collecting data on non-malignant tumors in 1996 and 1998, respectively. Texas provided data on malignant and non-malignant tumors for 1995-1998. North Dakota provided data on malignant tumors only for 1997-1999.



Data were edited using a modified metafile from the EDITS<sup>6</sup> program that generates warnings when illogical or impossible site, morphology, and/or behavior combinations were reported. When possible, queries were 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.<sup>7</sup> The list of ICDO-morphology codes included in each group is presented in Table 1. The classification scheme has been updated to include

morphology codes that were not previously reported to CBTRUS.<sup>8</sup> The CBTRUS classification scheme has also been updated to reflect any changes in the grouping of histology codes within the major histology categories as compared to the previous CBTRUS classification scheme.<sup>8</sup> 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 previous CBTRUS statistical reports. 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 based on the categories and site codes defined in the SEER Site/Histology Validation List.<sup>9</sup> The category designated as the brain, cranial nerves, and spinal cord (excluding the ventricle and cerebellum) includes the cerebrum, frontal lobe, temporal lobe, parietal lobe, occipital lobe, brain stem, overlapping lesion of the brain, and brain not otherwise specified (NOS) (ICDO site codes C71.0 - C71.4, C71.7-C71.9), the cranial nerves (C72.2-C72.5), the cauda equina (C72.1), and the spinal cord (C72.0). Ventricle (C71.5) and cerebellum (C71.6) are each grouped independently. The meninges (C70.0 - C70.9) include the cerebral meninges and spinal meninges. 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. Pituitary tumors (C75.1-C75.2) include tumors located in the pituitary gland and craniopharyngeal duct. Pineal tumors (C75.3) include tumors located in the pineal gland. In this report, tumors located in the nasal cavity (C30.0) are olfactory tumors (defined by ICDO-2 morphology codes 9522-9523).

### **Estimation of Incidence and Mortality Rates**

Incidence rates were generated using SAS, a computer based statistical analysis system.<sup>10</sup> Overall rates for benign and malignant tumors and rates for selected histology groupings by gender, race, and age were estimated using data from the twelve regions that provided five years of data, 1995-1999. Overall rates for benign and malignant tumors and rates for selected histology groupings by Hispanic origin were estimated using data from the fifteen regions that provided data for the year 1998. Age-adjusted rates based on five-year age group-

ings were standardized to the Year 2000 U.S. standard population. Populations for the CBTRUS regions, 12 states combined and 15 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 1995-1999 were obtained from the most current Cancer Incidence in North America (CINA) Publication on the NAACCR website.<sup>11</sup> 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).<sup>11,12</sup> 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). *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.<sup>13</sup> 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.<sup>13,14</sup> Standardization of brain tumor reporting will aid in distinguishing differences in reporting practices from true variation in the incidence of brain tumors between states. These issues are recognized by CBTRUS and by the National Coordinating Council for Cancer Surveillance and are actively being 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 1995-1999 data). Population data (projections) for each state were obtained from the U.S. Census Bureau website.<sup>15</sup>

Estimated number of deaths for malignant tumors were obtained from the American Cancer Society publication, *Cancer Facts & Figures 2002*. Their source for the data was the U.S. Mortality Public Use Data Tapes, 1960-1999, from the National Center for Health Statistics.<sup>16</sup>

### ***Estimation of Survival Rates***

The SEER\*Stat 4.2 statistical software was used to estimate one-, two-, five- and ten-year observed and relative survival rates for primary malignant brain tumor cases diagnosed between 1973-1999.<sup>17</sup> This program utilizes life-table (actuarial) methods to compute survival estimates and accounts for current follow-up. The SEER grouping for brain and other nervous system cancer included ICDO-site codes C70.0-C72.9. Lymphomas and leukemias (morphology codes 9590-9989) were excluded from all brain and central nervous system sites; meningiomas (morphology codes 9530-9539) were excluded from all brain sites. Survival estimates for pituitary tumors, pineal tumors, and olfactory tumors of the nasal cavity were determined using the following site codes: C75.1-C75.2, C75.3, and C30.0 (morphology codes 9522-9523), respectively. Second or later primary tumors, cases diagnosed at autopsy, cases in which race is other or unknown, and cases known to be alive but for whom follow-up time could not be calculated were excluded from the SEER 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 48,000 tumors were reported to CBTRUS from a combined population of 76.9 million that represents approximately 29% of the U.S. population. The overall percent of benign tumors varied considerably by state (range: 23-56%). Eighty-two percent of all tumors had a histologically confirmed diagnosis, with substantial regional variation (state range: 71-97%).

Among the reported brain tumors in Table 5, males accounted for 47% of the cases and females for 53% of the cases. Eight percent of the cases were in individuals less than 20 years of age at the time of diagnosis and 92% were in individuals 20 years of age or older at the time of the diagnosis. Caucasians accounted for 89% of the cases and African-Americans accounted for 7% of the cases. Eight percent of the cases were in individuals of Hispanic origin and 87% were in individuals not of Hispanic origin.

*Overall Incidence*

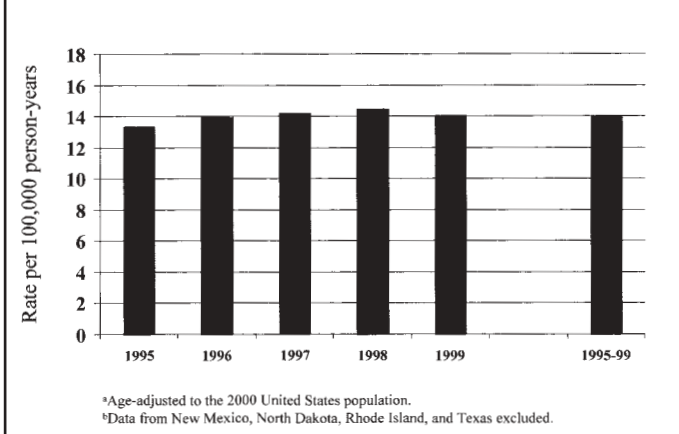
The inclusion of state data in the incidence rates in this report (except for the incidence rates by Hispanic origin) was limited to those registries who provided data for all five years, 1995-1999. Twelve states (Arizona, Colorado, Connecticut, Delaware, Idaho, Maine, Massachusetts, Minnesota, Montana, New York, North Carolina, and Utah) met this criterion. Among those states, almost 38,000

tumors were reported. The overall incidence rate for primary brain and central nervous system tumors was 14.0 per 100,000 person-years adjusted with the year 2000 standard (Table 6). The overall incidence rate was 3.9 per 100,000 person-years for children 0-19 years of age (4.0 per 100,000 person-years for children less than 15 years) and 18.1 per 100,000 person-years for adults (20+ years). The overall incidence rate of tumors by behavior and age group (0-19 years and 20+ years) is shown in Figure 2.

*Overall Incidence Rates by Year*

The overall incidence rates by calendar year varied slightly from 1995 through 1999 (Figure 3). The overall

**Figure 3. Average Annual Age-Adjusted Incidence Rates<sup>a</sup> of Primary Brain and CNS Tumors by Year CBTRUS 1995-1999<sup>b</sup>**

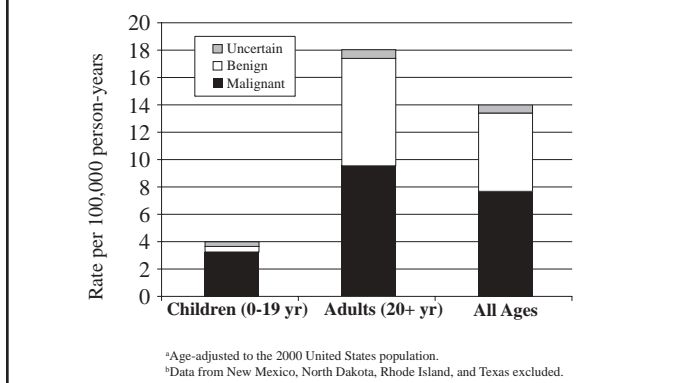


incidence rates were as follows: 13.4 per 100,000 person-years in 1995; 14.0 per 100,000 person-years in 1996; 14.2 per 100,000 person-years in 1997; 14.5 per 100,000 person-years in 1998; and 14.0 per 100,000 person-years in 1999. However, these differences in rates between years were not statistically 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*

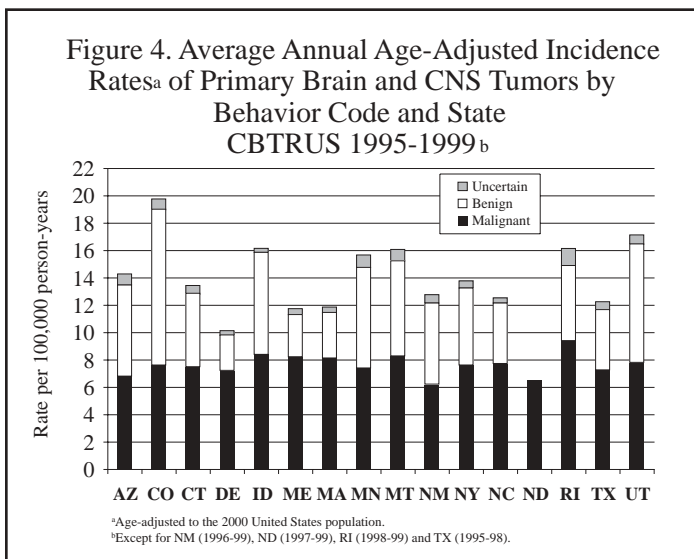
The overall average annual incidence rate by state, age, and behavior are displayed in Table 6. The total state incidence rates of all primary brain tumors (malignant and non-malignant) ranged from 10.2 to 19.9 per 100,000 person-years. The state incidence rates of all primary non-malignant brain tumors ranged from 2.9 to 12.2 per 100,000 person-years and the state incidence rates of all primary malignant brain tumors ranged from 6.3

**Figure 2. Average Annual Age-Adjusted Incidence Rates<sup>a</sup> of Primary Brain and CNS Tumors by Age and Behavior Code CBTRUS 1995-1999<sup>b</sup>**



to 9.5 per 100,000 person-years. The state-specific incidence rates for non-malignant tumors ranged from 3.9 to 16.6 per 100,000 person-years among adults 20 years of age and older and from 0.2 to 2.3 per 100,000 person-years among children less than 20 years of age. The state-specific incidence rates for malignant tumors ranged from 7.9 to 11.7 per 100,000 person-years among adults 20 years of age and older and from 2.5 to 3.8 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 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. 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.



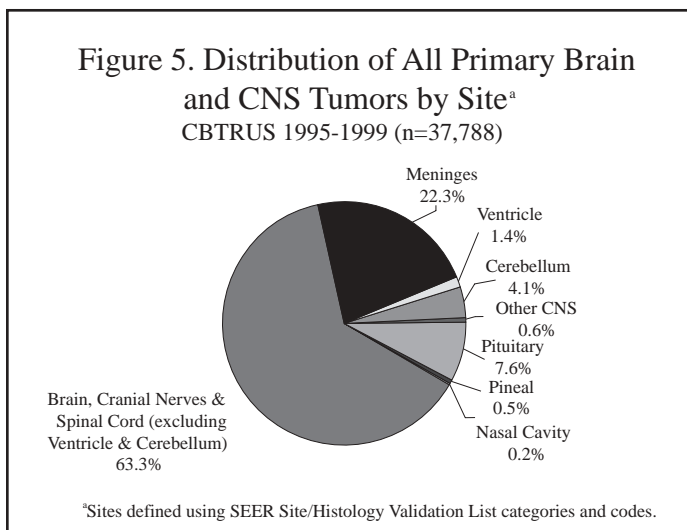
in children, the lower variability in incidence suggests reporting differences in benign tumors may be driving the variability in incidence rates between states in the adults. The small magnitude of tumors in children for several of the states listed in Table 6 may produce unstable rates, and thus it is prudent to use caution when interpreting and comparing these numbers.

