

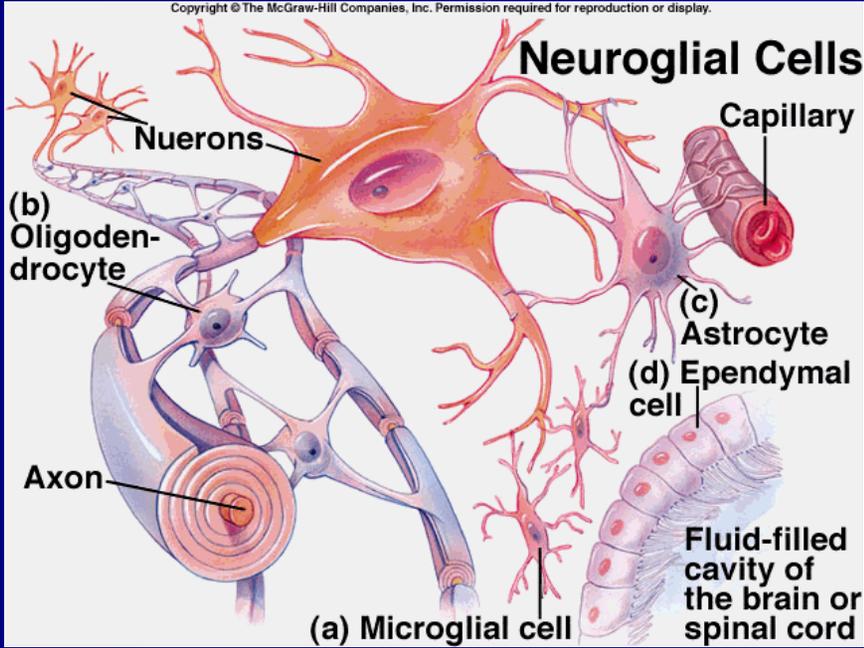
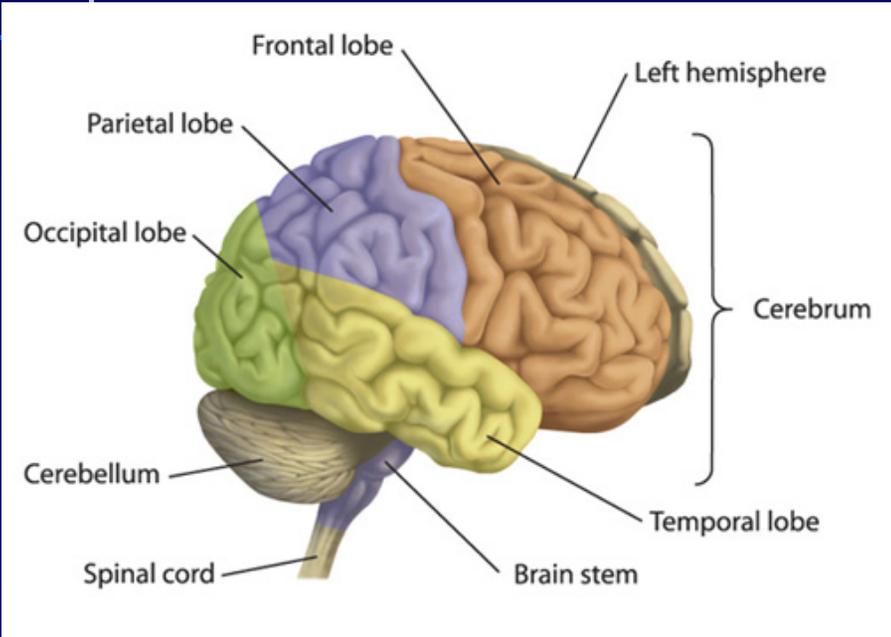
Brain Cancer: Statistics and Cluster Investigations

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Understanding Cancer

- All cells are programmed to follow a natural life cycle called the **cell cycle**.
- Cancer arises from changes in the cell's DNA controlling the cell cycle.
 - Cell loses ability to control it's growth
- DNA can be damaged through a variety of exposures:
 - Genetics, Infections, Drug or Tobacco Use, Chemical Exposure, Radiation Exposure...

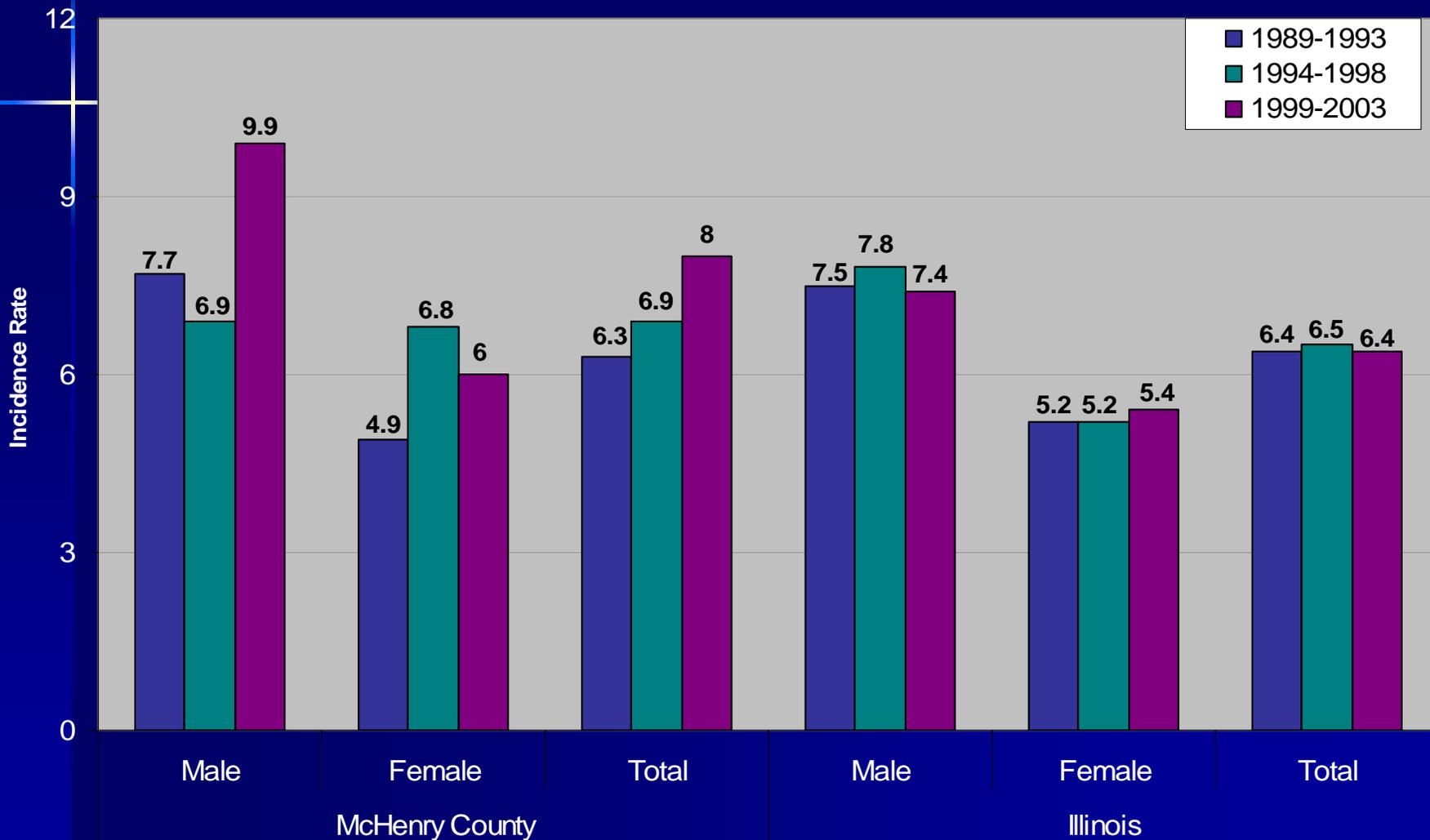
The Brain



General Brain Cancer Statistics

- 190,000 people diagnosed with brain cancer each year in the US.
 - US: 40,000 primary site tumors per year (11/100,000 persons)
 - Illinois: 773 brain/nervous system tumors per year (7/100,000 persons)
 - 60050 Zip Code: 3 brain/nervous system tumors per year (2/100,000 persons)
- Average age of diagnosis:
 - Adults: 54 years old
 - Children: Distributed evenly between 0 and 19 years old
- Trends in age vary depending on type and location of tumor.
- Certain cancers are found more commonly among a specific gender.

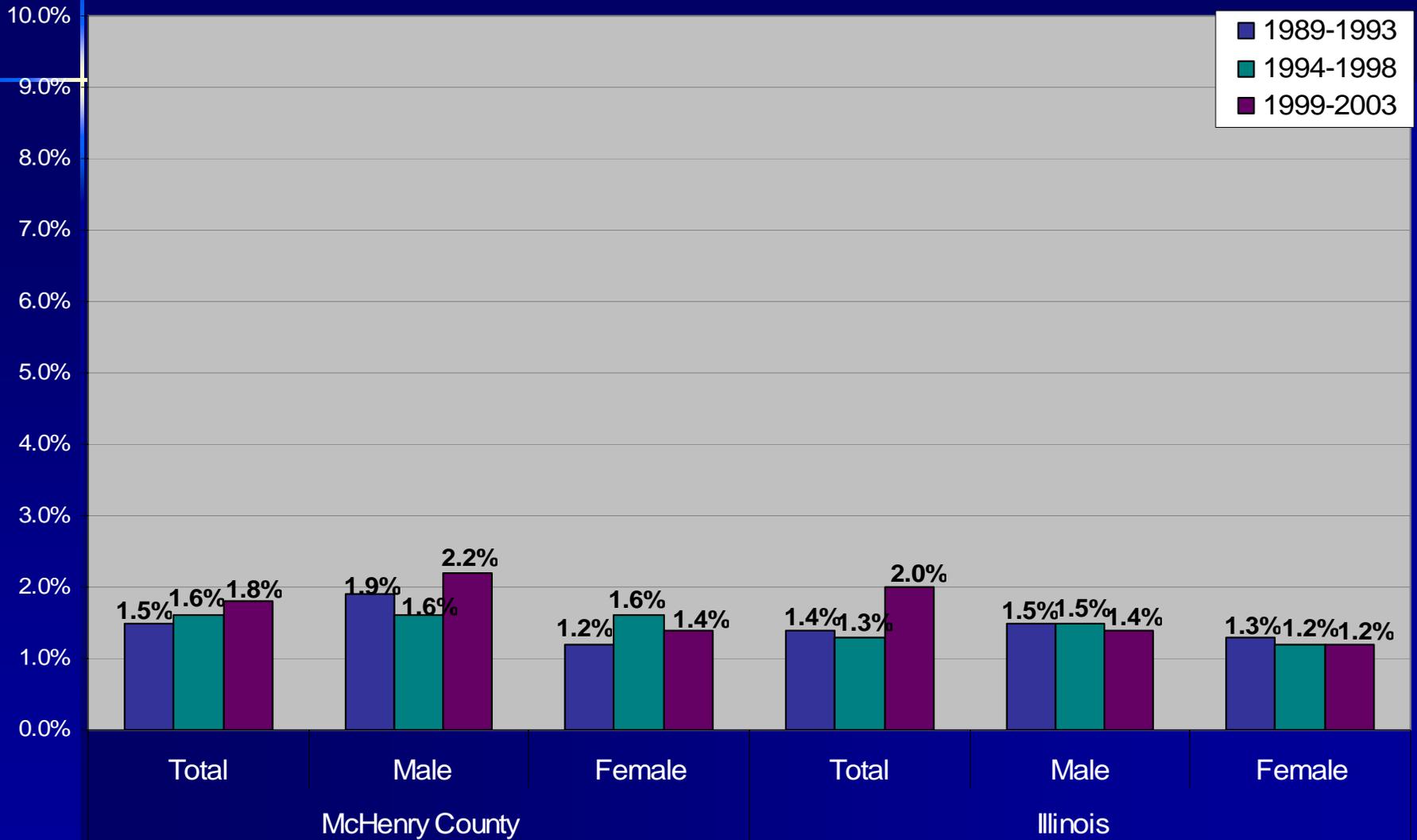
5-Year Incidence Rates of Brain/Nervous System Cancers (per 100,000 population) in McHenry County and Illinois from 1998-2003



