Epidemiology of Brain Cancer

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November 2, 2010

Definitions and subtypes

- Adult primary malignant brain cancer is predominantly of glioma cells
  - Most common is glioblastoma multiforme, followed by astrocytoma, meningioma and other cell types
- Overall incidence rate is 6.4 per 100,000
  - 40% higher incidence in males
  - Higher in North Americans, higher SES groups

Established Risk Factors in Adults

- Gliomas: high-dose radiation, hereditary syndromes, age, sex, race, epilepsy
  - Possibly mutagen sensitivity, specific polymorphisms (GSTs and CYP2E1)
- Meningiomas: hereditary syndromes, high-dose radiation, sex (higher in females), exogenous hormones
- Source: Bondy ML, et al. Brain Tumor Epidemiology: Consensus from the Brain Tumor Epidemiology Consortium (BTEC). *Cancer* 2008;113(7Suppl):1953-1968. (see also: www.cbtrus.org)

Potential Occupational and Environmental Risk Factors

- Pesticide applicators, mixed pesticide exposures
  - Cape Cod cranberry bog study
- Solvent exposed workers, benzene, methylene chloride, TCE and PCE
  - Semiconductor manufacturing workers
- Non-ionizing radiation (electrical workers) and metal workers (lead, chromium)

Persian Gulf War Veterans study (Barth, et al., 2009)

- Examined neurological mortality among 621,902 deployed veterans in thirteen years since the PGW (1991-2004)
- Compared adjusted mortality rates in deployed vs. era veterans using Cox proportional hazards model
- Overall findings showed no significant differences

Brain cancer in nerve gas and oil fire exposed veterans

- Sub-group analysis of those exposed to Khamisiyah two days or more showed significantly increased risk
  - RR=2.71 (95% C.I. 1.25-5.87)
- Oil fire exposed veterans had marginally increased risk
  - RR=1.81 (95% C.I. 1.00-3.27)
- Source: Barth SK, et al. Neurological Mortality among U.S. Veterans of the Persian Gulf War: 13-year Follow-Up. Am J Ind Med 2009;52:663-670.

Additional information from S Barth, VA first author

- No unusual cell types in 144 PGW decedents; primarily glioblastoma and astrocytoma
- No information about nitrosamines or nitrosating agents from Sarin gas
- Very few brain cancer deaths in early years, increasing in 2001-2004

Conclusions

Latency period may be twenty or thirty years

Results to date are suggestive

Additional follow-up is warranted