The incidence rates by tumor behavior and state are illustrated in Figure 4. The state rates for the malignant tumors (state range: 6.3 to 9.4 per 100,000 person-years) are much less variable than the reported rates for the benign tumors (state range: 2.6 to 11.3 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

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

#### *Distribution of Tumors*

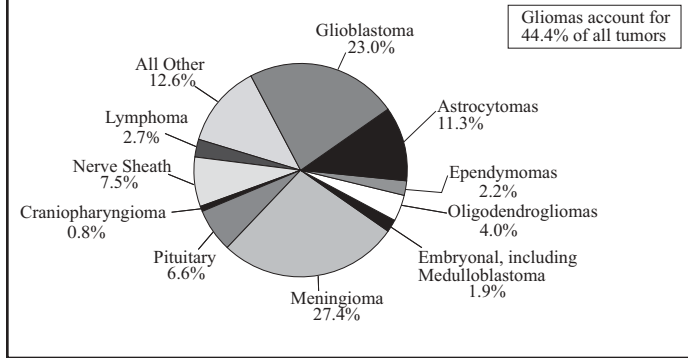
The distribution of tumors by site is shown in Figure 5. The majority of tumors (63%) are located within the brain, cranial nerves, and spinal cord (excluding the ventricle and cerebellum). (Brain stem tumors account for 2% of all tumors.) Tumors of the meninges represent 22% of all tumors reported to CBTRUS. Tumors of the ventricle, cerebellum and other central nervous system tumors account for 6% of tumors. The pituitary and pineal glands account for about 8% of tumors. Olfactory tumors of the nasal cavity account for less than 1% of tumors reported to



## BRAIN TUMOR STATISTICS REPORT AND FIGURES

Figure 6. Distribution of All Primary Brain and CNS Tumors by Histology

CBTRUS 1995-1999 (n=37,788)



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 27% of all tumors, followed closely by glioblastomas and astrocytomas. The predominately benign nerve sheath tumors and pituitary tumors account for

tomas account for more than three-quarters of gliomas.

### Incidence Rates by Site

Incidence rates by site are provided in Table 7. Rates were highest for tumors located in the brain (excluding ventricle and cerebellum), cranial nerves, and spinal cord (8.9 per 100,000 person-years), followed by tumors located in the meninges, pituitary, cerebellum, ventricle, other nervous system, and pineal gland. Rates were lowest for olfactory tumors of the nasal cavity (less 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 rates than females for all other sites.

### Median Age at Diagnosis

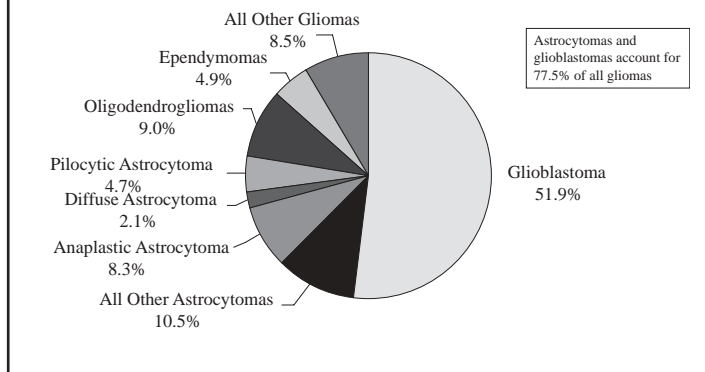
The median age of diagnosis for all primary brain tumors is 57 years (Table 8). The histology-specific median ages range from 10 to 71 years. Pilocytic astrocytomas, medulloblastomas, and germ cell tumors have a median age of onset under 20 years of age. Meningiomas and glioblastomas are primarily diagnosed at older ages. Unclassified tumors had a median age of 70 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 groupings, rates were highest for tumors of the neuroepithelial tissue (6.7 per 100,000 person-years), followed by tumors of the meninges (4.0 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 (1.0 per 100,000 person-years) (Table 8).

Figure 7. Distribution of All Primary Brain and CNS Gliomas by Histology Subtypes

CBTRUS 1995-1999 (n=16,780)



8% and 7% of all tumors, respectively.

Gliomas are tumors that arise from glial cells, and include astrocytomas, glioblastomas, oligodendrogliomas, ependymomas, mixed gliomas, malignant gliomas NOS, and neuroepithelial tumors. The broad category glioma represented 44% of all tumors (Figure 6). The distribution by specific histology for gliomas is illustrated in Figure 7. Glioblastomas account for the majority of gliomas, while astrocytomas and glioblas-

Incidence rates varied by specific histology (Table 8). Rates were highest for meningiomas (3.9 per 100,000 person-years), glioblastomas (3.2 per 100,000 person-years), nerve sheath tumors (1.1 per 100,000 person-years), and pituitary tumors (0.9 per 100,000 person-years).

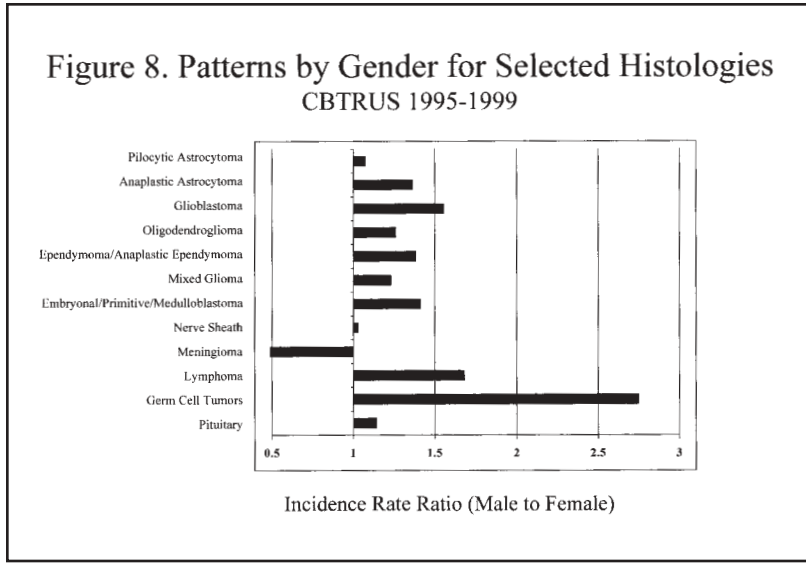
The incidence rate of gliomas was 6.2 per 100,000 person-years, a major contributor to the magnitude of the neuroepithelial tissue rate.

*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 males (14.2 per 100,000 person-years) than females (13.9 per 100,000 person-years).

more than two times greater in whites than in blacks. In contrast, meningiomas and lymphomas are as common in blacks as in whites. Rates for pituitary tumors are slightly higher among blacks (1.2 per 100,000 person-years) than whites (0.9 per 100,000 person-years).

Incidence rate ratios (white:black) for selected histologies are shown in Figure 9.



*Incidence Rates by Hispanic Origin (1998)*

The incidence rates by Hispanic origin are based on data from 15 states that provided data for the year 1998. These fifteen states include Arizona, Colorado, Connecticut, Delaware, Idaho, Maine, Massachusetts, Minnesota, Montana, New Mexico, New York, North Carolina, Rhode Island, Texas, and Utah. Of the 10,485 cases reported, 940 cases (9 percent) were in persons of Hispanic origin, as recorded in the cancer registries. The

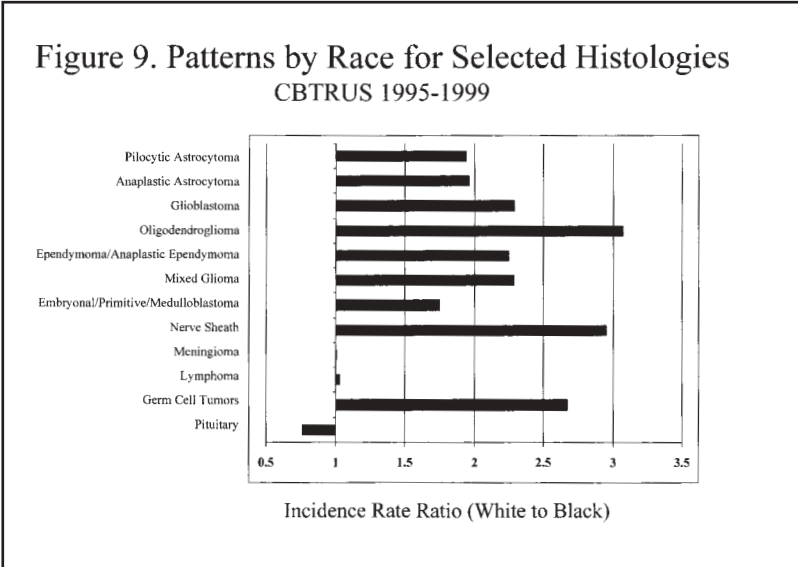
Rates for tumors of the neuroepithelial tissue are almost 1.5 times greater in males as compared to females, while tumors of the meninges are almost two times greater in females as compared to males. The incidence rate of gliomas is higher in males (7.5 per 100,000 person-years) than in females (5.2 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, 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 8.

number of cases of Hispanic ethnicity may be underestimated, as ethnicity may not be recorded in the medical records.

The overall incidence rate for primary brain and central nervous system tumors among Hispanics is 10.8 per 100,000 person-years (Table 11).

*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 (14.3 per 100,000 person-years) than blacks (9.9 per 100,000 person-years). Rates for most histologies are higher in whites or comparable between whites and blacks. Rates for glioblastomas, ependymomas, mixed gliomas, nerve sheath tumors, and germ cell tumors are



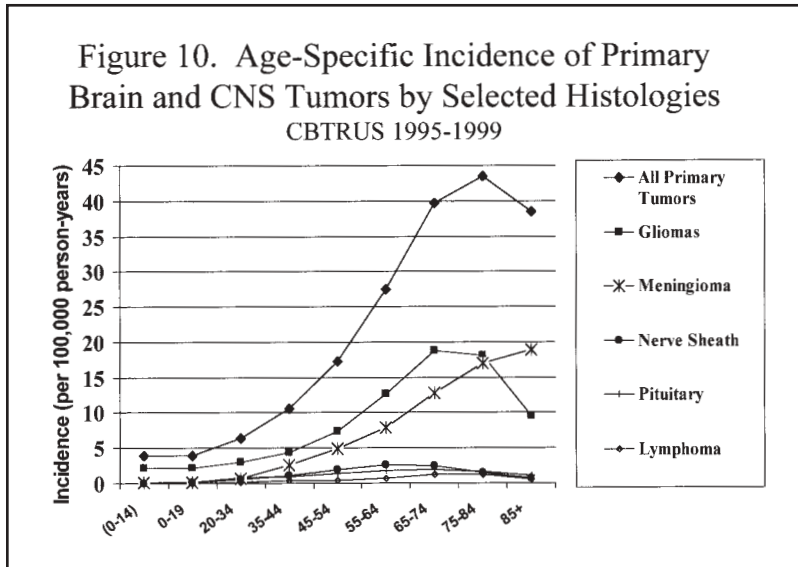
*Incidence Rates by Age*

The age-specific rates by histology are presented in

## BRAIN TUMOR STATISTICS REPORT AND FIGURES

Table 12. The incidence for all brain tumors is highest among the 75-84 year olds (43.6 per 100,000 person-years) and lowest among children less than 20 years

The distribution of tumors by site is shown in Figure 11. The majority of childhood tumors (ages 0-19 years) (63%) are located within the brain, cranial nerves, and spinal cord (excluding the ventricle and cerebellum).



(3.9 per 100,000 person-years). However, different histologies have different age distributions as shown in Table 12. 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 10. 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, leukemia being the most common.<sup>18</sup> Brain tumors are the most common form of solid tumor in children.<sup>18</sup> About 8% of the tumors reported to CBTRUS occurred in people under the age of 20 years.

#### Distribution of Tumors

The distribution of tumors by site is shown in Figure 11. The majority of childhood tumors (ages 0-19 years) (63%) are located within the brain, cranial nerves, and spinal cord (excluding the ventricle and cerebellum). Brain stem tumors account for 13% of all childhood tumors. Tumors of the meninges represent 3% of all childhood tumors reported to CBTRUS. Tumors of the cerebellum represent 18% of childhood tumors. Tumors of the ventricle and other central nervous system tumors account for 6% of childhood tumors. The pituitary and pineal glands account for about 10% of childhood tumors. Olfactory tumors of the nasal cavity 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 20% and 19%, respectively, of all brain tumors in children in this age group (Figure 12). The broad category glioma accounts for 57% 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 12% and 10%, respectively, of all brain tumors in that age group (Figure 12). The broad category glioma accounts for 46% of tumors in adolescents ages 15-19 years.

