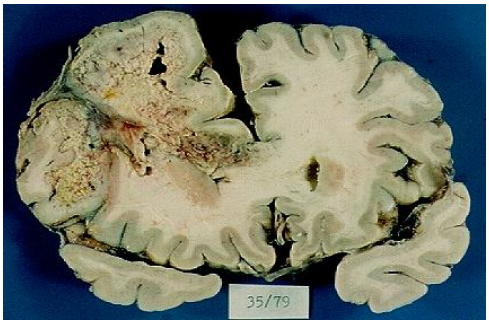
Astrocytoma/Glioma



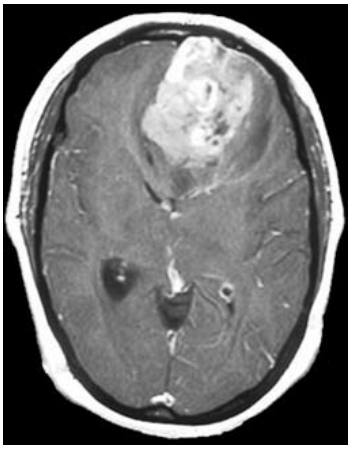
Astrocytomas are cancers of star-shaped glial cells. Astrocytoma and glioma are often used interchangeably because almost all gliomas are of the astrocytes (the other two types of gliomas being ependymomas and oligodendrogliomas). These cells are part of the supportive system of the brain. Sometimes, they occur in the spinal cord but usually they are in the brain, most commonly in the cerebrum. This type of cancer is particularly dangerous because it is the brain, and because it tends to grow and spread throughout the brain quickly, albeit rarely throughout the rest of the body. Gliomas have mechanisms in which they excrete huge quantities of glutamate, a neurotransmitter, which kill surrounding brain cells to make room for tumor growth. This makes them even more dangerous.

Statistics:

- Make up about 35% of all brain tumors
- Slightly more common in men
- More prevalent in children or younger people and account for the majority of children's brain tumors
- About 1000 children get astrocytomas yearly
- Approximately 18,000 Americans find out that they have a glioma
- The annual incidence of glioma in the United States is 5.4 cases per 100,000 population.

Classification System:
Usually astrocytomas are classified as being either low-grade or high-grade: low-grade being slow-moving and high-grade being faster-moving. Then they are usually labeled by their location in the brain and the appearance under a microscope. Common low-grade diagnoses include juvenile pilocytic astrocytoma (JPA), fibrillary astrocytoma, optic pathway glioma, and pleomorphic xantroastrocytoma (PXA). The two most common types of high-grade astrocytoma are glioblastoma multiforme (GBM) and anaplastic astrocytoma (AA). While it is tempting to label low-grade astrocytomas as "benign," most oncologists see all tumors of the brain as life threatening and threat them as malignant.

Diagnosis:



- Magnetic resonance imaging (MRI), computed tomography (CT), and a basic neurological exam are used to determine if a patient actually has an astrocytoma, and then the extent of it.
- MRI guided biopsy is performed on patients with a positive diagnosis in order to determine histological information about the tumor, especially its stage.
- Magnetic resonance spectroscopy (MRS) and positron emission tomography (PET scan) are sometimes used if more information is needed for individuals.

Symptoms: depend on age and the tumor's location. Some of the most common include:

- Loss of balance, difficulty walking, worsening handwriting, or slow speech
- Morning headache or headache that goes away after vomiting
- Nausea and vomiting
- Papilloedema
- Macrocephaly
- Unusual lethargy or change in energy level
- Change in personality or behavior
- Unexplained weight loss or weight gain
- Reduced visual acuity
- Loss of appetite
- Changes in ability to think and learn
- Seizures

Treatment:
Currently, complete surgical removal of the tumor is the most advisable option for an astrocytoma diagnosis, when the tumor is accessible. If a surgeon cannot remove the entire tumor, chemotherapy (antineoplastic therapy) is usually given, usually telozolomide. Doctors wait to see how patients respond to chemotherapy before giving radiation, because radiation is particularly damaging to children, and the brain. If the tumor has spread too much to be removed at all, chemotherapy and radiation are immediately prescribed. The prognosis is grim for these cases.

Radiation, radiosurgery, and chemotherapy techniques are often modified to accommodate the uniqueness of the brain.

Drugs are sometimes given to treat symptoms associated with astrocytomas. Notably, levetiracetam (Keppra), phenytoin (Dilantin), or carbamazepine (Tegretol) is given for seizures. Keppra is usually preferred because it does not interfere with chemotherapy. Swelling around the tumor is often counteracted with a gastroprotectant and steroid regimen.

Current Research: There are many drugs and treatments in the pipeline for this type of cancer.

- A drug called erlotinib, also known as Tarceva™ or OSI-774, inhibits tyrosine kinase. This is the first time that this drug will be tested along with radiation treatment in children with brain tumors.

- The drug sulfasalazine, which will enter clinical trials soon, blocks cystine importation into the cells, which stops glutamate prodction in the cell. Glutamate is an astrocytomas way of destroying surrounding brain tissue. The blocking of cystine also stops formation of the antioxidant glutathione, which is thought to help tumors survive chemotherapy.

- A synthetic version of chlorotoxin (TM-601) is currently in clinical trials in people with astrocytomas. This drug, derived from the toxin of the giant yellow Israeli scorpion, blocks glioma chloride channels,

preventing the tumor to expand in to the extracellular matrix. It would also kill only tum or cells, according to animal models.

- Researchers recently have used gene therapy to interfere with the protein, vascular endothelial growth factor (VEGF), at specific binding sites. Blocking VEGF activity interferes with the system of blood vessels that nourish the Gliomas. Growth of gliomas was inhibited by 90 to 95 percent in animals.

References:

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