

Epidemiology of Brain Tumors



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KEYWORDS

- Glioma • Meningioma • Pituitary adenoma • Medulloblastoma • Ionizing radiation
- Neurofibromatosis

KEY POINTS

- Although central nervous system (CNS) tumors are rare in adults, they are a significant cause of morbidity and mortality in young adults and are the most common solid tumors in infants and children.
- The most common tumors in children are pilocytic astrocytomas and medulloblastomas compared with meningiomas, pituitary tumors, and glioblastomas in adults.
- Ionizing radiation increases the risk for brain tumors, whereas cell phones that are nonionizing do not.
- Although several hereditary CNS syndromes may be associated with an increased risk of brain tumors, 95% of brain tumors are nonfamilial.

EPIDEMIOLOGY OF PRIMARY BRAIN TUMORS

Although CNS tumors are rare, they are a significant cause of cancer morbidity and mortality, especially in children and young adults where they respectively account for approximately 30% and 20% of cancer deaths (**Figs. 1** and **2**). They are also a cause of excessive mortality relative to other cancers. CNS tumors are predicted to represent 1.4% of new cancer diagnoses in 2015 and will cause 2.6% of cancer deaths.¹ The commonest CNS tumors in children are pilocytic astrocytoma, embryonal tumors, and malignant gliomas (**Fig. 3**) whereas meningiomas, pituitary tumors, and malignant gliomas are most common adult brain tumor types (**Fig. 4**). The most common histology by age group and their median age at diagnosis among the various types of brain tumors are summarized in **Tables 1** and **2**.

This review addresses the incidences and prevalences of the commonest types of childhood and adulthood brain tumors as well as their recurrence and survival rates. It reviews common genetic and environmental risk factors causally associated with brain tumors and temporal incidence trends.

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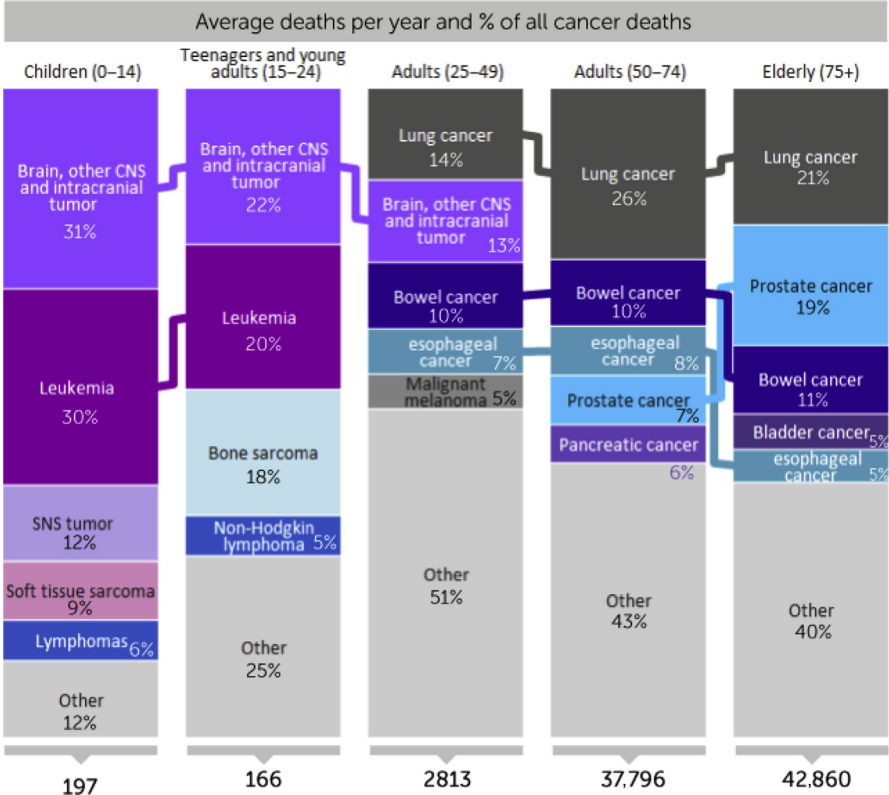


Fig. 1. Most common causes of cancer deaths in boys and men in the United Kingdom, by age, 2010 to 2012. (From Cancer Research UK. Available at: <http://www.cancerresearchuk.org/health-professional/cancer-statistics/mortality/age>. Accessed August 1, 2015.)

Meningiomas

Meningiomas are the commonest brain tumors in adults accounting for 36% of all brain tumors in the Central Brain Tumor Registry of the United States (CBTRUS).² The CBTRUS estimates that there will be approximately 24,000 new meningiomas diagnosed in the United States in 2015, with an estimated incidence of 7.61 per 100,000.² The prevalence is difficult to measure because the lesions are often asymptomatic and incidentally diagnosed. Several large autopsy studies from the pre-MRI era reported a prevalence ranging from 1.0% to 2.7%.³⁻⁵ Overall, 85% were diagnosed incidentally and 15% were symptomatic in 1 large autopsy study.⁴ The prevalence estimate of 0.3% to 0.9% in the modern era of MRI was somewhat lower,^{6,7} likely owing to the younger population studied and the threshold for detection of small lesions on imaging.

The incidence of meningioma steadily increases with age (Fig. 5) being twice as common in women as in men and 20% more common in blacks than in whites.^{2,8} A majority of meningiomas are benign (grade I), with 5% to 20% atypical (grade II) and 1% to 3% malignant in type (grade III).⁹ Benign meningiomas are an insignificant cause of mortality although skull-based tumors can cause significant morbidity. By contrast, atypical and malignant meningiomas can be associated with significant morbidity and mortality and high rates of recurrence. Approximately one-half of

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