

# Brain and Other Central Nervous System Tumors in Ohio 2023

July 2023

## Key Findings

- *An average of 922 cases of brain and other central nervous system (CNS) cancer were diagnosed each year from 2016 to 2020.*
- *Brain and other CNS cancer incidence rates were about 40% higher among males than in females.*
- *The incidence rate among White people was considerably higher than the rates among Black people, Asian/Pacific Islanders, and Hispanics in both Ohio and the United States.*
- *Brain and other CNS cancer was most frequently diagnosed among Ohioans 65 to 74 years old (22.3%).*
- *The mortality rate for brain and other CNS cancer in Ohio was 4.6 per 100,000 population from 2016 to 2020, compared with the national rate of 4.4 per 100,000 population during this period.*
- *Mortality rates of brain and other CNS cancer in Ohio were relatively stable from 1996 to 2020.*
- *In Ohio, 77.6% of brain and other CNS cancer cases were diagnosed at an early (local) stage.*
- *In Ohio, the five-year relative survival for patients with brain and other CNS cancer was 32.9%.*
- *An average of 1,423 cases of non-malignant brain and other CNS tumors (benign and borderline) were diagnosed annually in Ohio from 2016 through 2020.*
- *In contrast to malignant tumors, the incidence of non-malignant tumors was 68% higher among females than among males in Ohio.*

## Introduction

Brain tumors are the growth of abnormal cells in the tissues of the brain. These tumors may be either malignant (cancerous), benign (not cancerous), or borderline (neither malignant nor benign). This report highlights primary brain and other central nervous system (CNS) tumors—those that start in the brain, spinal cord, cranial nerves, or other nerves of the nervous system. Other tumors that start in or near the brain, such as pituitary tumors and CNS lymphomas, are not included in this category and are discussed separately in this report. Tumors that start in another part of the body and spread to the brain and nervous system are called metastatic tumors and are different from primary brain tumors.

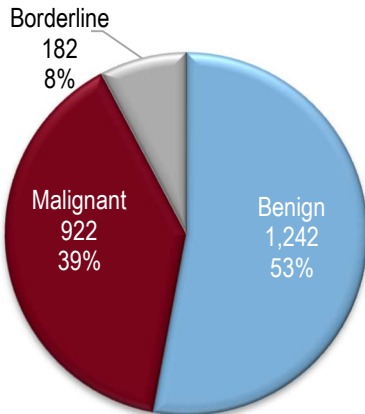
**Malignant** brain and other CNS tumors (referred to as brain and other CNS cancer) are likely to grow rapidly and crowd or invade the nearby healthy brain tissue. Unlike other cancers, tumors that start in the brain or spinal cord seldom spread to distant organs. Cancers of the brain and other CNS made up 1.3% of the incident (newly diagnosed) invasive cancers reported to the Ohio Cancer Incidence Surveillance System (OCISS), Ohio's central cancer registry, from 2016 through 2020. The most common type of malignant brain and other CNS tumors is glioma.

**Benign** brain and other CNS tumors represent over half of all primary brain and other CNS tumors. Benign brain and other CNS tumors rarely invade tissues around them or spread to other parts of the body. However, benign tumors can press on sensitive areas of the brain and cause serious health problems. As of 2004, benign brain and other CNS tumors are required to be reported to the OCISS and are included in this report. The most common type of benign brain and other CNS tumors is meningioma.

**Borderline** tumors are not invasive but also not completely benign. They are described as having borderline malignancy, low malignant potential, or uncertain malignant potential. Borderline tumors are grouped with benign tumors throughout this report.

## Classification by Behavior

**Figure 1. Brain and Other CNS Tumors: Average Annual Number and Percent of New Cases by Behavior, Ohio, 2016-2020**



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.  
CNS = Central Nervous System.

The behavior of a tumor is the way it acts within the body.

Figure 1 shows the average annual number and proportion of brain and other CNS tumors reported to OCISS from 2016-2020 by behavior (benign, malignant, and borderline).

- In Ohio, benign brain and other CNS tumors represented more than half (53%, 1,242 average annual cases) of all primary brain and other CNS tumors.
- An average of 922 malignant brain and other CNS tumors were diagnosed each year from 2016 to 2020 (39% of cases).
- About 8% of brain and other CNS tumors (182 average annual cases) were reported as borderline.

## Brain and Other CNS Cancer

### New Cases

An average of 922 cases of brain and other cancer were diagnosed annually in Ohio from 2016 through 2020, corresponding to an average annual age-adjusted incidence rate of 6.9 cases per 100,000 population. The incidence rate was about 40% higher among males than among females in both Ohio and the United States. The incidence rate among White people was higher than the rates among Black people, Asian/Pacific Islanders, and Hispanics in both Ohio and the United States (Table 1).

**Table 1. Brain and Other CNS Cancer: Average Annual Number of Cases and Deaths and Age-Adjusted Incidence and Mortality Rates per 100,000 Population by Sex, Race, and Ethnicity, Ohio and the United States, 2016-2020**

		New Cases			Deaths		
		Ohio		U.S.	Ohio		U.S.
		Cases	Rate	Rate	Deaths	Rate	Rate
<b>Total</b>		922	6.9	6.2	675	4.6	4.4
<b>Sex</b>	Male	511	8.0	7.4	381	5.7	5.4
	Female	411	5.8	5.2	295	3.7	3.6
<b>Race</b>	White	836	7.3	6.8	626	4.9	4.8
	Black	65	4.1	4.0	43	2.8	2.7
	A/PI	8	3.2	3.8	6	2.3	2.3
<b>Ethnicity</b>	Hispanic	11	3.3	5.1	9	3.1	3.1

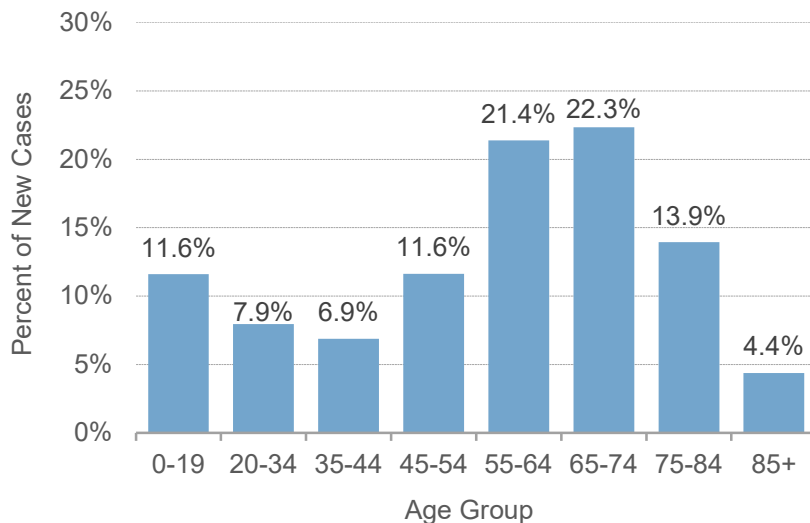
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023; Surveillance, Epidemiology, and End Results Program, National Cancer Institute, 2023.  
A/PI = Asian/Pacific Islander.