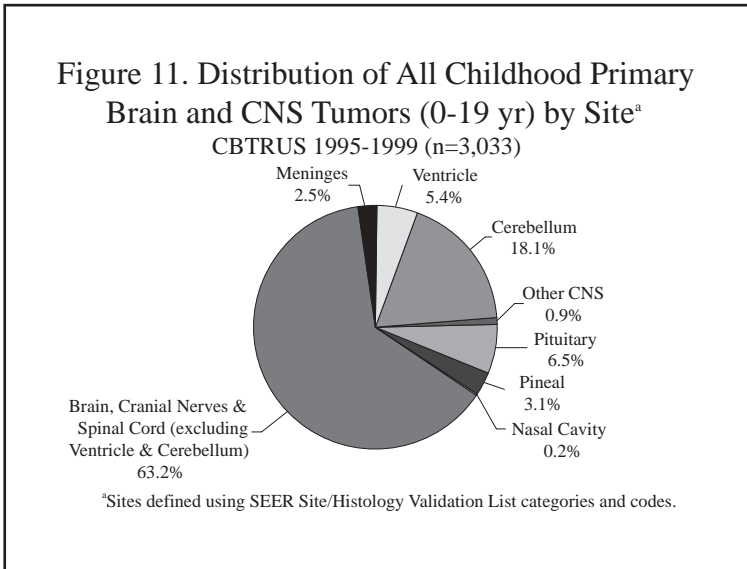
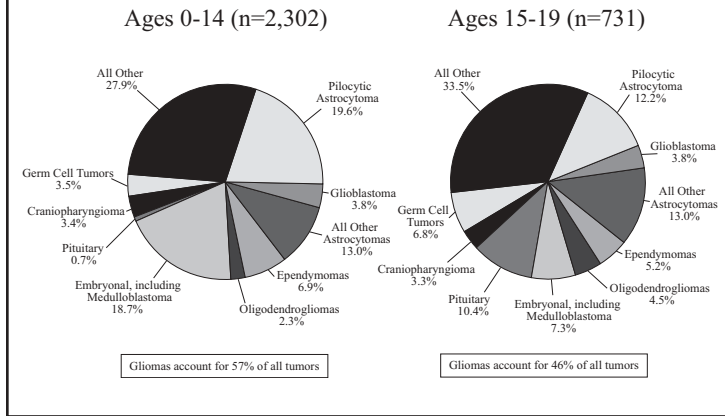


Figure 12. Distribution of Pediatric Primary Brain and CNS Tumors by Histology

CBTRUS 1995-1999



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 (4.2 per 100,000 person-years) and lowest among 10-14 year olds (3.7 per 100,000 person-years). However, the different histologies have different age distributions as shown in Table 15. The incidence of ependymomas 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 13. The histologic-specific differences in brain and central nervous system tumor distribution by age, gender, and

Overall Childhood Incidence Rates by Histology and Gender

race suggest that these childhood tumors have different causes.

The incidence of the most common childhood tumors is shown in Table 13. The overall incidence rate for childhood brain tumors (ages 0-19 years) is 3.9 per 100,000 person-years. Among major histology groupings, rates were highest for tumors of the neuroepithelial tissue (3.0 per 100,000 person-years). Pilocytic astrocytoma (0.7 per 100,000 person-years) and medulloblastoma (0.6 per 100,000 person-years) are the most common individual histologies.

Among the younger population, brain tumors are slightly more common in boys, with tumors of the neuroepithelial slightly more common and germ cell tumors more than 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. The small numbers of cases for some tumors require caution when interpreting and comparing rates.

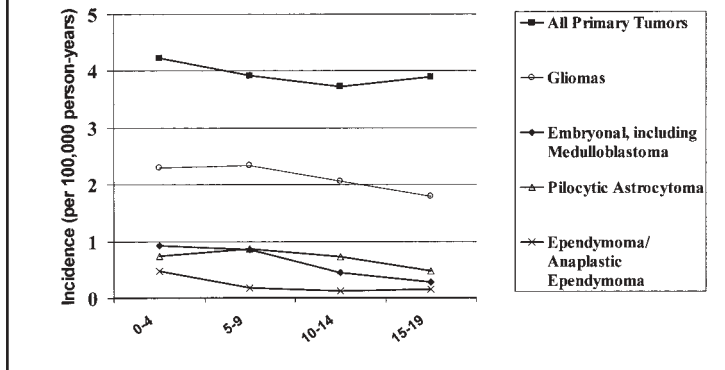
Childhood Incidence Rates by Race and Gender

Among the younger population (ages 0-19 years) brain tumors are slightly more common in whites (4.1 per 100,000 person-years) than in blacks (2.8 per 100,000 person-years) (Table 14). Among both whites and blacks, the rates among boys are slightly higher than the rates among girls (Table 14). 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

Figure 13. Age-Specific Incidence of Childhood Primary Brain and CNS Tumors by Selected Histologies

CBTRUS 1995-1999



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.<sup>19</sup> 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%).

## BRAIN TUMOR STATISTICS REPORT AND FIGURES

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 (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 ependymoma, 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 publication<sup>11</sup> and are shown in Table 16. These rates are adjusted using the 2000 U.S. standard population. The 1995-1999 mortality rates by gender are available for all 50 states. Incidence rates for malignant brain tumors were available for most states from the same time period with a few exceptions.

#### *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 2002 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 (1995-1999) 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 2002 is estimated to be 39,550. The total number of new cases of primary malignant brain tumors for all 50

states and the District of Columbia in 2002 is estimated to be 21,670.

#### *Estimated Numbers of Deaths for Malignant Brain Tumors by State*

The estimated numbers of deaths for primary malignant brain tumors by state for 2002 are shown in Table 17. The estimated number of deaths for malignant tumors were obtained from the American Cancer Society publication, Cancer Facts & Figures 2002.<sup>16</sup> Their source for the data was the U.S. Mortality Public Use Data Tapes, 1960-1999, 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 2002 is estimated to be 13,100.

#### *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. Survival is poorest for tumors located in the brain, cranial nerves, and spinal cord (excluding ventricle and cerebellum). Patients with tumors in the pituitary and pineal glands, nasal cavity, and cerebellum have five-year survival rates greater than 63%. 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 better five-year survival for tumors of the pituitary 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-, two-, five-, and ten-year observed and relative survival rates by histology are shown in Table 19. The estimated five- and ten-year relative survival rates for malignant brain tumors are 28% and 24% respectively. However, there is a large variation in survival estimates between tumor histologies (Table 19). Five-year survival rates exceed 85% for pilocytic astrocytomas but are less than 5% 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 27% of tumors reported to

CBTRUS (Table 8). Over 90% of meningiomas reported to CBTRUS had a benign behavior code. Meningiomas are more common in older adults (median age at diagnosis is 65 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 almost 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%.<sup>20</sup> 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%.<sup>20</sup>

Glioblastomas (GBMs) are the second most frequently reported histology and the most common malignancy. They account for 23% of all primary brain tumors (Table 8). Glioblastomas are more common in older adults (median age at diagnosis is 65 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 65 to 74 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 observed survival estimates for glioblastoma are quite low; less than 3% 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 (1995-1999) of the incidence of all primary 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. CBTRUS encourages all cancer registries to include the collection of non-malignant primary brain tumors.

# BRAIN TUMOR STATISTICS REPORT AND FIGURES

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- <sup>19</sup>Jukich PJ, McCarthy BJ, Surawicz TS, Freels S, Davis FG. Trends in incidence of primary brain tumors in the United States, 1985-1994. *Neuro-Oncology*. 3(3):141-151, 2001. (Posted to *Neuro-Oncology* [serial online], Doc. 00-055, June 5, 2001. URL <[neuro-oncology.mc.duke.edu](http://neuro-oncology.mc.duke.edu)>)
- <sup>20</sup>McCarthy BJ, Davis FG, Freels S, Surawicz TS, Damek DM, Grutsch J, Menck HR, Laws ER Jr. Factors associated with survival in patients with meningioma. *Journal of Neurosurgery*. 88(5):831-839, 1998.

**TABLE 1: CBTRUS BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR HISTOLOGY GROUPINGS, 2002 REVISION**

<b>HISTOLOGY</b>	<b>ICDO-2<sup>a</sup> HISTOLOGY CODE</b>
<b><u>TUMORS OF NEUROEPITHELIAL TISSUE</u></b>	
Pilocytic astrocytoma	9421, 9422
Diffuse astrocytoma (protoplasmic, fibrillary)	9410, 9420
Anaplastic astrocytoma	9401, 9411
Unique astrocytoma variants	9383, 9384, 9424
Astrocytoma, NOS	9400
Glioblastoma	9440, 9441, 9442, 9481 <sup>b</sup>
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, 9443 <sup>b</sup>
Benign and malignant neuronal/glial, neuronal and mixed	8680, 8681, 8682, 8690, 8693, 9490, 9491, 9500, 9505, 9506, 9522, 9523
Pineal parenchymal	9360, 9361, 9362
Embryonal/primitive/medulloblastoma	8963, 9363, 9364, 9470, 9471, 9472, 9473, 9501, 9502, 9503
<b><u>TUMORS OF CRANIAL AND SPINAL NERVES</u></b>	
Nerve sheath, benign and malignant	9540, 9541, 9550, 9560, 9561, 9570
Other tumors of cranial and spinal nerves	9562
<b><u>TUMORS OF THE MENINGES</u></b>	
Meningioma	9530, 9531, 9532, 9533, 9534, 9537, 9538, 9539 <sup>b</sup>
Other mesenchymal, benign and malignant	8324, 8800, 8801, 8802, 8803, 8804, 8810, 8824, 8830, 8850, 8851, 8857, 8861, 8890, 8897, 8900, 8910, 8920, 8990, 9040, 9150, 9180, 9210, 9241, 9260, 9480, 9536
Hemangioblastoma	9161, 9535
<b><u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u></b>	
Lymphoma	9590, 9591, 9592, 9593, 9594, 9595, 9650, 9652, 9653, 9654, 9655, 9659, 9661, 9662, 9663, 9664, 9665, 9667, 9670, 9671, 9672, 9673, 9674, 9675, 9676, 9677, 9680, 9681, 9682, 9683, 9684, 9685, 9686, 9687, 9690, 9691, 9692, 9693, 9694, 9695, 9696, 9698, 9701, 9702, 9705, 9706, 9707, 9711, 9712, 9713, 9714, 9720, 9723, 9731, 9740, 9741, 9766, 9827, 9830, 9861, 9930, 9970
<b><u>GERM CELL TUMORS AND CYSTS</u></b>	
Germ cell tumors, cysts and heterotopias	8020, 9060, 9061, 9064, 9070, 9071, 9072, 9080, 9081, 9082, 9083, 9084, 9085, 9100
<b><u>TUMORS OF THE SELLAR REGION</u></b>	
Pituitary	8022, 8040, 8140, 8146, 8246, 8260, 8270, 8271, 8280, 8281, 8290, 8300, 8310, 8323, 8333, 8334
Craniopharyngioma	9350
<b><u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u></b>	
Chordoma/chondrosarcoma	9220, 9231 <sup>b</sup> , 9240 <sup>b</sup> , 9370
<b><u>UNCLASSIFIED TUMORS</u></b>	
Hemangioma	9120, 9121, 9122, 9123, 9125, 9126, 9130, 9131, 9133 <sup>b</sup> , 9140
Neoplasm, unspecified	8000, 8001, 8002, 8003, 8004, 8010, 8021
All other	8720, 9173, 9580, 9722

<sup>a</sup>International Classification of Diseases for Oncology, Second Edition, 1996. World Health Organization, Geneva, Switzerland.

<sup>b</sup>Histology regrouped in the 2002 revision of the CBTRUS histology grouping scheme as compared to the previous version of the CBTRUS histology grouping scheme.

