



American Brain Tumor Association

Facts & Statistics, 2009

Brain tumors do not discriminate. Primary brain tumors - those that begin in the brain and tend to stay in the brain - occur in people of all ages, but they are statistically more frequent in children and older adults. Metastatic brain tumors – those that begin as a cancer elsewhere in the body and spread to the brain – are more common in adults than in children.

Brain tumors are the:

- the second leading cause of cancer-related deaths in children under age 20 (leukemia is the first)
- the second leading cause of cancer-related deaths in males up to age 39
- the second leading cause of cancer-related deaths in females under age 20.
- the fifth leading cause of cancer-related deaths in females ages 20–39.⁶

The facts and statistics here include brain and spinal cord tumors (central nervous system tumors). We continually update these statistics, as they become available, at our web site: www.abta.org. This material was last updated in July 2009. We thank the *Central Brain Tumor Registry of the United States (CBTRUS)* for their assistance with that update.

These numbers address incidence, trends and patterns in the United States only. For international statistics, please visit CBTRUS at www.cbtrus.org.

Incidence Statistics

An estimated 61,414 new cases of primary brain tumors are expected to be diagnosed in 2009. The incidence statistic of 61,414 persons diagnosed per year includes both malignant (22,738) and non-malignant (38,677) brain tumors. These estimates are based on an application of age-sex-race-specific incidence rates from the Surveillance, Epidemiology and End Results (SEER) program for 2004-2006¹¹ to projected 2009 US

population estimates for the respective age-sex-race groups (estimation methodology can be found at <http://www.idph.state.il.us/cancer/statistics.htm#PR>).

Incidence is the number of people newly diagnosed in one year. **Rate** is the measure of the amount of a disease in a specific population. It is calculated by counting the number of people with the disease and dividing by the total population at risk.

In 2009, approximately 4,000 children younger than age 20 will be diagnosed with primary brain tumors, of which 2,875 will be under age 15.¹¹

Brain tumors are the most common of the solid tumors in children, and the leading cause of death from solid tumors.^{1,2} Brain tumors are the second most frequent malignancy of childhood; leukemia is the most common²

Although statistics for brain metastases are not readily available, it is estimated that more than 150,000 cancer patients per year will have symptoms due to a metastatic brain tumor or a metastatic brain tumor in the spinal cord.³ *Metastatic brain tumors* begin as a cancer elsewhere in the body and spread, or metastasize, to the brain. *Primary brain tumors* are tumors that begin in the brain and tend to stay in the brain.

Regarding Incidence Rates

The incidence of all primary brain and central nervous system tumors appears to increase steadily with age. The lowest incidence rate is among children less than 20 years (4.6 per 100,000 person years). The rate increases steadily until age 75—84, when it peaks at 63.8 per 100,000 person years. After age 85, the incidence rate drops to 62.4.¹

Prevalence Statistics

It is estimated that, during the years 2004-2005, approximately 359,000 people in the United States were living with the diagnosis of a primary brain or central nervous system tumor. Specifically, more than 81,000 persons were living with a malignant tumor, more than 267,000 persons with a benign tumor, and more than 10,000 persons with a tumor of uncertain behavior (exact type, unknown).⁵ Note: year 2000 prevalence statistics are the most recent available.

For every 100,000 people in the United States, approximately 131 are living following the diagnosis of a brain tumor. This represents a prevalence rate of 130.8 per 100,000 person years.⁵

Of the brain tumor survivors, about 75% were diagnosed with benign tumors, 23% were diagnosed with malignant tumors, 2% with tumors of uncertain behaviors.⁵

The prevalence rate for primary malignant tumor survivors is estimated to be 29.5 per 100,000. The prevalence rate for primary benign tumor survivors is estimated to be 97.5 per 100,000 person years.⁵

Pediatric Statistics

An estimated 4,000 children under age 20 are diagnosed annually with a primary benign or malignant brain tumor. ¹¹ Of these, 2,875 will be less than 15 years of age, and 1,125 between the ages of 15 and 19.