### Deaths

An average of 675 deaths from brain and other CNS cancer occurred each year in Ohio from 2016-2020. The Ohio age-adjusted mortality rate of 4.6 deaths per 100,000 population was similar to the U.S. rate of 4.4 deaths per 100,000. Males had a higher mortality rate for brain and other CNS cancer than females. The mortality rate for White people was higher than the rates for Black people, Asian/Pacific Islanders, and Hispanics in both Ohio and the United States (Table 1).

## New Cases and Deaths by Age Group

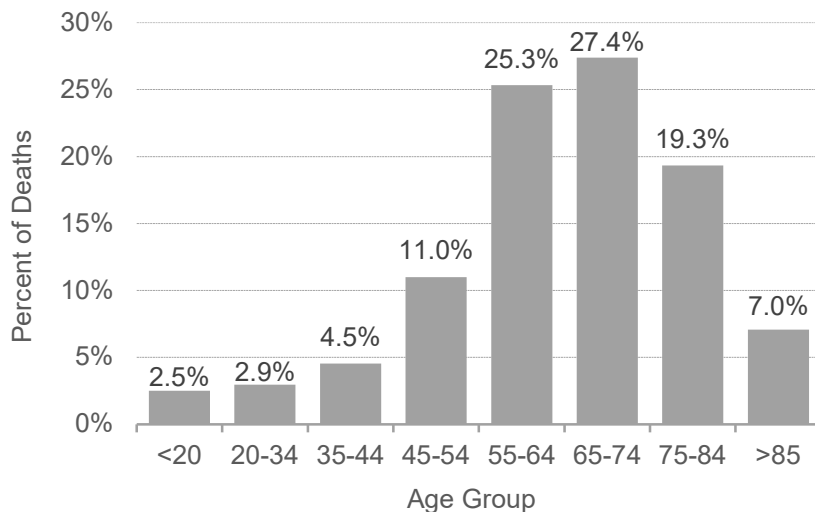
**Figure 2. Brain and Other CNS Cancer:  
Percent of New Cases by Age Group, Ohio, 2016-2020**



- In Ohio, brain and other CNS cancer was most frequently diagnosed among people 65 to 74 years old (22.3%), followed by people 55 to 64 years old (21.4%).
- Fewer than 12% of brain and other CNS cancer cases occurred among children and adolescents (ages 0-19).

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.

**Figure 3. Brain and Other CNS Cancer:  
Percent of Deaths by Age Group, Ohio, 2016-2020**

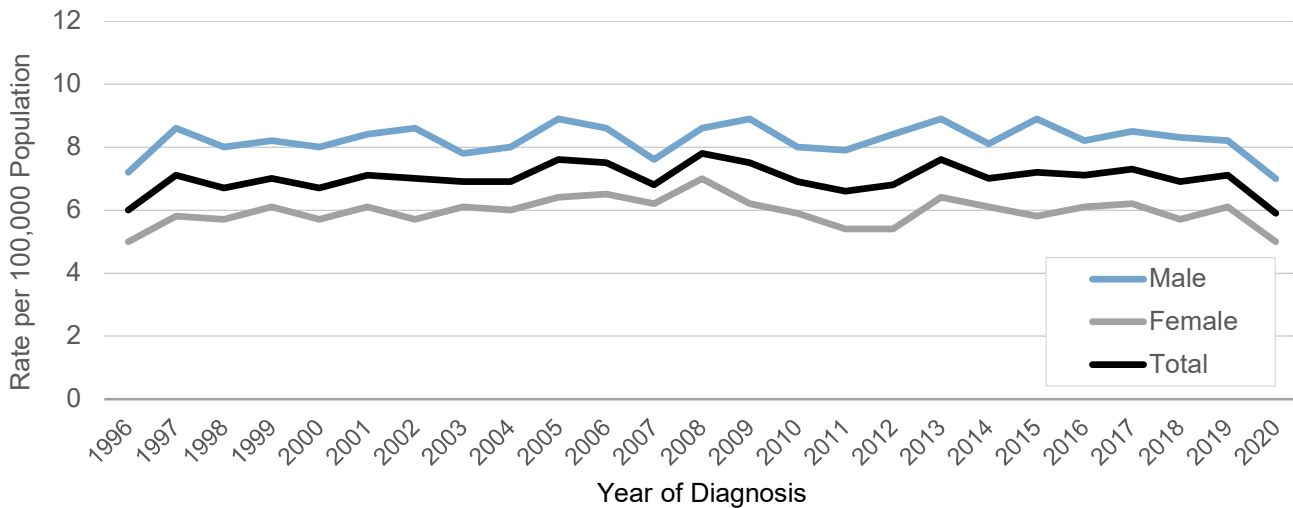


- In Ohio, deaths due to brain and other CNS cancer most frequently occurred among people 65 to 74 years old (27.4%), followed by people 55 to 64 years old (25.3%).
- About 2.5% of deaths occurred among children and adolescents (ages 0-19).

Source: Bureau of Vital Statistics, Ohio Department of Health, 2023.