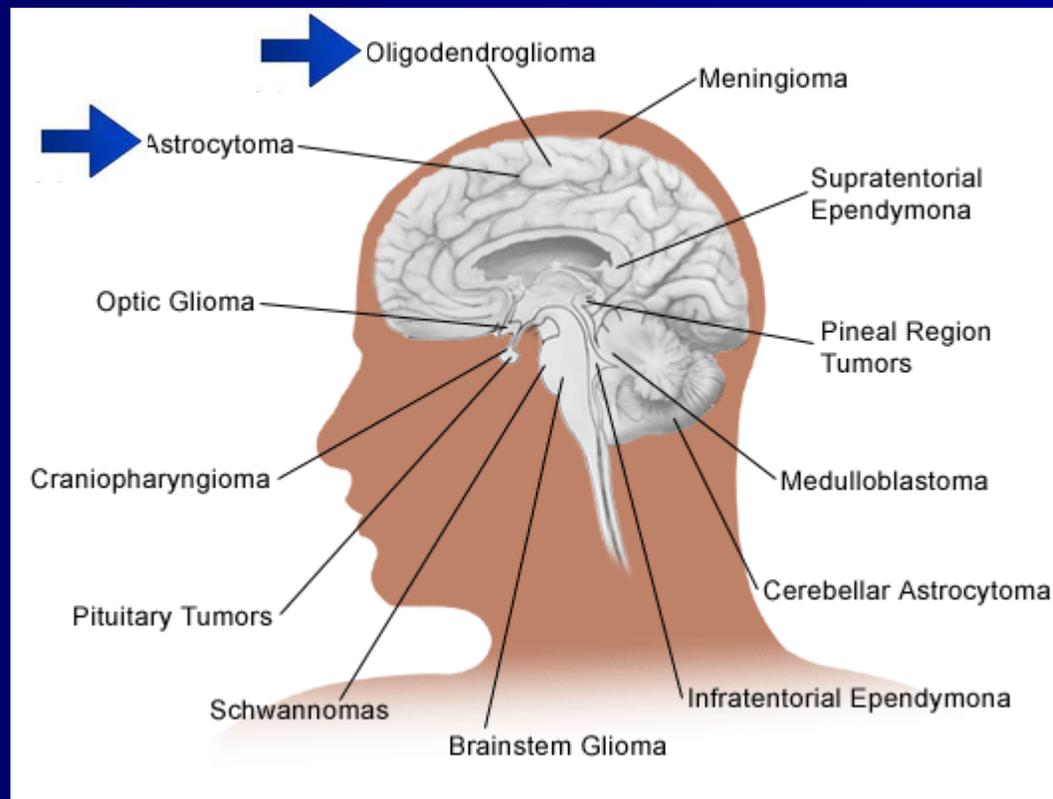
Leading Cancer Sites Among McHenry County Males and Females (1999-2003)

	All Genders	Male	Female
	1. Breast (17.5%)	1. Prostate (26.8%)	1. Breast (34.5%)
	2. Prostate (13.3%)	2. Lung & Bronchus (26.5%)	2. Lung & Bronchus (12.2%)
	3. Lung & Bronchus (13.2%)	3. Colon & Rectum (22.4%)	3. Colon & Rectum (10.2%)
	4. Colon & Rectum (11.2%)	4. Bladder (7.2%)	4. Corpus & Uterus (5.7%)
	5. Bladder (4.8%)	5. Skin Melanoma (4.6%)	5. Non-Hodgkin's Lymphoma (3.8%)
	6. Non-Hodgkin's Lymphoma (4.2%)	Non-Hodgkin's Lymphoma (4.6%)	6. Skin Melanoma (3.4%)
	7. Skin Melanoma (4.0%)	7. Kidney (3.8%)	7. Ovary (3.0%)
	8. Kidney (3.0%)	8. Oral & Esophagus (3.3%)	8. Bladder (2.5%)
	9. Corpus & Uterus (2.9%)	9. Pancreas (2.2%)	9. Cervix (2.2%)
	10. Leukemia (2.5%)	Brain & Nervous System (2.2%)	Kidney (2.2%)
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	13. Brain & Nervous System (1.8%)		12. Brain and Nervous System (2.2%)