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 AVERAGED OVER 1995-1999 FOR CBTRUS, 12 STATES COMBINED, BY AGE, GENDER AND RACE<sup>a</sup>**

Age Group	MALES			FEMALES		
	Total	Whites	Blacks	Total	Whites	Blacks
0-4	1,970,297	1,593,637	262,207	1,884,669	1,517,405	254,988
5-9	2,022,582	1,630,514	283,892	1,926,766	1,548,612	274,993
10-14	1,955,583	1,587,754	264,395	1,865,858	1,509,099	256,485
15-19	1,920,849	1,570,705	255,025	1,833,084	1,489,434	248,561
20-24	1,782,422	1,460,448	227,858	1,731,561	1,400,383	233,336
25-29	1,902,549	1,566,222	236,907	1,929,391	1,562,366	254,310
30-34	2,112,084	1,763,286	246,253	2,152,787	1,765,008	274,493
35-39	2,279,949	1,931,460	244,535	2,310,382	1,927,585	274,322
40-44	2,125,996	1,821,740	213,522	2,187,366	1,843,868	247,157
45-49	1,843,828	1,600,426	171,647	1,940,504	1,653,024	208,598
50-54	1,489,899	1,307,780	129,662	1,594,312	1,371,995	164,737
55-59	1,167,034	1,024,138	103,141	1,270,564	1,092,069	135,510
60-64	978,723	866,384	81,404	1,098,060	951,778	111,522
65-69	901,604	807,847	72,221	1,076,434	948,083	100,950
70-74	771,947	704,872	51,473	1,003,290	903,426	79,565
75-79	586,638	541,106	35,331	845,536	771,305	60,638
80-84	349,284	325,292	18,169	607,295	561,604	37,917
85+	233,948	216,022	13,775	591,228	548,052	36,155
<b>TOTAL</b>	<b>26,395,217</b>	<b>22,319,633</b>	<b>2,911,419</b>	<b>27,849,088</b>	<b>23,365,096</b>	<b>3,254,236</b>

<sup>a</sup>The average annual population combined for the twelve states for which rates were calculated by race, gender and age: Arizona, Colorado, Connecticut, Delaware, Idaho, Maine, Massachusetts, Minnesota, Montana, New York, North Carolina, and Utah.

**TABLE 3: 1998 ANNUAL POPULATIONS FOR CBTRUS, 15 STATES COMBINED, BY AGE, GENDER AND HISPANIC ORIGIN<sup>a</sup>**

AGE GROUP	Males			Females		
	TOTAL	HISPANIC	NON-HISPANIC	TOTAL	HISPANIC	NON-HISPANIC
0-4	2,883,335	714,535	2,168,800	2,758,510	684,732	2,073,778
5-9	2,963,779	625,766	2,338,013	2,827,260	602,272	2,224,988
10-14	2,853,037	550,333	2,302,704	2,723,520	528,120	2,195,400
15-19	2,874,682	567,697	2,306,985	2,737,500	537,172	2,200,328
20-24	2,581,500	514,570	2,066,930	2,502,383	503,629	1,998,754
25-29	2,658,252	471,956	2,186,296	2,685,096	468,355	2,216,741
30-34	2,863,449	486,738	2,376,711	2,905,590	473,397	2,432,193
35-39	3,225,443	480,508	2,744,935	3,252,581	467,510	2,785,071
40-44	3,079,635	405,673	2,673,962	3,147,513	410,230	2,737,283
45-49	2,627,900	315,485	2,312,415	2,747,496	334,853	2,412,643
50-54	2,176,336	235,948	1,940,388	2,317,638	262,485	2,055,153
55-59	1,686,867	173,375	1,513,492	1,828,319	200,664	1,627,655
60-64	1,367,713	137,637	1,230,076	1,527,983	165,615	1,362,368
65-69	1,209,893	104,602	1,105,291	1,429,180	134,276	1,294,904
70-74	1,042,615	80,170	962,445	1,339,523	107,581	1,231,942
75-79	803,620	54,494	749,126	1,135,340	77,209	1,058,131
80-84	472,349	29,720	442,629	804,360	48,734	755,626
85+	321,451	24,786	296,665	795,536	48,933	746,603
<b>TOTAL</b>	<b>37,691,856</b>	<b>5,973,993</b>	<b>31,717,863</b>	<b>39,465,328</b>	<b>6,055,767</b>	<b>33,409,561</b>

<sup>a</sup>The average annual population combined for the fifteen states for which rates were calculated by Hispanic origin: Arizona, Colorado, Connecticut, Delaware, Idaho, Maine, Massachusetts, Minnesota, Montana, New Mexico, New York, North Carolina, Rhode Island, Texas, and Utah.

**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<sup>a</sup> IN PARTICIPATING REGISTRIES, CBTRUS 1995-1999**

STATE	YEARS OF DATA	NO. OF NEWLY DIAGNOSED BRAIN & CNS TUMORS	PERCENT BENIGN TUMORS	PERCENT HISTOLOGICALLY CONFIRMED	POPULATION 1997 CENSUS <sup>b</sup>
Arizona	1995-99	3,187	45.4	76.2	4,552,207
Colorado	1995-99	3,604	56.2	71.4	3,891,293
Connecticut	1995-99	2,272	39.4	86.5	3,268,514
Delaware	1995-99	371	25.6	84.9	735,024
Idaho	1995-99	923	45.5	84.1	1,210,638
Maine	1995-99	747	23.2	86.8	1,245,215
Massachusetts	1995-99	3,657	26.8	89.6	6,115,476
Minnesota	1995-99	3,579	47.2	97.2	4,687,726
Montana	1995-99	720	44.0	76.0	878,706
New Mexico	1996-99	826	45.5	83.7	1,722,939
New York	1995-99	12,651	40.3	77.8	18,143,184
North Carolina	1995-99	4,634	34.3	86.8	7,428,672
North Dakota	1997-99	131	c	82.4	640,945
Rhode Island	1998-99	339	33.9	77.9	986,966
Texas	1995-98	8,501	36.4	78.4	19,355,427
Utah	1995-99	1,443	48.2	83.2	2,065,397
<b>TOTAL</b>		<b>47,585</b>	<b>40.0</b>	<b>81.6</b>	<b>76,928,329</b>

<sup>a</sup>Some 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.

<sup>b</sup>1997 population data estimates were obtained from the census data provided to the SEER program.

<sup>c</sup>Data were available for malignant tumors only.

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

**TABLES**

**TABLE 6: PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES<sup>a,b</sup> BY AGE, STATE, AND BEHAVIOR, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1995-1999<sup>c</sup>**

STATE	0-19 YEARS		20+ YEARS		ALL AGES		
	MALIGNANT	BENIGN & UNCERTAIN	MALIGNANT	BENIGN & UNCERTAIN	MALIGNANT	BENIGN & UNCERTAIN	ALL TUMORS
Arizona	2.65	0.59	8.69	9.90	6.95	7.23	14.18
Colorado	2.83	1.31	9.64	16.55	7.69	12.17	19.86
Connecticut	2.90	0.80	9.42	7.78	7.55	5.78	13.33
Delaware	2.71	0.19	9.15	3.93	7.30	2.86	10.16
Idaho	3.52	1.14	10.49	10.32	8.49	7.69	16.18
Maine	3.73	0.76	10.34	4.20	8.44	3.21	11.66
Massachusetts	3.21	0.61	10.12	4.74	8.14	3.56	11.69
Minnesota	2.91	1.34	9.23	11.09	7.42	8.29	15.71
Montana	3.12	0.81	10.64	10.27	8.48	7.56	16.04
New Mexico <sup>c</sup>	2.49	0.72	7.87	8.64	6.33	6.36	12.69
New York	3.17	0.83	9.43	8.24	7.63	6.11	13.75
North Carolina	3.14	0.74	9.68	6.39	7.80	4.77	12.58
North Dakota <sup>a,d</sup>	2.38 <sup>d</sup>	d	8.31 <sup>d</sup>	d	6.61 <sup>d</sup>	d	6.61 <sup>d</sup>
Rhode Island <sup>c</sup>	3.79	2.25	11.72	8.39	9.45	6.63	16.08
Texas <sup>c</sup>	2.89	0.77	8.91	6.92	7.19	5.16	12.34
Utah	2.96	1.10	9.86	12.69	7.88	9.36	17.25
<b>TOTAL<sup>c</sup></b>	<b>3.07</b>	<b>0.87</b>	<b>9.56</b>	<b>8.52</b>	<b>7.70</b>	<b>6.32</b>	<b>14.02</b>

<sup>a</sup>Rates are per 100,000 person-years.

<sup>b</sup>Some 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.

<sup>c</sup>Counts and rates based on 1995-1999 data except for New Mexico (1996-1999), North Dakota (1997-1999), Rhode Island (1998-1999), and Texas (1995-1998).

<sup>d</sup>Data were available for malignant tumors only.

<sup>e</sup>Includes data from 12 of the 16 registries listed above; New Mexico, North Dakota, Rhode Island, and Texas are excluded.

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

**TABLE 7: PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES<sup>a</sup> BY SITE<sup>b</sup> AND GENDER, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1995-1999<sup>c</sup>**

ICDO CODE	SITE <sup>b</sup>	MALES		FEMALES		TOTAL	
		N	ADJUSTED RATE	N	ADJUSTED RATE	N	ADJUSTED RATE
C71.0-C71.4, C71.7-C71.9, C72.0-C72.5	Brain(excluding ventricle and cerebellum), cranial nerves, and spinal cord	12,413	10.02	11,490	7.88	23,906	8.86
C71.5	Ventricle	279	0.21	248	0.18	527	0.19
C71.6	Cerebellum	802	0.61	729	0.52	1,531	0.57
C72.8-C72.9	Other nervous system	136	0.11	109	0.07	245	0.09
C70.0-C70.9	Meninges (cerebral and spinal)	2,344	1.99	6,072	4.10	8,417	3.14
C75.1-C75.2	Pituitary	1,424	1.14	1,456	1.03	2,880	1.07
C75.3	Pineal	129	0.10	60	0.04	189	0.07
C30.0 (9522:9523)	Olfactory tumors of the nasal cavity	58	0.05	35	0.02	93	0.03
<b>TOTAL</b>		<b>17,585</b>	<b>14.22</b>	<b>20,199</b>	<b>13.86</b>	<b>37,788</b>	<b>14.02</b>

<sup>a</sup>Rates are per 100,000 person-years.

<sup>b</sup>The sites referred to in this table are based on the categories and site codes defined in the SEER Site/Histology Validation List.

<sup>c</sup>Includes data from 12 of the 16 registries listed in Table 5; New Mexico, North Dakota, Rhode Island, and Texas are excluded.

Abbreviation used: CBTRUS, Central Brain Tumor Registry of the United States; SEER, Surveillance, Epidemiology, and End Results.

**TABLE 8: DISTRIBUTION AND INCIDENCE RATES<sup>a</sup> 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 1995-1999<sup>b</sup>**

HISTOLOGY	TOTAL	% OF ALL	MEDIAN AGE	ADJUSTED
	N	REPORTED BRAIN TUMORS	AT DIAGNOSIS	RATE (S.E.)
<b><u>TUMORS OF NEUROEPITHELIAL TISSUE</u></b>	<b>18,166</b>	<b>48.1</b>	<b>54</b>	<b>6.72 (0.05)</b>
Pilocytic astrocytoma	785	2.1	13	0.29 (0.01)
Diffuse astrocytoma (protoplasmic, fibrillary)	359	1.0	50	0.13 (0.01)
Anaplastic astrocytoma	1,388	3.7	52	0.51 (0.01)
Unique astrocytoma variants	171	0.5	37	0.06 (0.00)
Astrocytoma, NOS	1,583	4.2	46	0.58 (0.01)
Glioblastoma	8,690	23.0	65	3.24 (0.03)
Oligodendroglioma	1,083	2.9	40	0.40 (0.01)
Anaplastic oligodendroglioma	428	1.1	45	0.16 (0.01)
Ependymoma/anaplastic ependymoma	674	1.8	37	0.25 (0.01)
Ependymoma variants	150	0.4	38	0.06 (0.00)
Mixed glioma	392	1.0	40	0.14 (0.01)
Glioma malignant, NOS	1,035	2.7	48	0.38 (0.01)
Choroid plexus	92	0.2	26	0.03 (0.00)
Neuroepithelial	41	0.1	51	0.02 (0.00)
Benign and malignant neuronal/glial, neuronal and mixed	499	1.3	28	0.18 (0.01)
Pineal parenchymal	77	0.2	24	0.03 (0.00)
Embryonal/primitive/medulloblastoma	719	1.9	10	0.26 (0.01)
<b><u>TUMORS OF CRANIAL AND SPINAL NERVES</u></b>	<b>2,822</b>	<b>7.5</b>	<b>52</b>	<b>1.05 (0.02)</b>
Nerve sheath, benign and malignant	2,822	7.5	52	1.05 (0.02)
Other tumors of cranial and spinal nerves	-	-	-	-
<b><u>TUMORS OF THE MENINGES</u></b>	<b>10,831</b>	<b>28.7</b>	<b>64</b>	<b>4.03 (0.04)</b>
Meningioma	10,359	27.4	65	3.86 (0.04)
Other mesenchymal, benign and malignant	131	0.3	50	0.05 (0.00)
Hemangioblastoma	341	0.9	44	0.13 (0.01)
<b><u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u></b>	<b>1,006</b>	<b>2.7</b>	<b>58</b>	<b>0.37 (0.01)</b>
Lymphoma	1,006	2.7	58	0.37 (0.01)
<b><u>GERM CELL TUMORS AND CYSTS</u></b>	<b>202</b>	<b>0.5</b>	<b>16</b>	<b>0.08 (0.01)</b>
Germ cell tumors, cysts and heterotopias	202	0.5	16	0.08 (0.01)
<b><u>TUMORS OF THE SELLAR REGION</u></b>	<b>2,805</b>	<b>7.4</b>	<b>48</b>	<b>1.04 (0.02)</b>
Pituitary	2,496	6.6	49	0.92 (0.02)
Craniopharyngioma	309	0.8	35	0.11 (0.01)
<b><u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u></b>	<b>79</b>	<b>0.2</b>	<b>47</b>	<b>0.03 (0.00)</b>
Chordoma/chondrosarcoma	79	0.2	47	0.03 (0.00)
<b><u>UNCLASSIFIED TUMORS</u></b>	<b>1,877</b>	<b>5.0</b>	<b>70</b>	<b>0.70 (0.02)</b>
Hemangioma	140	0.4	42	0.05 (0.00)
Neoplasm, unspecified	1,713	4.5	71	0.64 (0.02)
All other	24	0.1	50	0.01 (0.00)
<b>TOTAL</b>	<b>37,788</b>	<b>100.0</b>	<b>57</b>	<b>14.02 (0.07)</b>

<sup>a</sup>Rates are per 100,000 person-years.

<sup>b</sup>Includes data from 12 of the 16 registries listed in Table 5; New Mexico, North Dakota, Rhode Island, and Texas 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; SE, standard error.

## TABLES

**TABLE 9: PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES<sup>a</sup> BY MAJOR HISTOLOGY GROUPINGS, HISTOLOGY AND GENDER, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1995-1999<sup>b</sup>**

HISTOLOGY	MALES		FEMALES	
	N	ADJUSTED RATE	N	ADJUSTED RATE
<b><u>TUMORS OF NEUROEPITHELIAL TISSUE</u></b>	<b>10,061</b>	<b>8.02</b>	<b>8,103</b>	<b>5.62</b>
Pilocytic astrocytoma	410	0.30	375	0.28
Diffuse astrocytoma (protoplasmic, fibrillary)	213	0.17	146	0.10
Anaplastic astrocytoma	757	0.60	631	0.44
Unique astrocytoma variants	97	0.08	74	0.05
Astrocytoma, NOS	908	0.71	675	0.47
Glioblastoma	4,851	4.02	3,837	2.59
Oligodendroglioma	586	0.44	497	0.35
Anaplastic oligodendroglioma	229	0.17	199	0.14
Ependymoma/anaplastic ependymoma	380	0.29	294	0.21
Ependymoma variants	92	0.07	58	0.04
Mixed glioma	215	0.16	177	0.13
Glioma malignant, NOS	536	0.43	499	0.34
Choroid plexus	43	0.03	49	0.04
Neuroepithelial	20	0.02	21	0.01
Benign and malignant neuronal/glial, neuronal and mixed	269	0.20	230	0.17
Pineal parenchymal	34	0.03	43	0.03
Embryonal/primitive/medulloblastoma	421	0.31	298	0.22
<b><u>TUMORS OF CRANIAL AND SPINAL NERVES</u></b>	<b>1,351</b>	<b>1.07</b>	<b>1,471</b>	<b>1.04</b>
Nerve sheath, benign and malignant	1,351	1.07	1,471	1.04
Other tumors of cranial and spinal nerves	-	-	-	-
<b><u>TUMORS OF THE MENINGES</u></b>	<b>3,149</b>	<b>2.66</b>	<b>7,680</b>	<b>5.19</b>
Meningioma	2,891	2.46	7,466	5.04
Other mesenchymal, benign and malignant	70	0.06	61	0.04
Hemangioblastoma	188	0.15	153	0.11
<b><u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u></b>	<b>597</b>	<b>0.47</b>	<b>409</b>	<b>0.28</b>
Lymphoma	597	0.47	409	0.28
<b><u>GERM CELL TUMORS AND CYSTS</u></b>	<b>149</b>	<b>0.11</b>	<b>53</b>	<b>0.04</b>
Germ cell tumors, cysts and heterotopias	149	0.11	53	0.04
<b><u>TUMORS OF THE SELLAR REGION</u></b>	<b>1,393</b>	<b>1.11</b>	<b>1,412</b>	<b>1.00</b>
Pituitary	1,242	1.00	1,254	0.88
Craniopharyngioma	151	0.11	158	0.12
<b><u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u></b>	<b>41</b>	<b>0.03</b>	<b>38</b>	<b>0.03</b>
Chordoma/chondrosarcoma	41	0.03	38	0.03
<b><u>UNCLASSIFIED TUMORS</u></b>	<b>844</b>	<b>0.74</b>	<b>1,033</b>	<b>0.66</b>
Hemangioma	67	0.05	73	0.05
Neoplasm, unspecified	765	0.68	948	0.60
All other	12	0.01	12	0.01
<b>TOTAL</b>	<b>17,585</b>	<b>14.22</b>	<b>20,199</b>	<b>13.86</b>

<sup>a</sup>Rates are per 100,000 person-years.

<sup>b</sup>Includes data from 12 of the 16 registries listed in Table 5; New Mexico, North Dakota, Rhode Island, and Texas 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 10: PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES<sup>a</sup> BY MAJOR HISTOLOGY GROUPINGS, HISTOLOGY AND RACE, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1995-1999<sup>b</sup>**

HISTOLOGY	WHITES		BLACKS	
	N	ADJUSTED RATE	N	ADJUSTED RATE
<b><u>TUMORS OF NEUROEPITHELIAL TISSUE</u></b>	<b>16,701</b>	<b>7.14</b>	<b>912</b>	<b>3.29</b>
Pilocytic astrocytoma	686	0.31	60	0.16
Diffuse astrocytoma (protoplasmic, fibrillary)	340	0.15	15	0.04
Anaplastic astrocytoma	1,284	0.55	72	0.28
Unique astrocytoma variants	151	0.07	13	0.04
Astrocytoma, NOS	1,444	0.62	87	0.30
Glioblastoma	8,134	3.43	360	1.50
Oligodendroglioma	1,003	0.43	44	0.14
Anaplastic oligodendroglioma	392	0.17	20	0.07
Ependymoma/anaplastic ependymoma	607	0.27	36	0.12
Ependymoma variants	143	0.06	-	-
Mixed glioma	364	0.16	18	0.07
Glioma malignant, NOS	911	0.39	68	0.23
Choroid plexus	77	0.03	7	-
Neuroepithelial	35	0.01	-	-
Benign and malignant neuronal/glial, neuronal and mixed	438	0.19	35	0.11
Pineal parenchymal	62	0.03	12	0.04
Embryonal/primitive/medulloblastoma	630	0.28	56	0.16
<b><u>TUMORS OF CRANIAL AND SPINAL NERVES</u></b>	<b>2,536</b>	<b>1.09</b>	<b>99</b>	<b>0.37</b>
Nerve sheath, benign and malignant	2,536	1.09	99	0.37
Other tumors of cranial and spinal nerves	-	-	-	-
<b><u>TUMORS OF THE MENINGES</u></b>	<b>9,387</b>	<b>3.96</b>	<b>913</b>	<b>3.90</b>
Meningioma	8,982	3.78	875	3.77
Other mesenchymal, benign and malignant	110	0.05	16	0.05
Hemangioblastoma	295	0.13	22	0.07
<b><u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u></b>	<b>871</b>	<b>0.37</b>	<b>106</b>	<b>0.36</b>
Lymphoma	871	0.37	106	0.36
<b><u>GERM CELL TUMORS AND CYSTS</u></b>	<b>169</b>	<b>0.08</b>	<b>12</b>	<b>0.03</b>
Germ cell tumors, cysts and heterotopias	169	0.08	12	0.03
<b><u>TUMORS OF THE SELLAR REGION</u></b>	<b>2,281</b>	<b>0.98</b>	<b>338</b>	<b>1.29</b>
Pituitary	2,029	0.87	294	1.15
Craniopharyngioma	252	0.11	44	0.14
<b><u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u></b>	<b>73</b>	<b>0.03</b>	<b>-</b>	<b>-</b>
Chordoma/chondrosarcoma	73	0.03	-	-
<b><u>UNCLASSIFIED TUMORS</u></b>	<b>1,636</b>	<b>0.68</b>	<b>166</b>	<b>0.69</b>
Hemangioma	123	0.05	11	0.04
Neoplasm, unspecified	1,492	0.62	153	0.65
All other	21	0.01	-	-
<b>TOTAL</b>	<b>33,654</b>	<b>14.34</b>	<b>2,548</b>	<b>9.94</b>

<sup>a</sup>Rates are per 100,000 person-years.

<sup>b</sup>Includes data from 12 of the 16 registries listed in Table 5; New Mexico, North Dakota, Rhode Island, and Texas 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.

**TABLES**

**TABLE 11: PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES<sup>a</sup> BY MAJOR HISTOLOGY GROUPINGS, HISTOLOGY AND HISPANIC ETHNICITY, AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1998, 15 REGISTRIES<sup>b</sup>**

HISTOLOGY	HISPANICS (OF ANY RACE) <sup>c</sup>		TOTAL	
	N	ADJUSTED RATE	N	ADJUSTED RATE
<b><u>TUMORS OF NEUROEPITHELIAL TISSUE</u></b>	<b>454</b>	<b>4.74</b>	<b>5,058</b>	<b>6.69</b>
Pilocytic astrocytoma	34	0.23	264	0.34
Diffuse astrocytoma (protoplasmic, fibrillary)	-	-	86	0.11
Anaplastic astrocytoma	26	0.30	382	0.50
Unique astrocytoma variants	6	-	49	0.06
Astrocytoma, NOS	37	0.34	379	0.50
Glioblastoma	159	2.17	2,346	3.16
Oligodendroglioma	31	0.30	305	0.40
Anaplastic oligodendroglioma	8	-	151	0.20
Ependymoma/anaplastic ependymoma	33	0.26	199	0.26
Ependymoma variants	6	-	56	0.07
Mixed glioma	12	0.12	122	0.16
Glioma malignant, NOS	26	0.26	267	0.35
Choroid plexus	6	-	30	0.04
Neuroepithelial	-	-	16	0.02
Benign and malignant neuronal/glial, neuronal and mixed	17	0.14	170	0.22
Pineal parenchymal	-	-	24	0.03
Embryonal/primitive/medulloblastoma	43	0.29	212	0.27
<b><u>TUMORS OF CRANIAL AND SPINAL NERVES</u></b>	<b>50</b>	<b>0.57</b>	<b>794</b>	<b>1.06</b>
Nerve sheath, benign and malignant	50	0.57	794	1.06
Other tumors of cranial and spinal nerves	-	-	-	-
<b><u>TUMORS OF THE MENINGES</u></b>	<b>257</b>	<b>3.45</b>	<b>2,987</b>	<b>4.02</b>
Meningioma	246	3.35	2,860	3.85
Other mesenchymal, benign and malignant	-	-	43	0.06
Hemangioblastoma	6	-	84	0.11
<b><u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u></b>	<b>38</b>	<b>0.47</b>	<b>264</b>	<b>0.35</b>
Lymphoma	38	0.47	264	0.35
<b><u>GERM CELL TUMORS AND CYSTS</u></b>	<b>11</b>	<b>0.07</b>	<b>68</b>	<b>0.09</b>
Germ cell tumors, cysts and heterotopias	11	0.07	68	0.09
<b><u>TUMORS OF THE SELLAR REGION</u></b>	<b>79</b>	<b>0.84</b>	<b>689</b>	<b>0.91</b>
Pituitary	67	0.74	610	0.81
Craniopharyngioma	12	0.10	79	0.10
<b><u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u></b>	<b>-</b>	<b>-</b>	<b>27</b>	<b>0.04</b>
Chordoma/chondrosarcoma	-	-	27	0.04
<b><u>UNCLASSIFIED TUMORS</u></b>	<b>46</b>	<b>0.63</b>	<b>598</b>	<b>0.80</b>
Hemangioma	-	-	39	0.05
Neoplasm, unspecified	42	0.60	553	0.74
All other	-	-	6	-
<b>TOTAL</b>	<b>940</b>	<b>10.83</b>	<b>10,485</b>	<b>13.95</b>

<sup>a</sup>Rates are per 100,000 person-years.