## Trends in Brain and Other CNS Cancer Rates

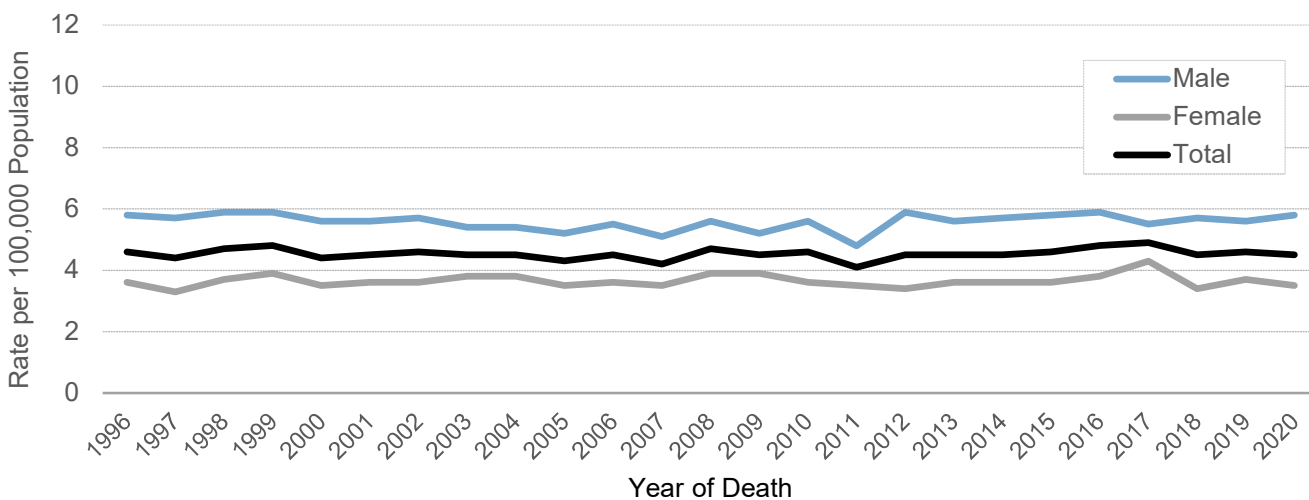
**Figure 4. Brain and Other CNS Cancer: Trends in Age-Adjusted Incidence Rates per 100,000 Population by Sex, Ohio, 1996-2020**



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.

- Incidence rates of brain and other CNS cancer in Ohio were slightly variable from 1996 to 2020 for males, females, and both sexes combined (total). Incidence rates among males were greater than those among females for each year (Figure 4).

**Figure 5. Brain and Other CNS Cancer: Trends in Age-Adjusted Mortality Rates per 100,000 Population by Sex, Ohio, 1996-2020**



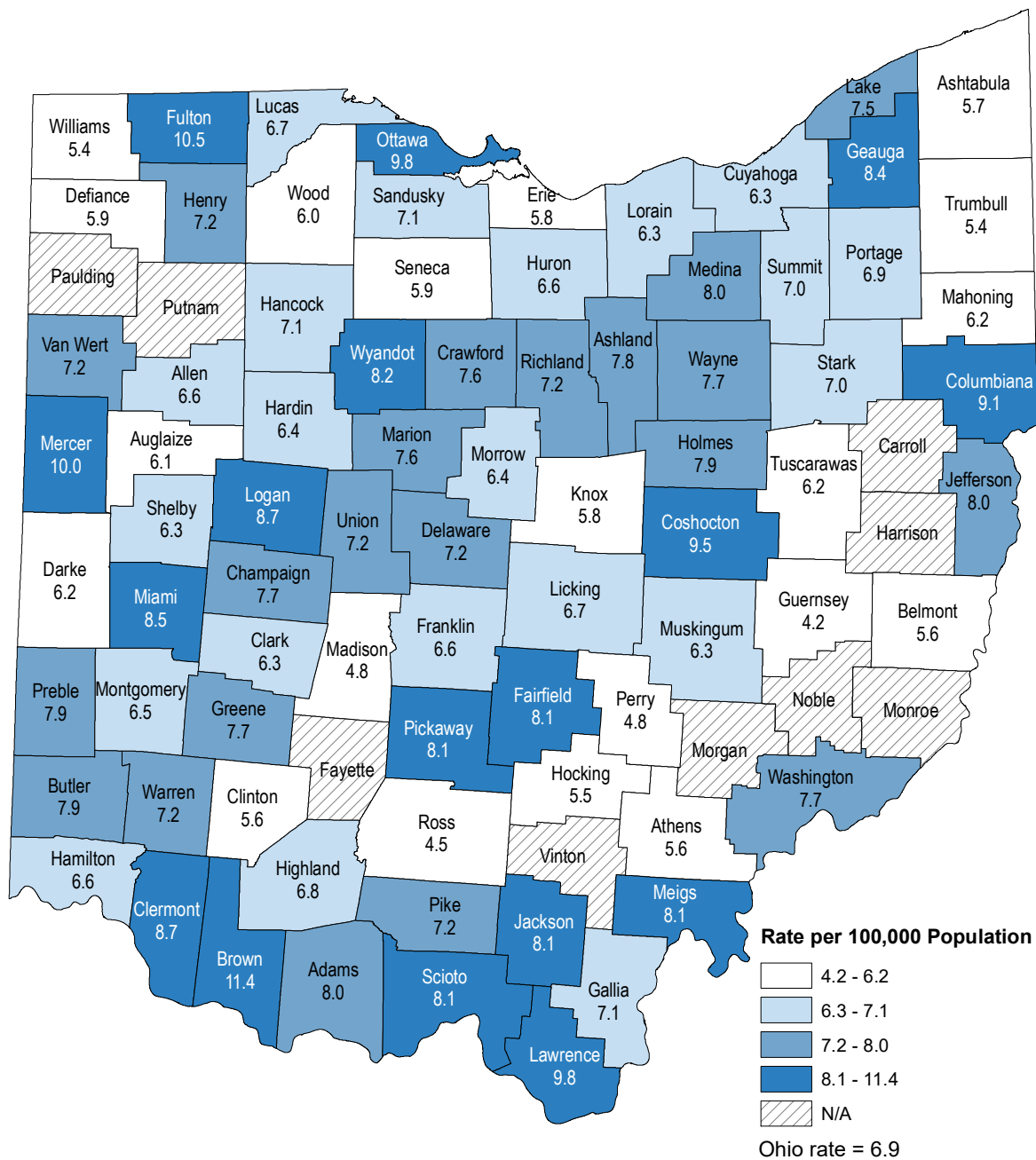
Source: Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, 2023.

- As shown in Figure 5, mortality rates of brain and other CNS cancer in Ohio were stable among males, females, and both sexes combined from 1996 to 2020. Mortality rates among males were greater than those among females for each year.

## Incidence by County

Figure 6 presents the 2016-2020 average annual age-adjusted incidence rates of brain and other CNS cancer by county of residence in Ohio. Rates ranged from 4.2 to 11.4 per 100,000 population, compared with Ohio's rate of 6.9 per 100,000. The following counties had the highest incidence rates, in decreasing order, for this period: Brown, Fulton, Mercer, Lawrence, and Ottawa.

**Figure 6. Brain and Other CNS Cancer: Average Annual Age-Adjusted Incidence Rates per 100,000 Population by County of Residence, Ohio, 2016-2020**



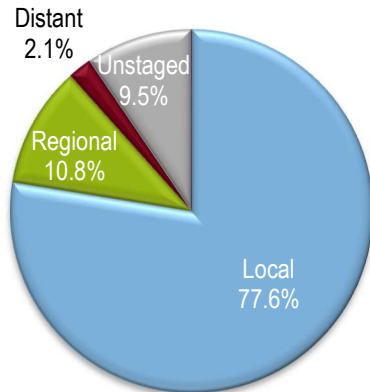
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.

N/A: Rate not presented when the count for 2016-2020 is less than 10.

## Stage at Diagnosis

Staging describes the extent or spread of cancer at the time of diagnosis. For most cancers, stage at diagnosis is based on the size or extent of the primary (initial) tumor and whether the cancer has spread to nearby lymph nodes or other areas of the body.

**Figure 7. Brain and Other CNS Cancer:  
Percent of New Cases by Stage at Diagnosis, Ohio, 2018-2020**



Of the brain and other CNS cancer cases diagnosed in Ohio from 2018 to 2020:

- 77.6% were diagnosed at a local stage.
- 10.8% were diagnosed at a regional stage.
- 2.1% were diagnosed at the distant stage.
- 9.5% were unstaged/unknown stage.

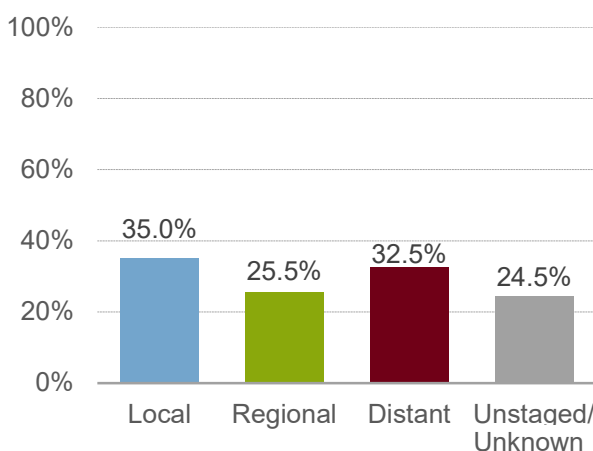
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.

Based on malignant cases and the National Cancer Institute's Surveillance, Epidemiology, and End Results Program Summary Stage 2018.

## Survival

In general, cancer survival is the estimated proportion of people alive at some point after cancer diagnosis, usually five years. Five-year relative survival compares the survival of people diagnosed with cancer with the survival of people in the general population who are the same age, race, and sex, and who have not been diagnosed with cancer.

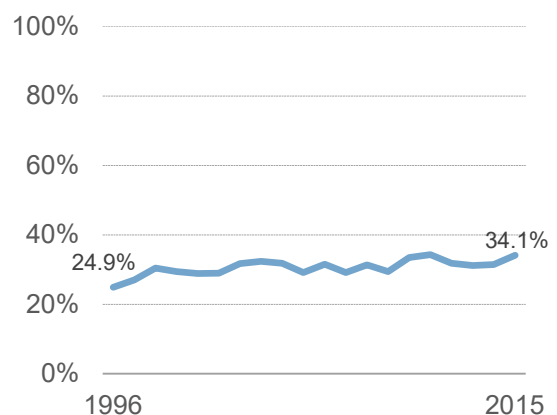
**Figure 8. Brain and Other CNS Cancer:  
Five-Year Relative Survival (%) by Stage, Ohio, 2013-2019**



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.

Based on Ohio cases diagnosed from 2013 to 2019 and followed through 2020.

**Figure 9. Brain and Other CNS Cancer: Trends in  
Five-Year Relative Survival (%) by Year, Ohio,  
1996-2015**



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.

In Ohio, the overall five-year relative survival for brain and other CNS cancer was 32.9%, 35.0% at the local stage, 25.5% at the regional stage, 32.5% at the distant stage, and 24.5% at an unstaged/unknown stage (Figure 8). As shown in Figure 9, there was a slight upward trend in five-year relative survival in Ohio from 1996 (24.9%) to 2015 (34.1%).



## Types of Malignant Brain Tumors

Histology refers to the type of cells making up a tumor. Most primary malignant brain tumors are classified as glioma. Glioma brain tumors arise from glial tissue and represent a large class of tumors with many histologic variations. The three major types of gliomas are astrocytoma, oligodendroglioma, and ependymoma.

- **Astrocytoma**

Astrocytomas arise from astrocytes primarily in the cerebrum, cerebellum, or brain stem and often spread quickly. They are further classified according to grade, which refers to the degree of cellular differentiation. Grade IV astrocytomas, or glioblastomas, are the highest grade (least differentiated) and have exceptionally poor prognoses. Glioblastomas made up more than half (57%) of all malignant cases of brain and other CNS cancer diagnosed in Ohio during 2016-2020 (Figure 10). The second-most common histologic grouping of brain and other CNS cancer is diffuse and anaplastic astrocytoma (13%). A diffuse astrocytoma grows slowly, but often spreads into nearby tissues, whereas an anaplastic astrocytoma grows quickly and spreads into nearby tissues.

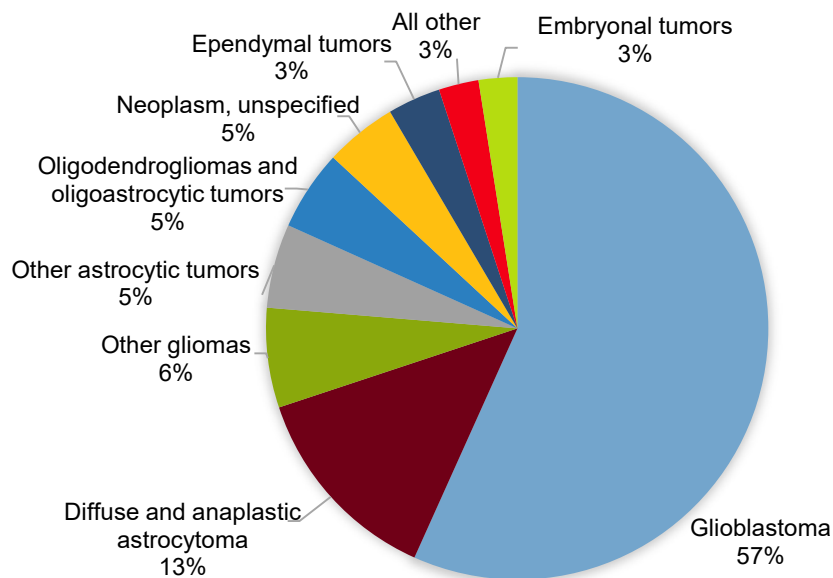
- **Oligodendroglioma**

Oligodendrogliomas arise from oligodendrocytes, cells that make the fatty substance that protects the nerves, and usually do not spread into surrounding brain tissue.

- **Ependymoma**

Ependymomas (ependymal tumors), which arise from ependymal cells that line the ventricles (fluid-filled spaces of the brain) or the central canal of the spinal cord, usually do not spread to normal brain tissue and are associated with higher survival probability.

**Figure 10. Brain and Other CNS Cancer: Percent of New Cases by Histology, Ohio, 2016-2020**



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.

## Benign and Borderline Brain and Other CNS Tumors

### New Cases

An average of 1,423 cases of non-malignant (benign and borderline) brain and other CNS tumors were diagnosed annually in Ohio from 2016 through 2020, corresponding to an average annual age-adjusted incidence rate of 10.4 cases per 100,000 population. In contrast to malignant brain and other CNS tumors, the incidence rate for non-malignant tumors was 68% higher among females than among males in Ohio. The incidence rate among White people was similar to the rate among Black people in both Ohio and the United States, while Asian/Pacific Islanders and Hispanics had lower rates in Ohio than in the United States (Table 2).

**Table 2. Benign and Borderline Brain and Other CNS Tumors: Average Annual Number of Cases and Age-Adjusted Incidence Rates per 100,000 Population by Sex, Race, and Ethnicity, Ohio and the United States, 2016-2020**

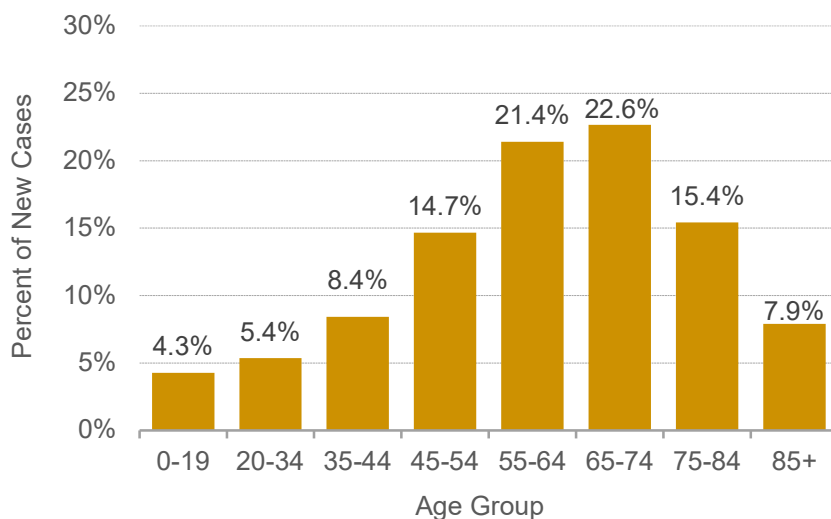
		Ohio		U.S.
		Cases	Rate	Rate
<b>Total</b>		1,423	10.4	14.3
<b>Sex</b>	Male	484	7.7	10.1
	Female	939	12.9	17.9
<b>Race</b>	White	1,221	10.4	14.3
	Black	159	10.4	14.5
	A/PI	23	9.0	14.3
<b>Ethnicity</b>	Hispanic	22	6.7	12.1

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023; Surveillance, Epidemiology, and End Results Program, National Cancer Institute, 2023.

A/PI = Asian/Pacific Islander.

### New Cases by Age Group

**Figure 11. Benign and Borderline Brain and Other CNS Tumors: Percent of New Cases by Age Group, Ohio, 2016-2020**



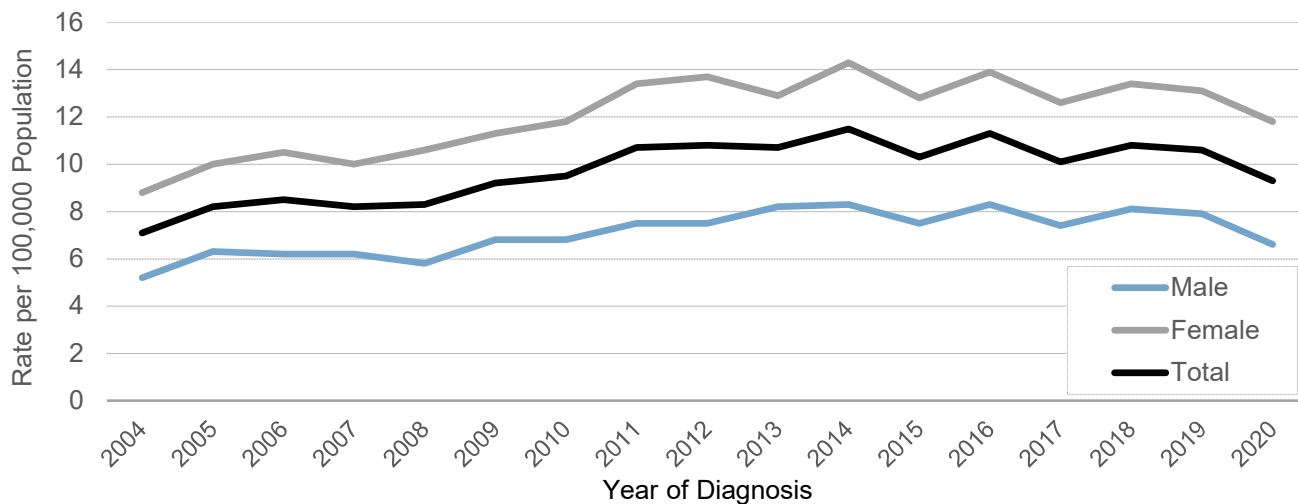
- In Ohio, non-malignant brain and other CNS tumors were most frequently diagnosed among people 65 to 74 years old (22.6%), followed by people 55 to 64 years old (21.4%).
- 4.3% of non-malignant brain and other CNS tumors occurred among children and adolescents (ages 0-19).

Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.



## Trends in Benign and Borderline Brain and Other CNS Tumors

**Figure 12. Benign and Borderline Brain and Other CNS Tumors:**  
Trends in Age-Adjusted Incidence Rates per 100,000 Population by Sex, Ohio, 2004-2020



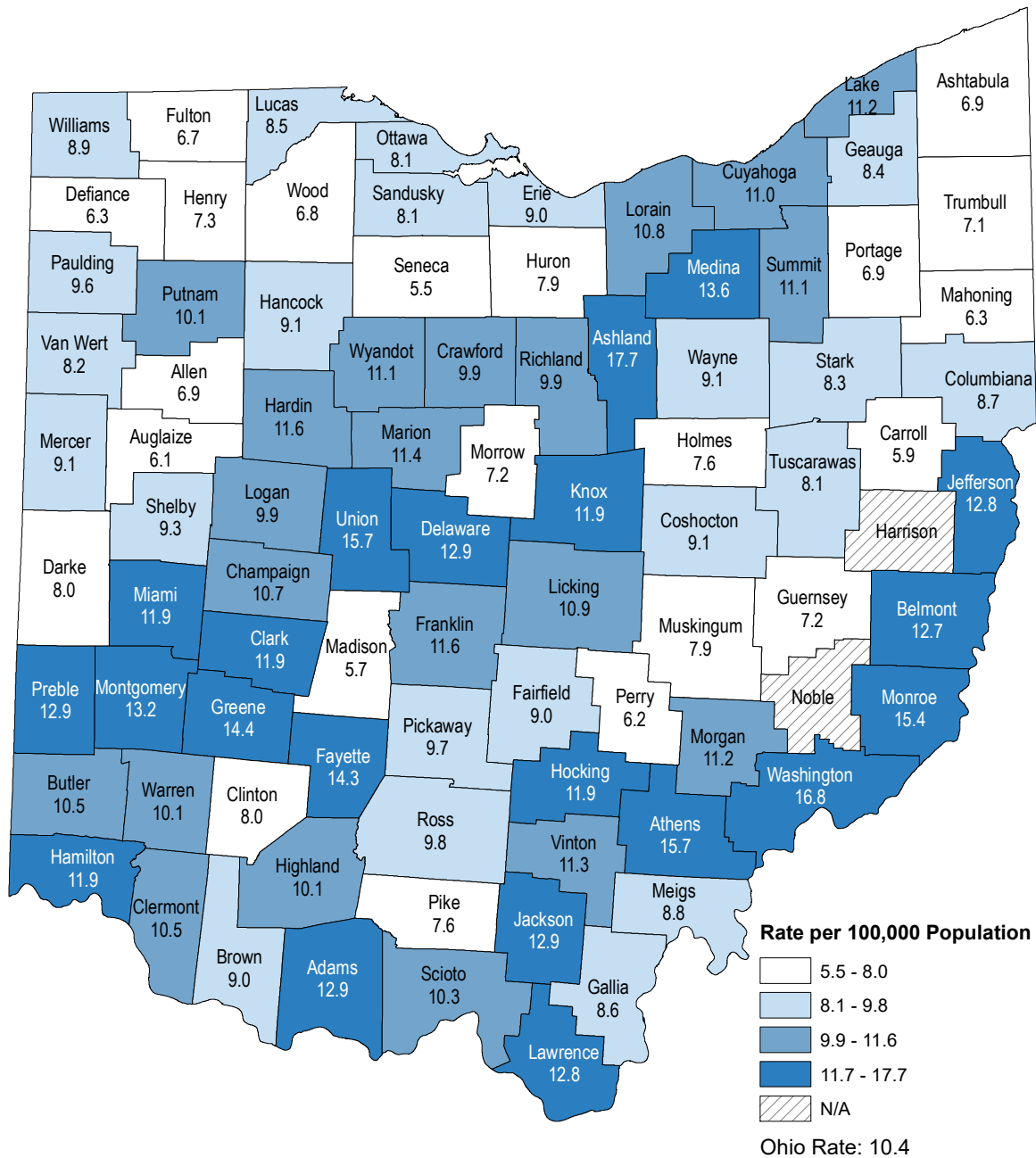
Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.

- Incidence rates of benign and borderline brain and other CNS tumors in Ohio increased from 1996 to 2014 for males and females, remained relatively stable from 2015 through 2019, and then declined in 2020. In contrast to malignant tumors, incidence rates of non-malignant brain and other CNS tumors were higher among females than males for each year (Figure 12).

## Incidence by County

County-specific average annual age-adjusted incidence rates of benign and borderline brain and other CNS tumors in Ohio ranged from 5.5 to 17.7 per 100,000 population in 2016-2020, compared with Ohio's rate of 10.4 per 100,000. The following counties had the highest incidence rates, in decreasing order, for this period: Ashland, Washington, Athens, Union, and Monroe.

**Figure 13. Benign and Borderline Brain and Other CNS Tumors: Average Annual Age-Adjusted Incidence Rates per 100,000 Population by County of Residence, Ohio, 2016-2020**



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.

N/A: Rate not presented when the count for 2016-2020 is less than 10.

## Types of Non-Malignant Brain Tumors

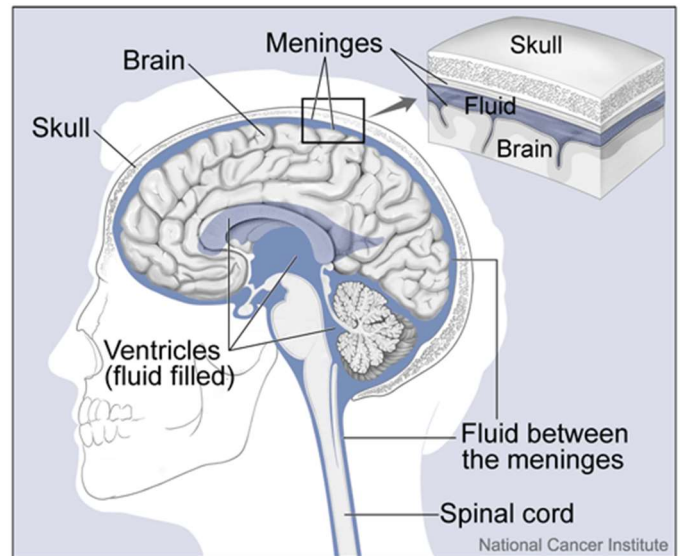
The main types of non-malignant brain and other CNS tumors include meningiomas and nerve sheath tumors.

- **Meningioma**

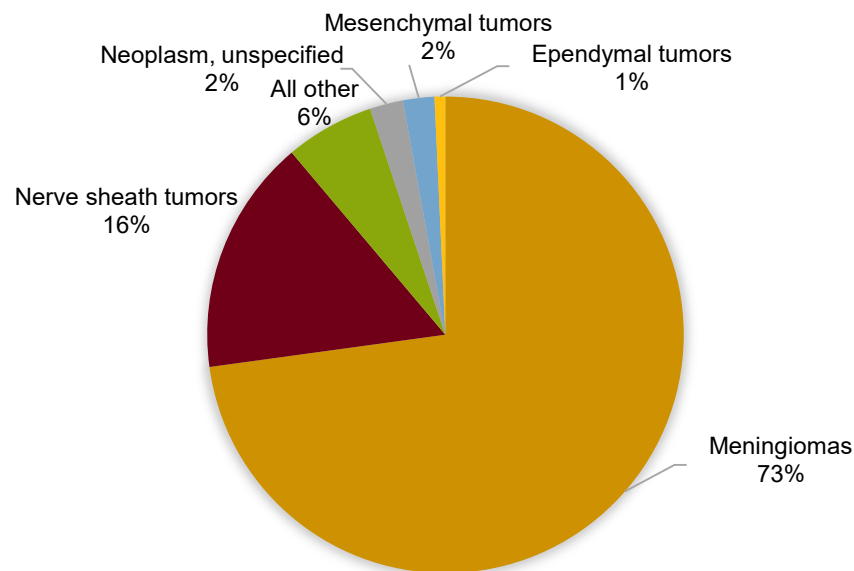
Meningiomas are tumors of the meninges, the tissue surrounding the brain (See illustration at right). Meningiomas make up a sizable proportion of non-malignant brain tumors and represent a unique histologic grouping of tumors that are characterized by good prognoses. Meningiomas represent the highest proportion (73%) of all new non-malignant brain and other CNS tumors in Ohio based on data from 2016 to 2020 (Figure 12).

- **Tumors of the Cranial and Spinal Nerves**

Tumors of the cranial and spinal nerves include nerve sheath tumors and other tumors of the cranial and spinal nerves. Nerve sheath tumors are second to meningioma in the percentage of benign/borderline brain tumors reported in Ohio during 2016-2020 (16%, Figure 12).



**Figure 12. Benign and Borderline Brain and Other CNS Tumors: Percent of New Cases by Histology, Ohio, 2016-2020**



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.

## Other Tumors in or Near the Brain

Other tumors can start in or near the brain. These include tumors of the sellar region (pituitary gland tumors and craniopharyngiomas), CNS lymphomas, and other hemopoietic neoplasms.

- **Pituitary tumors**

The pituitary gland is a pea-sized organ at the base of the brain. Most pituitary tumors are benign; however, they can cause problems if they press on nearby structures or affect hormone production. In Ohio, an average of 396 pituitary gland tumors were diagnosed each year during 2016-2020.

- **Craniopharyngiomas**

Craniopharyngiomas are rare, slow-growing, benign brain tumors that form near the pituitary gland and the hypothalamus. They do not spread to other parts of the brain or to other parts of the body. However, they can grow and press on nearby parts of the brain, including the pituitary gland and the hypothalamus, affecting hormones, or the optic nerves, where they can cause problems with vision. Craniopharyngiomas usually occur among children and young adults. In Ohio, about 21 cases of craniopharyngioma occurred each year during 2016-2020.

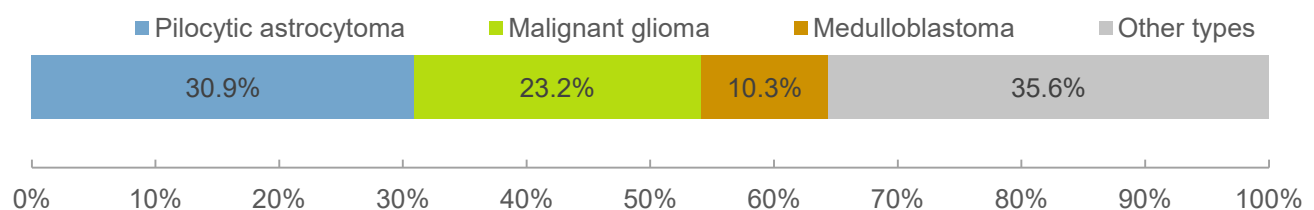
- **CNS Lymphomas**

Lymphomas are cancers that start in cells called lymphocytes (one of the main cell types of the immune system). Most lymphomas start in other parts of the body, but some may start in the CNS. CNS lymphomas are more common in people with immune system problems, such as those infected with HIV, the virus that causes AIDS. On average, 62 CNS lymphomas were diagnosed each year in Ohio during 2016-2020.

## Childhood Brain and Other CNS Cancer

- Brain and other CNS cancer is the most common cancer in children and adolescents 0-19 years old in the United States.
- Brain and other CNS cancer is the largest cause of cancer-related death in children 0-14 years old in the United States.
- The three most common brain and other CNS cancers among children and adolescents are:
  - Malignant pilocytic astrocytoma.
  - Malignant glioma.
  - Medulloblastoma.
- In Ohio, these three types accounted for 64% of all malignant brain and other CNS cancers among children and adolescents during 2016-2020 (Figure 13).

**Figure 13. Childhood Brain and Other CNS Cancer: Percent of New Cases by Histology, Ohio, 2016-2020**



Source: Ohio Cancer Incidence Surveillance System, Ohio Department of Health, 2023.

## Risk and Protective Factors

The only well-established potentially modifiable risk factor for brain and other CNS tumors is exposure to ionizing radiation. Most brain and other CNS tumors have no clear known cause.

- **Age:** The risk of meningioma increases steadily with age. The relationship between age and glioma risk varies by tumor histology.
  - Pilocytic astrocytoma typically occurs in children and young adults.
  - Oligodendrogliomas are most common in the 35-44 age group.
  - The incidence of anaplastic astrocytoma and glioblastoma increases with age.
- **Sex:**
  - Gliomas are more common in men than women, with 55% of gliomas occurring in men.
  - Meningiomas occur twice as often in women than men; it has been hypothesized that hormones (endogenous and exogenous) may increase risk of meningiomas among women.
  - Medulloblastomas and primitive neuroectodermal tumors are more common in boys than girls.
- **Race and Ethnicity:**
  - In the United States, gliomas are more common in non-Hispanic White people than in Hispanics, Black people, or Asians.
  - Meningiomas are 20% more common in Black people than in White people.
- **Exposure to Ionizing Radiation:** People who have been exposed to ionizing radiation, most commonly therapeutic radiation to the head, have an increased risk of developing brain tumors.
- **Genetic Syndromes:** There is an increased risk of brain and other CNS cancer in individuals with specific genetic syndromes including neurofibromatosis types 1 and 2 (NF1, NF2), tuberous sclerosis, von-Hippel-Lindau disease, Li-Fraumeni syndrome, Gorlin syndrome (basal cell nevus syndrome), Turcot syndrome, Cowden syndrome, hereditary retinoblastoma, and Rubinstein-Taybi syndrome.
- **Family History:** There is a small increased risk of brain tumors among people who have relatives who have been diagnosed with brain tumors.
- **Immune System Disorders:** People with impaired immune systems are at increased risk for primary CNS lymphomas.