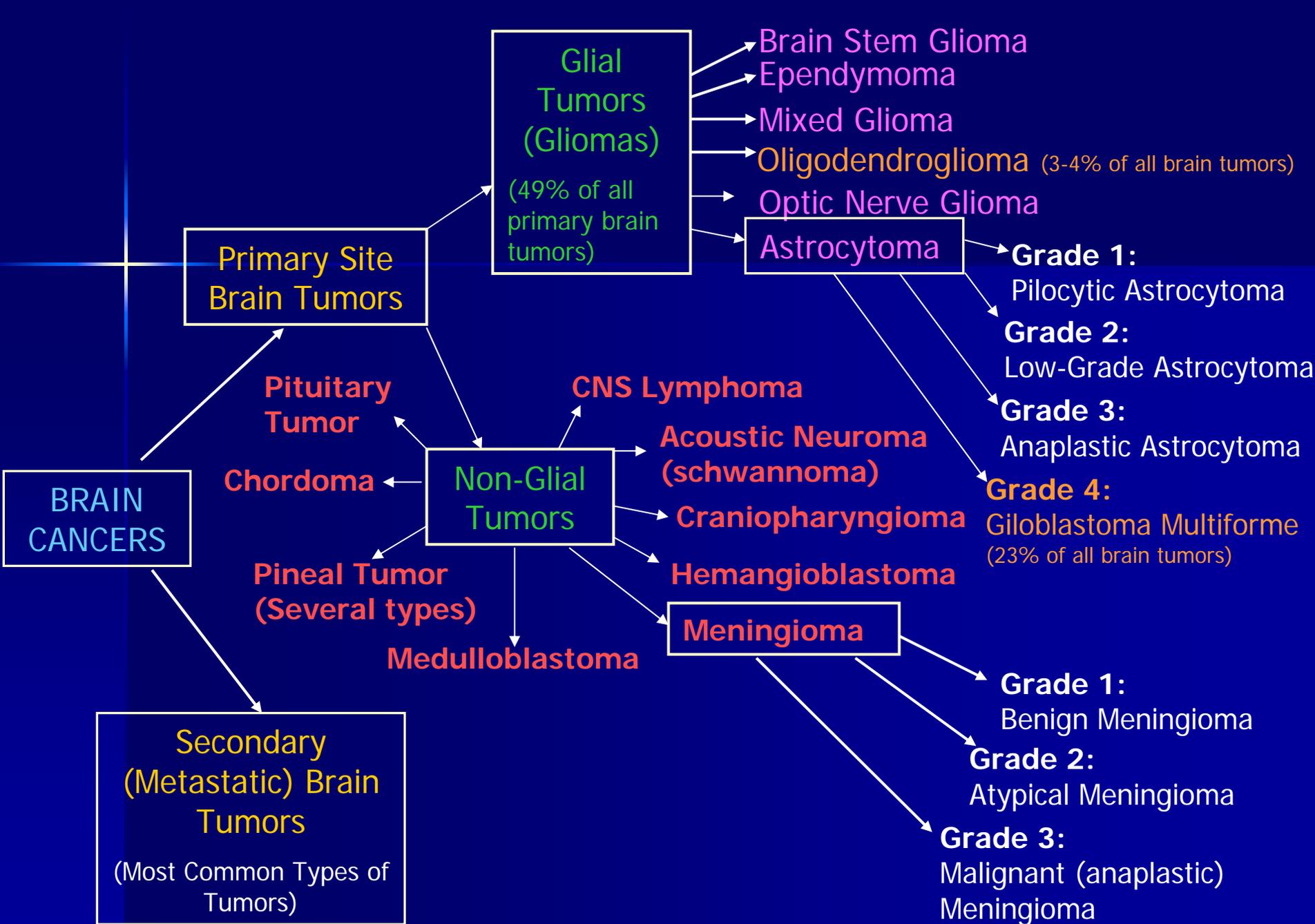
Percent of All Cancers that are Brain or Nervous System Cancers Diagnosed in McHenry County and Illinois Utilizing 5-Year Incidence Rates from 1989-2003



There are over 120 types of brain tumors!



Locations of common primary site brain tumors



Astrocytoma

- A form of Glioma
- Located anywhere in the brain, but most commonly in the frontal lobe.
- Most common primary site brain tumor.
- 4 Different classifications depending on how fast the cancer cells grow.
 - Grade I: Pilocytic Astrocytoma
 - Grade II: Low-Grade Astrocytoma
 - Grade III: Anaplastic Astrocytoma
 - **Grade IV: Glioblastoma Multiforme (GBM)**

Astrocytoma (continued)

- The symptoms, gender and age group affected depends on the astrocytoma grade and location.
 - Example:
 - Pilocytic astrocytoma: Children and Teens
2% of all brain tumors
 - Glioblastoma Multiforme: 50 – 70 year olds
More common in males
23% of all brain tumors

Oligodendroglioma

- A form of glioma
- Low to High Grade
- Commonly among men and women in their 20s – 40s, but can occur in children.
- More common in men than women.
- Accounts for slightly less than 3% of all brain tumors.
- Associated with 1p or 19q chromosomal losses.

Incidence and Mortality

- Primary site brain tumors are among the top 10 causes of cancer related deaths.
- Nearly 13,000 people die in the US each year from primary site brain tumors.
- Factors affecting survival:
 - Race and Ethnicity
 - Age
 - Tumor Type
 - Location
 - Treatment Options
 - Functional Status

Known and Possible Causes

- Only proven causes of brain tumors:
 - Rare hereditary syndromes
 - Therapeutic radiation
 - Immunosuppression
- Account for only a very small amount of cases
- Little agreement about the nature and extent of the risk factor

Known and Possible Causes (continued)

- Heredity
- Viruses
- Ionizing Radiation
- Diet (n-nitroso compounds)
- Air Pollution
- Cell Phones?

Chemicals

- Gathering evidence is difficult
 - Workers rarely exposed to one single chemical
 - Certain chemicals probably work together to increase or decrease risk
- SOME evidence that workers in the production of synthetic rubber, PVC and petrochemicals are at greater risk for developing brain tumors.
- Potential for parents exposed in the workplace may increase the risk of cancer in their children.

Cancer Cluster Investigations

- Objectives:
 - Verify that a cancer cluster truly exists
 - Determine if human exposure to a possible environmental hazard actually exists
 - Resolve if the relationship between these two merit further investigation and/or action.

How Would we Know if There is a True “Cancer Cluster?”

- A “Biologically-Plausible” explanation is discovered
 - Usually through environmental inspection
- There is a significant increase in ONE type of cancer among residents.
 - Must be a geographically defined area
 - Must occur in residents with the same exposure periods.
- Residents must be exposed to the possible agent through the same mechanism.

Why are Cancer Clusters Difficult to Investigate?

- Potential clusters of disease are usually too small to perform a useful epidemiological study.
- Reported clusters often have vague definitions of disease.
- The “Texas Sharpshooter” fallacy.
- Exposures are often poorly characterized, mixed together and are low in concentration.
- Potential clusters often create publicity making unbiased data collection impossible.

60050 Zip Code

- Includes the following locations:
 - Bull Valley (portions)
 - Holiday Hills (portions)
 - Johnsburg (portions)
 - Lakemoor (portions)
 - McCullom Lake
 - McHenry (portions)

60050 Zip Code Analysis

- Environmental analysis does not support evidence of a cancer cluster.
- Several different forms of cancer were reported in the population by the media.
- No significant increase in the incidence of cancer in the 60050 zip code compared to the incidence of cancers in McHenry County.
- No significant increase in the incidence of total brain cancer/nervous system cancers in the 60050 zip code compared to the incidence of brain cancers in McHenry County.