<sup>b</sup>Includes data from 15 of the 16 registries listed in Table 5; North Dakota is excluded.

<sup>c</sup>Hispanic is not mutually exclusive of race.

- 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 12: SELECTED PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR AGE-SPECIFIC INCIDENCE RATES<sup>a</sup> BY AGE AT DIAGNOSIS, CBTRUS 1995-1999<sup>b</sup>**

HISTOLOGY	AGE AT DIAGNOSIS								
	0-14	0-19	20-34	35-44	45-54	55-64	65-74	75-84	85+
<b><u>TUMORS OF NEUROEPITHELIAL TISSUE</u></b>	<b>3.29</b>	<b>3.07</b>	<b>3.47</b>	<b>4.70</b>	<b>7.67</b>	<b>12.97</b>	<b>18.99</b>	<b>18.26</b>	<b>9.53</b>
Pilocytic astrocytoma	0.78	0.70	0.20	0.12	0.12	0.09	0.07	-	-
Diffuse astrocytoma	0.05	0.06	0.09	0.13	0.14	0.27	0.32	0.27	-
Anaplastic astrocytoma	0.09	0.10	0.36	0.53	0.75	0.91	1.33	1.16	0.48
Unique astrocytoma variants	0.07	0.07	0.05	0.03	0.07	0.08	0.10	0.12	-
Astrocytoma, NOS	0.30	0.29	0.47	0.55	0.64	0.77	1.23	1.55	0.78
Glioblastoma	0.15	0.15	0.44	1.34	3.99	8.76	13.74	12.78	6.54
Oligodendroglioma	0.07	0.09	0.50	0.68	0.58	0.48	0.37	0.32	-
Anaplastic oligodendroglioma	0.02	0.03	0.16	0.22	0.26	0.29	0.23	0.16	-
Ependymoma/anaplastic ependymoma	0.26	0.23	0.22	0.26	0.31	0.30	0.28	0.18	-
Ependymoma variants	-	0.02	0.08	0.07	0.08	0.08	-	-	-
Mixed glioma	0.02	0.03	0.20	0.19	0.19	0.23	0.18	0.09	-
Glioma malignant, NOS	0.39	0.35	0.21	0.23	0.25	0.39	0.85	1.34	1.24
Embryonal/primitive/medulloblastoma	0.74	0.63	0.21	0.12	0.09	0.05	-	-	-
<b><u>TUMORS OF CRANIAL AND SPINAL NERVES</u></b>	<b>0.06</b>	<b>0.08</b>	<b>0.56</b>	<b>1.14</b>	<b>1.95</b>	<b>2.61</b>	<b>2.44</b>	<b>1.47</b>	<b>0.70</b>
Nerve sheath, benign and malignant	0.06	0.08	0.56	1.14	1.95	2.61	2.44	1.47	0.70
<b><u>TUMORS OF THE MENINGES</u></b>	<b>0.12</b>	<b>0.17</b>	<b>0.90</b>	<b>2.82</b>	<b>5.15</b>	<b>8.18</b>	<b>13.12</b>	<b>17.23</b>	<b>19.05</b>
Meningioma	0.08	0.12	0.74	2.62	4.89	7.89	12.79	17.04	18.86
Hemangioblastoma	-	0.03	0.14	0.15	0.20	0.18	0.21	0.16	-
<b><u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u></b>	<b>0.02</b>	<b>0.02</b>	<b>0.19</b>	<b>0.40</b>	<b>0.42</b>	<b>0.70</b>	<b>1.25</b>	<b>1.16</b>	<b>0.51</b>
Lymphoma	0.02	0.02	0.19	0.40	0.42	0.70	1.25	1.16	0.51
<b><u>GERM CELL TUMORS</u></b>	<b>0.14</b>	<b>0.17</b>	<b>0.09</b>	-	-	-	-	-	-
Germ cell	0.14	0.17	0.09	-	-	-	-	-	-
<b><u>TUMORS OF THE SELLAR REGION</u></b>	<b>0.16</b>	<b>0.25</b>	<b>0.91</b>	<b>1.09</b>	<b>1.49</b>	<b>1.96</b>	<b>2.08</b>	<b>1.69</b>	<b>1.21</b>
Pituitary	0.03	0.12	0.82	0.97	1.37	1.81	1.97	1.65	1.14
Craniopharyngioma	0.14	0.13	0.09	0.12	0.11	0.15	0.11	-	-
<b><u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u></b>	<b>-</b>	<b>0.02</b>	<b>0.02</b>	<b>0.03</b>	<b>0.03</b>	<b>0.06</b>	<b>0.05</b>	<b>-</b>	<b>-</b>
<b><u>UNCLASSIFIED TUMORS</u></b>	<b>0.15</b>	<b>0.15</b>	<b>0.25</b>	<b>0.36</b>	<b>0.48</b>	<b>0.92</b>	<b>1.79</b>	<b>3.68</b>	<b>7.49</b>
<b>TOTAL<sup>c</sup></b>	<b>3.96</b>	<b>3.94</b>	<b>6.40</b>	<b>10.55</b>	<b>17.21</b>	<b>27.42</b>	<b>39.73</b>	<b>43.55</b>	<b>38.54</b>

<sup>a</sup>Rates are per 100,000 person-years.

<sup>b</sup>Includes data from 12 of the 16 registries listed in Table 5; New Mexico, North Dakota, Rhode Island, and Texas are excluded.

<sup>c</sup>Refers 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.

**TABLES**

**TABLE 13: SELECTED CHILDHOOD PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES<sup>a</sup> BY MAJOR HISTOLOGY GROUPINGS, HISTOLOGY AND GENDER (AGES 0-19), AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1995-1999<sup>b</sup>**

HISTOLOGY	MALES		FEMALES		TOTAL	
	N	ADJUSTED RATE	N	ADJUSTED RATE	N	ADJUSTED RATE
<b><u>TUMORS OF NEUROEPITHELIAL TISSUE</u></b>	<b>1,253</b>	<b>3.17</b>	<b>1,107</b>	<b>2.93</b>	<b>2,360</b>	<b>3.05</b>
Pilocytic astrocytoma	281	0.71	260	0.69	541	0.70
Anaplastic astrocytoma	33	0.08	42	0.11	75	0.10
Astrocytoma, NOS	123	0.31	101	0.27	224	0.29
Glioblastoma	70	0.18	46	0.12	116	0.15
Ependymoma/anaplastic ependymoma	98	0.25	82	0.22	180	0.23
Glioma malignant, NOS	126	0.32	143	0.38	269	0.35
Benign and malignant neuronal/glial, neuronal and mixed	91	0.23	75	0.20	166	0.22
Embryonal/primitive/medulloblastoma	276	0.69	208	0.55	484	0.62
<b><u>TUMORS OF CRANIAL AND SPINAL NERVES</u></b>	<b>35</b>	<b>0.09</b>	<b>30</b>	<b>0.08</b>	<b>65</b>	<b>0.09</b>
<b><u>TUMORS OF THE MENINGES</u></b>	<b>75</b>	<b>0.19</b>	<b>58</b>	<b>0.16</b>	<b>133</b>	<b>0.18</b>
<b><u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u></b>	<b>8</b>	<b>-</b>	<b>8</b>	<b>-</b>	<b>16</b>	<b>0.02</b>
<b><u>GERM CELL TUMORS AND CYSTS</u></b>	<b>93</b>	<b>0.24</b>	<b>38</b>	<b>0.10</b>	<b>131</b>	<b>0.17</b>
Germ cell tumors, cysts and heterotopias	93	0.24	38	0.10	131	0.17
<b><u>TUMORS OF THE SELLAR REGION</u></b>	<b>64</b>	<b>0.16</b>	<b>131</b>	<b>0.36</b>	<b>195</b>	<b>0.26</b>
Craniopharyngioma	48	0.12	55	0.15	103	0.13
<b><u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u></b>	<b>-</b>	<b>-</b>	<b>10</b>	<b>0.03</b>	<b>15</b>	<b>0.02</b>
<b><u>UNCLASSIFIED TUMORS</u></b>	<b>63</b>	<b>0.16</b>	<b>55</b>	<b>0.15</b>	<b>118</b>	<b>0.15</b>
<b>TOTAL<sup>c</sup></b>	<b>1,596</b>	<b>4.05</b>	<b>1,437</b>	<b>3.82</b>	<b>3,033</b>	<b>3.94</b>

<sup>a</sup>Rates are per 100,000 person-years.

<sup>b</sup>Includes data from 12 of the 16 registries listed in Table 5; New Mexico, North Dakota, Rhode Island, and Texas are excluded.

<sup>c</sup>Refers 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.

**TABLE 14: CHILDHOOD PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR INCIDENCE RATES<sup>a</sup> BY MAJOR HISTOLOGY GROUPINGS AND RACE (AGES 0-19), AGE-ADJUSTED TO THE 2000 U.S. STANDARD POPULATION, CBTRUS 1995-1999<sup>b</sup>**

HISTOLOGY GROUPING	WHITES		BLACKS	
	N	ADJUSTED RATE	N	ADJUSTED RATE
Tumors of Neuroepithelial Tissue	1,988	3.18	236	2.22
Tumors of Cranial and Spinal Nerves	55	0.09	-	-
Tumors of the Meninges	107	0.17	16	0.16
Lymphomas and Hemopoietic Neoplasms	14	0.02	-	-
Germ Cell Tumors and Cysts	108	0.18	8	-
Tumors of the Sellar Region	165	0.27	19	0.18
Local Extensions from Regional Tumors	14	0.02	-	-
Unclassified Tumors	93	0.15	15	0.15
<b>TOTAL</b>	<b>2,544</b>	<b>4.09</b>	<b>299</b>	<b>2.83</b>
<b>MALES</b>	<b>1,328</b>	<b>4.16</b>	<b>163</b>	<b>3.04</b>
<b>FEMALES</b>	<b>1,216</b>	<b>4.00</b>	<b>136</b>	<b>2.62</b>

<sup>a</sup>Rates are per 100,000 person-years.

<sup>b</sup>Includes data from 12 of the 16 registries listed in Table 5; New Mexico, North Dakota, Rhode Island, and Texas 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.

