

Brain Tumors

Basics

OVERVIEW

- Brain tumors may be classified as “primary” or “secondary”
- “Primary brain tumors” originate from cells normally found within the brain and meninges (membranes covering the brain)
- “Secondary tumors” are either cancer that has spread to the brain (known as “metastasis”) from a primary tumor outside the nervous system, or tumors that affect the brain by invading or extending into brain tissue from adjacent non-nervous system tissues, such as bone
- Pituitary gland tumors (adenomas or carcinomas) and tumors arising from cranial nerves are considered secondary brain tumors; the “cranial nerves” are nerves that originate in the brain and go to various structures of the head (such as the eye, face, and tongue)
- Brain tumors appear to be more common in dogs than in other domestic species



GENETICS

- An unusually high incidence of benign tumors originating from the membranes covering the brain (the membranes are the meninges; tumors are “meningiomas”) has been reported in cats with mucopolysaccharidosis type I; “mucopolysaccharidosis” is the term for a group of inherited disorders in which particular enzymes necessary for normal cell function (that is, metabolism) are deficient
- A component of glioma susceptibility has been mapped to chromosome 2

SIGNALMENT/DESCRIPTION OF PET

Species

- Dogs
- Cats

Breed Predispositions

- Meningiomas (benign tumors originating from the membranes covering the brain) occur most frequently in dolichocephalic breeds of dog; “dolichocephalic breeds” are dogs that have long heads and noses, such as the collie and Afghan hound
- Glial cell tumors and pituitary tumors occur commonly in short-nosed, flat-faced (known as “brachycephalic”) breeds of dog; “glial cell tumors” originate from cells that surround and support nerve cells and act as insulation between these cells
- Canine breeds that appear to develop brain tumors more frequently than other breeds include the boxer, golden retriever, Doberman pinscher, Scottish terrier, and Old English sheepdog
- No increased likelihood of developing brain tumors has been identified in any breed of cat

Mean Age and Range

- Brain tumors occur in dogs and cats of any age

- Most frequent in older dogs, with the greatest incidence in dogs greater than 5 years of age
- Median age for meningiomas diagnosis is 10-11 years of age, gliomas, 8 years of age, and choroid plexus tumors at 5-6 years of age

Predominant Sex

- