Epidemiology of Brain/Nervous System Tumors in Children

Parviz Ghadirian, Ph.D., Kazem Fathie, M.D., Ph.D., Jean-Pierre Thouez, Ph.D.

Department of Nutrition, Faculty of Medicine, University of Montreal, and Centre de recherche, CHUM-Hôtel-Dieu, Montreal, Quebec, Canada - Hospital Sainte-Justine, Research Center, Montreal, Quebec, Canada

'Secretary of the American Academy of Neurological and Orthopedic Surgeons

Department of Geography, Faculty of Arts and Science, University of Montreal, and Centre de recherche, CHUM-Hôtel-Dieu, Montreal, Quebec, Canada

Introduction

In the United States cancer is relatively less frequent among children. It has been estimated that only 1 in 540 children will develop cancer. The relative rate of cancer occurring before the age of 15 years and among children less than 5 years of age is around 40%.

Although this disease is uncommon among young individuals, the mortality due it is high, accounting for more than 11% of all causes of death among children.

In other words, childhood cancer is the second leading cause of death, after accidents. The age-adjusted rate for all cancers combined among white children aged less than 15 years in the United States is around 14.4 per 100,000 per year.

Susceptibility to certain types of childhood cancers may also follow an autosomal dominant pattern of inheritance. For example, it has been estimated that 40% of retinoblastomas are due in part to an autosomal dominant germ cell mutation.

Neurofibromatosis is another autosomal dominant syndrome associated with the occurrence of cancer in childhood.

Socio-economic Status

It appears there is no significant association between socio-economic status, ethnicity and CNS tumors.

Age

In general, there is no apparent age-dependency of brain and CNS cancer sites, but a specific age pattern averages for some CNS malignancies. For example, neuroblastoma is more common among children aged less than 1 year, and is rare after 5 years of age.

The highest incidence rate of astrocytomas belongs to 3 years old children. Its rate decreases afterward, while medulloblastoma occurs mostly at 5 years, and glioblastoma is more common among 7 year-old.

In general, the incidence of primary cancer and CNS tumors seems to be increasing in the United States among all age groups. In a large cohort of children less than 15 years old, a modest rise in Infectious diseases

In a case-control study in Greece, a significant association was found between influenza in pregnant women and tumor occurrence in the index child. In other words, the risk increased more than 3-fold among children from mothers who had influenza during pregnancy.
Gender
The lowest male:female ratio (0.3) for all brain and CNS tumors in the world comes from Mali (Bamako), and the highest ratio (1.8) from China (Tianjin). In North America, the lowest male:female ratio (0.3) for all brain and CNS tumors in the world comes from Mali (Bamako), and the highest ratio (1.8) from China (Tianjin). In North America, the lowest male:female ratio is seen among Los Angeles the highest ratio (1.3) among the non-black population of the Greater Delaware Valley in the United States.15

Other factors
In a nested case-central study utilizing data from a national birth registry in Sweden,19 the risk for brain tumors (all types) was elevated significantly when the mother of the index case had been exposed to oral contraceptives prior to conception (OR = 1.3) or Penthrane (OR = 1.5) during delivery as well as after treatment for neonatal distress (OR = 1.6) and, finally neonatal infections (OR = 2.4).

Contact with Domestic and Farm Animals
It has been suggested that domestic and farm animals may increase the risk of brain cancer in children. In a large in the United States in 1984-91, it was found that childhood brain tumors were more common among children mothers had been exposed to pigs (OR = 3.8) and horses (OR = 2.2) during the index pregnancy.16 It seems that children diagnosed with primitive neuroectodermhas have a higher risk for childhood brain tumors with personal and maternal prenatal exposure to swine (OR = 4.0 for child and 11.9 for mother) or poultry (OR = 3.0 for child and 4.0 for mother). A non-significant increased risk for childhood brain tumors has also been found for children mothers who had worked on livestock farins compared with controls.16

Smoking
A large body of evidence implicates cigarette-smoking in the etiology of childhood cancer, particularly brain tumors. Most of these studies concentrated on the effect of maternal smoking. In a case-central study in Shangha17 paternal preconception smoking was related to a significantly elevated risk of childhood cancers, particularly brain tumors (OR = 2.7); the second most common cancer in children after leukemia, yet its etiology remains unknown. N-nitroso compound precursor is one of several dozens of toxic compounds downstream of tobacco smoke. Fetuses and infants have incompletely-formed blood-brain barriers that may allow the passage of carcinogenic tobacco metabolites into the CNS and initiate the formation of neural tumors.18

References


4To whom correspondence should be address:
Epidemiology Research Unit, Research Centre-CHUM-Hôtel-Dieu
3850 St-Urbain
Montreal (Quebec) H2W IT8
Tel. (514) 843-2742; Fax: (514) 843-2715
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