The pediatric incidence rate of 4.58 per 100,000 person years is slightly higher in boys (4.61 per 100,000) than girls (4.55 per 100,000)¹.

Brain tumors are the second most frequent malignancy of childhood⁶ and the most common of the solid tumors in children.² Brain tumors are the second leading cause of cancer-related deaths in children under the age of 20.⁶ Leukemia remains the first.^{2,6}

The majority of childhood tumors (17.3%) are located within the frontal, temporal, parietal, and occipital lobes of the brain. Tumors located in the cerebrum, ventricle, brain stem and cerebellum account for 6%, 6%, 16%, and 12% of all childhood tumors, respectively. Tumors located in overlapping or 'other' brain locations account for 14% of all childhood tumors.¹

Gliomas account a significant percentage of childhood tumors:

- 55% of all tumors and 70% of malignant tumors in children age 0–14
- 40% of all tumors and 73% of malignant tumors in children age 15–19.¹

Trends in incidence of primary malignant brain tumors for children in the United States using Surveillance, Epidemiology, and End Results (SEER) Program data and a sophisticated statistical technique were evaluated in 1998.⁷ SEER is a

program of the National Cancer Institute. It collects and analyzes information on cancer incidence, mortality, and survival in the U.S. SEER data does not include benign brain tumors. The incidence of brain malignancies did not increase steadily from 1978 to 1994 as previously reported, but rather “jumped” to a steady, higher rate after 1984-85. The timing of the “jump” coincided with the wider availability of magnetic resonance imaging (MRI) in the United States.

This finding, combined with the absence of any “jump” in corresponding mortality for the same period, appears due to improved diagnosis and reporting during the 1980s.

Age-, Gender-, and Race-Specific Statistics

The incidence rate of primary non-malignant and malignant brain and central nervous system tumors is 18.16 cases per 100,000 person-years. For all primary brain and other nervous system tumors, the incidence rate is 17.08 per 100,000 for males and 19.16 per 100,000 for females.¹ Rates are age-adjusted to the year 2000 U.S. standard population.

Brain tumors are the:

- the second leading cause of cancer-related deaths in children under age 20
- the second leading cause of cancer-related deaths in males up to age 39
- the second leading cause of cancer-related deaths in females under age 20.
- the fifth leading cause of cancer-related deaths in females ages 20–39.⁶

Within the following age groups, the most common primary brain tumors are:

- In ages 0–4, embryonal/primitive neuroectodermal tumors/medulloblastomas (incidence rate of 0.92 per 100,000 person-years), followed by pilocytic astrocytomas (0.90);
- in ages 5–9, pilocytic astrocytomas (0.90 per 100,000) followed by malignant gliomas, not otherwise specified (0.70);
- in ages 10–14, pilocytic astrocytomas (0.80 per 100,000) followed by non-malignant and malignant neuronal/glia (0.39);
- in ages 15–19, pituitary tumors (0.97 per 100,000) followed by pilocytic astrocytomas (0.58);
- in ages 20–34, pituitary (1.82 per 100,000) followed by meningioma tumors (1.01);

- in ages 35—44, meningiomas (3.60 per 100,000) followed by pituitary tumors (2.47);
- in ages 45—54, meningiomas (7.20 per 100,000) followed by glioblastoma (3.74);
- in ages 55—64, meningiomas (12.04 per 100,000) followed by glioblastoma (8.09);
- in ages 65—74, meningiomas (20.44 per 100,000) followed by glioblastoma (13.16);
- in ages 75—84, meningiomas (28.66 per 100,000) followed by glioblastoma (14.61); and,
- in ages 85 and older, meningiomas (35.27 per 100,000) followed by glioblastoma (8.57)¹

The median age of diagnosis for all primary brain tumors is 57 years old.¹⁰

Rates for all primary brain tumors combined are higher among Whites (18.38 per 100,000 persons) than African-Americans (16.34 per 100,000). The difference between these rates is statistically significant¹.