## TABLES

**TABLE 15: SELECTED CHILDHOOD PRIMARY (MALIGNANT AND NON-MALIGNANT) BRAIN AND CENTRAL NERVOUS SYSTEM TUMOR AGE-SPECIFIC INCIDENCE RATES<sup>a</sup> (AGES 0-19), BY AGE AT DIAGNOSIS, CBTRUS 1995-1999<sup>b</sup>**

HISTOLOGY	Age at Diagnosis								0-19		0-14	
	0-4		5-9		10-14		15-19		N	RATE	N	RATE
<b><u>TUMORS OF NEUROEPITHELIAL TISSUE</u></b>	<b>719</b>	<b>3.73</b>	<b>665</b>	<b>3.37</b>	<b>529</b>	<b>2.77</b>	<b>447</b>	<b>2.38</b>	<b>2,360</b>	<b>3.07</b>	<b>1,913</b>	<b>3.29</b>
Pilocytic astrocytoma	142	0.74	171	0.87	139	0.73	89	0.47	541	0.70	452	0.78
Anaplastic astrocytoma	8	-	27	0.14	19	0.10	21	0.11	75	0.10	54	0.09
Astrocytoma, NOS	59	0.31	60	0.30	55	0.29	50	0.27	224	0.29	174	0.30
Glioblastoma	23	0.12	27	0.14	38	0.20	28	0.15	116	0.15	88	0.15
Ependymoma/anaplastic ependymoma	90	0.47	35	0.18	25	0.13	30	0.16	180	0.23	150	0.26
Glioma malignant, NOS	90	0.47	87	0.44	52	0.27	40	0.21	269	0.35	229	0.39
Benign and malignant neuronal/glial, neuronal and mixed	55	0.29	23	0.12	40	0.21	48	0.26	166	0.22	118	0.20
Embryonal/primitive/medulloblastoma	178	0.92	167	0.85	86	0.45	53	0.28	484	0.63	431	0.74
<b><u>TUMORS OF CRANIAL AND SPINAL NERVES</u></b>	<b>-</b>	<b>-</b>	<b>8</b>	<b>-</b>	<b>23</b>	<b>0.12</b>	<b>30</b>	<b>0.16</b>	<b>65</b>	<b>0.08</b>	<b>35</b>	<b>0.06</b>
<b><u>TUMORS OF THE MENINGES</u></b>	<b>18</b>	<b>0.09</b>	<b>17</b>	<b>0.09</b>	<b>35</b>	<b>0.18</b>	<b>63</b>	<b>0.34</b>	<b>133</b>	<b>0.17</b>	<b>70</b>	<b>0.12</b>
<b><u>LYMPHOMAS AND HEMOPOIETIC NEOPLASMS</u></b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>6</b>	<b>-</b>	<b>16</b>	<b>0.02</b>	<b>10</b>	<b>0.02</b>
<b><u>GERM CELL TUMORS</u></b>	<b>15</b>	<b>0.08</b>	<b>24</b>	<b>0.12</b>	<b>42</b>	<b>0.22</b>	<b>50</b>	<b>0.27</b>	<b>131</b>	<b>0.17</b>	<b>81</b>	<b>0.14</b>
Germ cell	15	0.08	24	0.12	42	0.22	50	0.27	131	0.17	81	0.14
<b><u>TUMORS OF THE SELLAR REGION</u></b>	<b>13</b>	<b>0.07</b>	<b>39</b>	<b>0.20</b>	<b>43</b>	<b>0.23</b>	<b>100</b>	<b>0.53</b>	<b>195</b>	<b>0.25</b>	<b>95</b>	<b>0.16</b>
Craniopharyngioma	12	0.06	39	0.20	28	0.15	24	0.13	103	0.13	79	0.14
<b><u>LOCAL EXTENSIONS FROM REGIONAL TUMORS</u></b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>6</b>	<b>-</b>	<b>15</b>	<b>0.02</b>	<b>9</b>	<b>-</b>
<b><u>UNCLASSIFIED TUMORS</u></b>	<b>41</b>	<b>0.21</b>	<b>17</b>	<b>0.09</b>	<b>31</b>	<b>0.16</b>	<b>29</b>	<b>0.15</b>	<b>118</b>	<b>0.15</b>	<b>89</b>	<b>0.15</b>
<b>TOTAL<sup>c</sup></b>	<b>816</b>	<b>4.23</b>	<b>774</b>	<b>3.92</b>	<b>712</b>	<b>3.73</b>	<b>731</b>	<b>3.89</b>	<b>3,033</b>	<b>3.94</b>	<b>2,302</b>	<b>3.96</b>

<sup>a</sup>Rates are per 100,000 person-years.

<sup>b</sup>Includes data from 12 of the 16 registries listed in Table 5; New Mexico, North Dakota, Rhode Island, and Texas are excluded.

<sup>c</sup>Refers 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.

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

STATE	INCIDENCE					MORTALITY				
	YEARS	MALES		FEMALES		YEARS	MALES		FEMALES	
		N	RATE	N	RATE		N	RATE	N	RATE
Alabama	1999	137	6.8	109	4.5	1995-99	535	5.7	520	4.2
Alaska	1996-99	70	6.7	56	5.8	1995-99	63	5.5	27	2.7
Arizona		-	-	-	-	1995-99	546	5.3	441	3.6
Arkansas	1996-99	369	7.6	270	4.8	1995-99	455	7.7	352	4.7
California	1995-99	5,283	7.5	4,217	5.4	1995-99	3,745	5.7	2,995	3.9
Colorado	1995-99	710	8.2	580	6.1	1995-99	459	5.7	356	3.8
Connecticut	1995-99	664	8.6	521	5.6	1995-99	415	5.5	325	3.3
Delaware	1995-99	129	7.7	123	6.1	1995-99	72	4.5	76	3.8
District of Columbia	1995-99	100	8.4	71	4.7	1995-99	50	4.3	28	1.7
Florida		-	-	-	-	1995-99	2,368	6.0	1,874	3.9
Georgia	1995-99	1,025	6.4	905	4.9	1995-99	772	5.3	648	3.6
Hawaii	1995-99	148	5.1	122	4.1	1995-99	93	3.2	76	2.5
Idaho	1995-99	262	9.5	188	6.4	1995-99	182	6.8	124	4.2
Illinois	1995-99	2,067	7.6	1,683	5.3	1995-99	1,377	5.3	1,080	3.3
Indiana	1995-99	986	7.4	831	5.3	1995-99	756	5.9	672	4.2
Iowa	1995-99	558	8.1	474	5.8	1995-99	450	6.5	383	4.4
Kansas		-	-	-	-	1995-99	377	6.4	316	4.4
Kentucky	1995-99	704	8.0	603	5.7	1995-99	588	6.8	461	4.2
Louisiana	1995-99	666	7.2	583	5.1	1995-99	497	5.5	449	4.0
Maine	1995-97	172	9.9	137	6.5	1995-99	212	7.4	162	4.4
Maryland	1995-99	868	7.7	752	5.7	1995-99	553	5.2	491	3.7
Massachusetts	1995-99	1,227	8.7	1,046	6.1	1995-99	799	5.8	651	3.6
Michigan	1995-99	1,789	8.1	1,552	6.0	1995-99	1,265	5.9	1,074	4.1
Minnesota	1995-99	878	8.1	656	5.5	1995-99	622	6.0	497	4.1
Mississippi		-	-	-	-	1995-99	378	6.7	353	4.8
Missouri	1996-99	898	8.9	799	6.6	1995-99	748	6.0	618	4.0
Montana	1995-99	177	8.2	171	7.3	1995-99	116	5.3	102	4.2
Nebraska	1995-99	319	8.3	256	5.7	1995-99	249	6.6	205	4.4
Nevada	1995-99	294	7.5	234	5.8	1995-99	188	5.0	118	2.9
New Hampshire	1995-99	233	8.8	183	6.2	1995-99	181	7.1	139	4.6
New Jersey	1995-99	1,608	8.5	1,402	6.2	1995-99	898	4.9	836	3.6
New Mexico	1995-99	276	7.3	191	4.5	1995-99	180	4.9	134	3.2
New York	1995-99	3,614	8.7	3,238	6.4	1995-99	1,994	4.9	1,737	3.3
North Carolina	1995-99	1,241	7.4	1,076	5.4	1995-99	954	5.9	895	4.4
North Dakota	1997-99	62	6.7	63	6.0	1995-99	101	6.6	110	6.2
Ohio	1996-99	1,628	7.8	1,363	5.6	1995-99	1,469	5.8	1,170	3.7
Oklahoma		-	-	-	-	1995-99	454	5.9	360	3.8
Oregon	1996-99	551	8.7	399	5.7	1995-99	528	6.9	400	4.5
Pennsylvania	1995-99	2,328	7.9	2,008	5.7	1995-99	1,651	5.6	1,437	3.8
Rhode Island	1995-99	210	9.0	209	7.0	1995-99	138	6.0	159	5.0
South Carolina	1997-99	396	7.6	329	5.3	1995-99	530	6.5	433	4.2
South Dakota		-	-	-	-	1995-99	11	6.6	108	5.1
Tennessee	1997	198	7.8	153	5.3	1995-99	818	6.8	684	4.6
Texas	1995-99	3,060	7.4	2,657	5.7	1995-99	2,187	5.8	1,957	4.3
Utah	1995-99	330	8.1	290	6.4	1995-99	196	5.4	155	3.8
Vermont		-	-	-	-	1995-99	78	5.7	58	3.8
Virginia	1995-99	1,009	6.7	844	4.9	1995-99	702	5.0	636	3.7
Washington	1995-99	1,147	9.0	821	5.8	1995-99	837	6.8	593	4.2
West Virginia	1995-99	328	7.4	332	6.2	1995-99	228	5.0	255	4.5
Wisconsin	1995-99	1,014	8.4	913	6.6	1995-99	714	6.0	617	4.4
Wyoming	1995-99	93	8.2	74	6.3	1995-99	62	5.6	51	4.3

<sup>a</sup>Rates are per 100,000 person years.

<sup>b</sup>Source: Cancer Incidence in North America, 1995-1999. Volumes One and Two. North American Association of Central Cancer Registries, April 2002.

- Not available

## TABLES

**TABLE 17: PRIMARY BRAIN AND OTHER NERVOUS SYSTEM TUMORS, ESTIMATED NUMBER OF CASES<sup>a,b</sup> BY STATE, 2002; PRIMARY MALIGNANT BRAIN AND OTHER NERVOUS SYSTEM TUMORS, ESTIMATED NUMBER OF CASES<sup>a,b</sup> AND DEATHS<sup>c,d</sup> BY STATE, 2002**

STATE	YEAR	All Brain Tumors	Malignant Brain Tumors	
		ESTIMATED CASES	ESTIMATED CASES	ESTIMATED DEATHS
Alabama	2002	660	360	200
Alaska	2002	80	40	-
Arizona	2002	710	390	200
Arkansas	2002	410	220	200
California	2002	4,270	2,360	1,500
Colorado	2002	590	330	200
Connecticut	2002	490	270	100
Delaware	2002	110	60	-
District of Columbia	2002	70	40	-
Florida	2002	2,570	1,400	900
Georgia	2002	1,070	590	300
Hawaii	2002	180	100	-
Idaho	2002	190	110	100
Illinois	2002	1,690	930	500
Indiana	2002	870	480	300
Iowa	2002	440	240	200
Kansas	2002	390	210	100
Kentucky	2002	590	320	200
Louisiana	2002	610	340	200
Maine	2002	190	100	100
Maryland	2002	740	400	200
Massachusetts	2002	900	490	300
Michigan	2002	1,370	750	400
Minnesota	2002	690	380	200
Mississippi	2002	400	220	200
Missouri	2002	820	450	300
Montana	2002	150	80	-
Nebraska	2002	250	140	100
Nevada	2002	290	160	100
New Hampshire	2002	170	90	100
New Jersey	2002	1,200	660	400
New Mexico	2002	260	140	100
New York	2002	2,600	1,420	800
North Carolina	2002	1,150	630	400
North Dakota	2002	100	50	-
Ohio	2002	1,660	910	600
Oklahoma	2002	510	280	100
Oregon	2002	530	290	200
Pennsylvania	2002	1,880	1,020	600
Rhode Island	2002	150	80	100
South Carolina	2002	560	310	200
South Dakota	2002	110	60	100
Tennessee	2002	830	460	300
Texas	2002	2,700	1,490	900
Utah	2002	270	150	100
Vermont	2002	90	50	-
Virginia	2002	990	540	300
Washington	2002	850	460	300
West Virginia	2002	290	160	100
Wisconsin	2002	780	420	300
Wyoming	2002	80	40	-

<sup>a</sup>Source: CBTRUS, 1995-1999 data.

<sup>b</sup>Rounded to the nearest 10.