### Brain and Other CNS Cancer Protective Factors

- **Allergic and Immune-Related Conditions:** There is a reduced risk of glioma for those with allergic or various autoimmune conditions (including asthma, eczema, and hay fever). It has been hypothesized that increased immune surveillance in individuals with these conditions results in more effective identification and elimination of precancerous cells.

### Uncertain Risk and Protective Factors

- The following may increase brain and other CNS cancer risk: exposure to vinyl chloride, petroleum products, or other chemicals, advanced parental age, birth defects, high birth weight, computerized tomography (CT) scans (diagnostic ionizing radiation), maternal dietary N-nitroso compounds (NOCs), and residential pesticide exposure.
- There may be a decreased risk of brain tumors for children of mothers who took supplemental folic acid during pregnancy.

# Signs and Symptoms

Early signs and symptoms of brain and other CNS tumors vary greatly. They may occur gradually and worsen over time or may occur suddenly. Symptoms result from increased intracranial pressure caused by tumor growth, swelling in the brain or the blocked flow of cerebrospinal fluid. Tumors frequently affect the functions controlled by the area of the brain in which the tumors develop. Signs and symptoms of brain and other CNS tumors include:

- Headaches that increase in number and severity over time.
- Nausea.
- Vomiting.
- Vision problems, including blurred vision, double vision, or loss of peripheral vision.
- Balance problems.
- Personality or behavior changes.
- Seizures.
- Drowsiness (even coma).
- Weakness or numbness of a part of the body.
- Problems with speech or understanding words.
- Confusion.
- Abnormal movements and positioning of the body.
- Hearing problems.

*Any of these signs/symptoms may be caused by brain and other CNS tumors, or by other, less serious health problems. If you have any of these signs/symptoms, see your healthcare provider.*

# Treatment

- There are different types of treatment for patients with adult brain and other CNS tumors. Five types of standard treatment are used:
  - Active surveillance (active monitoring).
  - Surgery.
  - Radiation therapy.
  - Chemotherapy.
  - Targeted therapy.
- New types of treatment are being tested in clinical trials.
  - Proton beam radiation therapy.
  - Immunotherapy.

## Technical Notes

**Age-Adjusted Rate:** A summary rate that is a weighted average of age-specific rates, where the weights represent the age distribution of a standard population (direct adjustment). The incidence and mortality rates presented in this report were standardized to the age distribution of the 2000 U.S. Standard Population. Under the direct method, the population was first divided into 19 age groups, i.e., <1, 1-4, 5-9, 10-14, 15-19...85+, and the age-specific rate was calculated for each age group. Each age-specific rate was then multiplied by the standard population proportion for the respective age group.

**Average Annual Number:** The number of cases or deaths diagnosed per year, on average, for the time period of interest (e.g., 2016-2020). Average annual numbers are calculated by summing the number of cases or deaths for a given time period, dividing by the number of years that comprise the time period, and rounding to the nearest whole number.

**Cancer:** A term for diseases in which abnormal cells divide without control and can invade nearby tissues. Cancer cells can also spread to other parts of the body through the blood and lymph systems. Central nervous system cancers are cancers that begin in the tissues of the brain and spinal cord. Also called malignancy.

**Census Data:** The 1996-2020 rates were calculated using population estimates from the U.S. Census Bureau and National Center for Health Statistics. Population data were compiled from bridged-race intercensal population estimates for July 1, 1990-July 1, 1999, revised bridged-race intercensal population estimates for July 1, 2000-July 1, 2004 (released 10/26/2012); revised bridged-race intercensal population estimates for July 1, 2005-July 1, 2009 (released 6/26/2014); and vintage 2020 bridged-race postcensal population estimates for July 1, 2010-July 1, 2020 (released 9/22/2021).

**Incidence:** The number of cases diagnosed during a specified time period (e.g., 2016-2020). Brain and other CNS cancer cases were defined as follows: International Classification of Diseases for Oncology, Third Edition (ICD-O-3), codes C700-C729.

**Mortality:** The number of deaths during a specified time period (e.g., 2016-2020). Brain and other CNS cancer deaths were defined as follows: International Statistical Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10), codes C700-C729.

**Rate:** The number of cases or deaths per unit of population (e.g., per 100,000 persons) during a specified time period (e.g., 2016-2020). Rates may be unstable and are not presented when the count is less than 10 for incidence and mortality.

**Relative Survival:** The percentage of people who are alive at a designated time period (usually five years) after a cancer diagnosis divided by the percentage expected to be alive in the absence of cancer based on normal life expectancy.

**Stage at Diagnosis:** The degree to which a tumor has spread from its site of origin at the time of diagnosis. A system of summary staging is often used to group cases into the following stages:

***in situ*** – Noninvasive cancer that has not penetrated surrounding tissue.

**Local** – A malignant tumor confined entirely to the organ of origin.

**Regional** – A malignant tumor that has extended beyond the organ of origin directly into surrounding organs or tissues or into regional lymph nodes.

**Distant** – A malignant tumor that has spread to parts of the body (distant organs, tissues, and/or lymph nodes) remote from the primary tumor.

**Unstaged/Unknown** – Insufficient information is available to determine the stage or extent of the disease at diagnosis.



## Sources of Data and Additional Information

**Ohio Cancer Incidence Surveillance System:**

<https://odh.ohio.gov/know-our-programs/ohio-cancer-incidence-surveillance-system/welcome>

**National Cancer Institute:**

<https://www.cancer.gov/types/brain>

**American Cancer Society:**

<https://www.cancer.org/cancer/brain-spinal-cord-tumors-adults.html>

<https://www.cancer.org/cancer/brain-spinal-cord-tumors-children.html>

**To address comments and information requests:**

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