The overall incidence rate for primary brain and central nervous system tumors among Hispanics is 17.38 per 100,000, compared to 16.55 per 100,000 for non-Hispanic African-Americans and 18.62 per 100,000 for White non-Hispanics.¹

Tumor-Specific Statistics

Meningiomas represent 33.4% of all primary brain tumors, making them the most common primary brain tumor.¹

Gliomas, a broad term which includes all tumors arising from the gluey or supportive tissue of the brain, represent 33% of all brain tumors and 80% of all malignant tumors.¹

Glioblastomas represent 17.6% of all primary brain tumors, and 54% of all gliomas¹

Astrocytomas represent 7.4% of all primary brain tumors.¹

Astrocytomas and glioblastomas combined represent 77% of all gliomas.¹

Nerve sheath tumors (such as acoustic neuromas) represent about 9% of all primary brain tumors.¹

Pituitary tumors represent 12.2% of all primary brain tumors.¹

Lymphomas represent 2.5% of all primary brain tumors.¹

Oligodendrogliomas represent 2.1% of all primary brain tumors.¹

Medulloblastomas/embryonal/primitive tumors represent 1% of all primary brain tumors.¹

The majority of primary tumors (32%) are located within the meninges, followed by those located within the frontal, temporal, parietal and occipital lobes of the brain (24%).¹

Metastatic brain tumors are the most common brain tumor, with an annual incidence more than four times greater than that of primary brain tumors.

The cancers that most commonly metastasize to the brain are lung and breast.

Survival Trends

In 2008, the American Cancer Society reported a significant decrease in the number of brain and central nervous system cancer deaths over the past 13 years. Deaths due to malignant brain tumors decreased 14.36% between 1991 and 2004.⁶

In an analysis of SEER data from 1973-2001, five year survival rates for those with malignant brain tumors showed improvement over a three decade period: 21% in the 1970's, 27% in the 1980's, and 31% in the 1990's.⁹

Another analysis of survival rates for those with primary malignant brain tumors was reported by the Central Brain Tumor Registry in data obtained from SEER. From 1973—1976, 22% of persons diagnosed in the US with a malignant brain tumor survived at least five years. For those diagnosed from 1992-1998, that survival rate increased to 32%. SEER data from 1973-2004 shows a 29% survival rate for males and 32% rate for females.¹⁰

Children, age 0 to 19, had the highest five-year survival rate at 66% between 1973 and 2004. That survival rate diminishes as age increases, down to 5% for persons age 75 and older.¹⁰

For Whites, the five-year survival rate jumped from 22% between 1974 and 1976, to 34% between 1996 and 2003.⁶ For African Americans, the five-year survival rates for the same time periods increased from 27 to 37%.⁶

NOTE – The term “five year survival” does not mean that group of people lived only five years after the start of the study. It means the study followed them for only five years. Five years is a standard “goal” in measuring survival for most diseases.

Five year, or even ten year, survival statistics do not tell us how many people lived longer than the five or ten years of the study. Those statistics require longer-term follow-up of people diagnosed with the given disease, which can be challenging to do in our mobile society. It can be very difficult for researchers to stay in contact with patients for more than five or ten years given the frequency of American family moves.

Sources

¹ CBTRUS (2009). CBTRUS Statistical Report: Primary Brain and Central Nervous System Tumors Diagnosed in the United States in 2004-2005. Source: Central Brain Tumor Registry of the United States, Hinsdale, IL. website: www.cbtrus.org

²Ries LAG, Melbert D, Krapcho M, Mariotto A, Miller BA, Feuer EJ, Clegg L, Horner MJ, Holader N, Eisner MP, Reichman M, Edwards BK (eds). SEER Cancer Statistics Review, 1975-2004, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2004/, based on November 2006 SEER data submission, posted to the SEER web site, 2007.