<sup>c</sup>Source: Cancer Facts & Figures 2002. American Cancer Society, 2002.

<sup>d</sup>Rounded to the nearest 100.

- Estimate is 50 or fewer deaths.

**TABLE 18: FIVE-YEAR RELATIVE SURVIVAL RATES FOR MALIGNANT BRAIN AND CENTRAL NERVOUS SYSTEM TUMORS BY SITE<sup>a</sup> AND GENDER, SEER 1973-1999**

ICDO CODE	SITE <sup>a</sup>	MALES		FEMALES		TOTAL	
		N	%	N	%	N	%
C71.0-C71.4, C71.7-C71.9, C72.0-C72.5	Brain(excluding ventricle and cerebellum), cranial nerves, and spinal cord	17,175	23.9	13,400	25.1	30,575	24.4
C71.5	Ventricle	379	50.4	268	52.6	647	51.3
C71.6	Cerebellum	1,193	63.4	873	69.9	2,066	66.0
C72.8-C72.9	Other nervous system	55	37.1	39	40.4	94	38.2
C70.0-C70.9	Meninges (cerebral and spinal)	247	48.7	267	63.3	514	56.4
C75.1-C75.2	Pituitary	60	79.2	72	77.8	132	78.1
C75.3	Pineal	229	65.1	64	56.3	293	63.2
C30.0 (9522:9523)	Olfactory tumors of the nasal cavity	65	71.8	59	75.6	124	73.7

<sup>a</sup>The sites referred to in this table are based on the categories and site codes defined in the SEER Site/Histology Validation List. Abbreviation used: SEER, Surveillance, Epidemiology, and End Results.

**TABLE 19: ONE-, TWO-, FIVE-, AND TEN-YEAR OBSERVED AND RELATIVE SURVIVAL RATES<sup>a</sup> FOR SELECTED MALIGNANT BRAIN AND CENTRAL NERVOUS SYSTEM TUMORS, SEER 1973-1999**

HISTOLOGY	ICDO CODE(S)	NO. OF CASES	1-YEAR		2-YEAR		5-YEAR		10-YEAR	
			OBS	REL	OBS	REL	OBS	REL	OBS	REL
Pilocytic astrocytoma	9421-9422	895	94.7	94.9	92.9	93.3	88.9	89.7	85.6	87.1
Diffuse astrocytoma	9410, 9420	659	72.7	73.4	60.3	61.4	44.6	46.9	34.1	38.1
Anaplastic astrocytoma	9401, 9411	1,998	59.7	60.4	43.3	44.4	28.0	30.0	19.4	22.7
Astrocytoma, NOS	9400	6,964	58.2	59.0	45.0	46.4	33.6	36.3	25.1	29.9
Glioblastoma	9440-9442, 9481	13,733	28.1	28.8	8.2	8.6	2.9	3.3	1.7	2.3
Oligodendroglioma	9450	1,524	87.9	88.5	80.1	81.3	65.7	68.3	46.8	51.1
Anaplastic oligodendroglioma	9451, 9460	256	75.0	75.8	56.8	58.1	38.1	40.5	24.5	27.7
Ependymoma/anaplastic ependymoma	9391-9393	1,038	85.9	86.3	78.6	79.5	65.9	67.9	55.3	59.0
Mixed glioma	9382	664	83.6	84.1	71.9	72.8	54.4	56.3	39.0	42.3
Glioma malignant, NOS	9380	2,346	46.6	47.7	33.9	35.5	25.3	28.5	19.3	24.7
Neuroepithelial	9381, 9423, 9430, 9443	235	59.5	60.2	47.3	48.5	37.0	39.4	28.5	32.7
Malignant neuronal/glioma, neuronal and mixed	8680-8682, 8690, 8693, 9490-9491, 9500, 9505-9506, 9522-9523	154	77.1	77.4	63.6	64.0	51.3	52.1	46.3	47.5
Embryonal/primitive/medulloblastoma	8963, 9363-9364, 9470-9473, 9501-9503	1,269	79.8	80.0	70.2	70.4	53.6	54.0	45.2	45.9
<b>TOTAL: ALL BRAIN AND CNS<sup>b</sup></b>	<b>8000-9989</b>	<b>33,896</b>	<b>50.0</b>	<b>50.9</b>	<b>35.0</b>	<b>36.4</b>	<b>25.6</b>	<b>28.2</b>	<b>19.5</b>	<b>24.2</b>

<sup>a</sup>Rates are an estimate of the percentage of patients alive at one, two, five and ten years, respectively.

<sup>b</sup>Includes histologies not listed in this table. Brain lymphomas, olfactory tumors of the nasal cavity, and malignant tumors of the pituitary and pineal glands are excluded.

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

**TABLES**

**TABLE 20: ONE-, TWO-, FIVE-, AND TEN-YEAR RELATIVE SURVIVAL RATES<sup>a</sup> FOR SELECTED MALIGNANT BRAIN AND CENTRAL NERVOUS SYSTEM TUMORS BY AGE GROUPS, SEER 1973-1999**

HISTOLOGY	ICDO CODE(S)	AGE GROUP	# CASES	1-YEAR	2-YEAR	5-YEAR	10-YEAR
Pilocytic astrocytoma	9421-9422	0-14	523	97.0	96.0	92.7	90.7
		0-19	634	96.9	96.0	92.7	91.2
		20-44	201	93.4	90.2	87.2	81.5
		45-64	42	87.9	85.5	72.1	57.8
		65+	18	b	b	b	b
		<b>Total</b>	<b>895</b>				
Diffuse astrocytoma	9410, 9420	0-14	98	92.9	85.4	80.9	78.2
		0-19	124	92.7	86.7	82.3	80.3
		20-44	268	89.9	81.8	56.6	37.9
		45-64	163	58.8	35.5	23.5	14.2
		65+	104	29.3	15.5	6.0	6.0
		<b>Total</b>	<b>659</b>				
Anaplastic astrocytoma	9401, 9411	0-14	117	73.0	57.4	48.8	46.1
		0-19	158	78.1	61.0	52.4	47.8
		20-44	771	85.9	72.6	49.5	32.8
		45-64	598	53.9	32.1	16.1	11.7
		65+	471	20.4	6.0	2.4	1.7
		<b>Total</b>	<b>1,998</b>				
Astrocytoma, NOS	9400	0-14	852	87.3	82.0	77.8	73.8
		0-19	1,114	87.5	81.4	76.4	72.5
		20-44	2,034	86.7	75.5	54.2	37.4
		45-64	2,070	49.5	28.8	17.6	10.8
		65+	1,746	18.6	7.8	4.6	2.5
		<b>Total</b>	<b>6,964</b>				
Glioblastoma	9440-9442, 9481	0-14	162	47.7	24.7	17.2	15.5
		0-19	244	51.0	28.8	19.3	16.4
		20-44	1,643	58.9	29.8	13.4	8.4
		45-64	5,872	34.8	7.8	2.1	1.0
		65+	5,974	13.3	2.1	0.3	0.2
		<b>Total</b>	<b>13,733</b>				
Oligodendroglioma	9450	0-14	99	92.7	89.3	85.3	76.0
		0-19	152	92.0	86.2	82.1	76.3
		20-44	773	95.2	91.0	80.5	62.1
		45-64	453	85.9	74.1	53.6	31.8
		65+	146	57.3	45.9	28.5	9.6
		<b>Total</b>	<b>1,524</b>				
Anaplastic oligodendroglioma	9451, 9460	0-14	5	b	b	b	b
		0-19	8	b	b	b	b
		20-44	109	91.2	73.6	49.7	30.6
		45-64	93	72.2	57.2	39.1	29.0
		65+	46	44.3	23.9	18.4	b
		<b>Total</b>	<b>256</b>				
Ependymoma/ anaplastic ependymoma	9391-9393	0-14	337	83.5	68.4	48.0	42.2
		0-19	380	84.8	71.1	51.9	43.8
		20-44	364	91.1	89.1	83.6	75.8
		45-64	219	85.3	80.5	69.3	57.9
		65+	75	73.7	73.5	70.7	50.4
		<b>Total</b>	<b>1,038</b>				

TABLE 20 (CONTINUED).

HISTOLOGY	ICDO CODE(S)	AGE GROUP	# CASES	1-YEAR	2-YEAR	5-YEAR	10-YEAR
Mixed glioma	9382	0-14	72	88.9	80.4	70.0	62.6
		0-19	101	87.1	79.9	71.3	64.9
		20-44	318	92.1	84.9	69.1	48.8
		45-64	188	79.6	58.8	35.1	22.4
		65+	57	49.0	35.2	16.4	8.2
		<b>TOTAL</b>	<b>664</b>				
Glioma malignant, NOS	9380	0-14	504	67.6	48.9	42.9	40.0
		0-19	572	69.2	51.8	45.5	41.2
		20-44	417	79.3	67.1	50.4	35.8
		45-64	533	46.7	30.3	20.6	14.7
		65+	824	16.4	9.4	5.3	4.2
		<b>TOTAL</b>	<b>2,346</b>				
Neuroepithelial	9381, 9423, 9430, 9443	0-14	46	84.9	74.0	58.9	56.6
		0-19	62	87.2	77.4	65.4	63.7
		20-44	64	76.7	64.3	51.8	32.1
		45-64	65	45.1	26.4	18.6	11.0
		65+	44	18.0	13.1	3.6	b
		<b>TOTAL</b>	<b>235</b>				
Malignant neuronal/glial, neuronal and mixed	8680-8682, 8690, 8693, 9490-9491, 9500, 9505-9506, 9522-9523	0-14	98	75.7	65.1	54.8	52.2
		0-19	111	76.7	67.5	53.3	51.0
		20-44	28	89.4	68.1	57.3	49.7
		45-64	13	b	b	b	b
		65+	2	b	b	b	b
		<b>TOTAL</b>	<b>154</b>				
Embryonal/primitive/ medulloblastoma	8963, 9363-9364, 9470-9473, 9501-9503	0-14	841	77.8	67.5	52.3	46.1
		0-19	926	79.0	69.2	53.3	46.3
		20-44	287	85.5	75.4	56.5	45.1
		45-64	47	73.5	68.8	55.0	38.4
		65+	9	b	b	b	b
		<b>TOTAL</b>	<b>1,269</b>				
<b>TOTAL: ALL BRAIN AND CNS<sup>c</sup></b>	<b>8000-9989</b>	0-14	3,966	80.6	70.9	61.8	57.7
		0-19	4,866	81.7	72.3	63.1	58.6
		20-44	7,631	81.5	67.8	50.4	37.0
		45-64	10,917	45.7	23.1	14.2	9.4
		65+	10,482	18.7	8.3	4.9	3.2
		<b>TOTAL</b>	<b>33,896</b>				

<sup>a</sup>Rates are an estimate of the percentage of patients alive at one, two, five and ten years, respectively.

<sup>b</sup>Too few cases to estimate.

<sup>c</sup>Includes histologies not listed in this table. Brain lymphomas, olfactory tumors of the nasal cavity, and malignant tumors of the pituitary and pineal glands are excluded.

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

## **PROCEDURE FOR REQUESTING ADDITIONAL DATA**

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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 twelve population-based cancer registries. These data include all cases newly diagnosed between 1995 and 1999 with ICDO codes C70.0–C70.9, C71.0–C71.9, C72.0–C72.9, C75.1– C75.3, and C30.0 (9522-9523). These data have no identifiers. In addition, CBTRUS will assist in accessing mortality, survival and treatment information using other databases.

This Report (1995-1999 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

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

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1. TITLE OF PROJECT:

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

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3. POSITION TITLE:

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4. DEPARTMENT, SERVICE, LABORATORY OR EQUIVALENT:

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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):

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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.)

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11. DATES OF ENTIRE PROPOSED PROJECT:

FROM: TO:

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12. PERFORMANCE SITES: (ORGANIZATIONS AND ADDRESSES)

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

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14. SIGNATURE OF PRINCIPAL INVESTIGATOR:

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**PUBLISHED**

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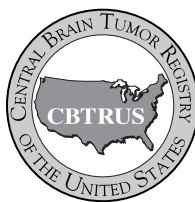
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## NOTES

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# 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 in the United States of databases on primary brain tumors from population-based registries 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.*