³Lenhard Jr. RE, Osteen RT, Gansler T. Clinical Oncology, American Cancer Society, 2001, p. 655.

⁴Legler JM, Ries LAG, Smith MA, Warren JL, et al. “Brain and Other Central Nervous System Cancers: Recent Trends in Incidence and Mortality.” Journal of the National Cancer Institute, Vol. 91, No. 16, August 18, 1999, pp. 1382-1390.

⁵Davis 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*, Vol. 3, No. 3, June 2001, pp. 152-158.

⁶Jemal A, Siegel R, Ward E, et al. *Cancer Statistics, 2009*. CA: A Cancer Journal for Clinicians. American Cancer Society. Published online May 2009.

⁷Smith MA, Freidlin B, Ries LAG, Simon R. "Trends in reported incidence of primary malignant brain tumors in children in the United States." *Journal of the National Cancer Institute*, Sept 1998, Vol. 90, No. 17, pp. 1269-1277.

⁸Estimated by CBTRUS using Surveillance, Epidemiology and End Results (SEER) Program public use CD-ROM (1973-2002). National Cancer Institute, CDCPC, Surveillance Program, Cancer Statistics Branch, issued April 2005, based on the November 2004 submission.

⁹Sundeeep, D, Lynch, C. Trends in brain cancer incidence and survival in the United States: Surveillance, Epidemiology, and End Results Program, 1973 to 2001. *Neurosurgical Focus* 20 (4):E1, 2006

¹⁰CBTRUS (2008). *Statistical Report: Primary Brain Tumors in the United States, 2000-2004*. Published by the Central Brain Tumor Registry of the United States.

¹¹Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) SEER*Stat Database: Incidence - SEER 17 Regs Limited-Use + Hurricane Katrina Impacted Louisiana Cases, Nov 2008 Sub (2000-2006) <Katrina/Rita Population Adjustment> - Linked To County Attributes - Total U.S., 1969-2006 Counties, National Cancer Institute, DCCPS, Surveillance Research Program, Cancer Statistics Branch, released April 2009, based on the November 2008 submission. Analyzed by CBTRUS July 13, 2009.

For Additional Information

In 1990, the American Brain Tumor Association conducted a feasibility study to evaluate the status of brain tumor data collection, and to determine the practicality of starting a registry whose purpose would be the collection of statistics for both benign and malignant brain tumors. The results of that study highlighted both the need and feasibility of such a registry. The American Brain Tumor Association then incorporated the Central Brain Tumor Registry of the United States (CBTRUS), and provided organization and financial support to the new entity.

CBTRUS was incorporated as a not-for-profit organization in 1992 to provide a resource for the gathering and circulating of current information on all primary brain tumors, benign and malignant, for the purposes of:

- describing incidence and survival patterns
- evaluating diagnosis and treatment
- facilitating etiologic (causation) studies
- establishing awareness of the disease
- and, ultimately, for the prevention of all brain tumors.

State or regional tumor registries obtain information about brain tumor patients from hospitals in their area. CBTRUS began by collection information from four registries that were already collecting data on benign and malignant brain tumors. Using their preliminary data, CBTRUS conducted studies to determine diagnostic accuracy and data completeness. They now have the voluntary collaboration of 15 state registries, and encourage other population-based registries that collect data on benign and malignant brain tumors to contact them about their efforts. The data collected is used to define incidence rates of all primary brain tumors, and can be used by researchers to identify geographic clusters of patients.

CBTRUS joined the North American Brain Tumor Coalition in supporting federal legislation (Public Law 107-260) that passed in October 2002 that enables government funded surveillance organizations to collect data on primary benign brain tumors beginning in 2004.

Please visit the Web site of the Central Brain Tumor Registry at www.cbtrus.org. For more information or additional statistical data on primary brain tumors, contact CBTRUS at 3333 W. 47th St., Chicago, Illinois 60632. Phone. 630-655-4786.

Web: www.cbtrus.org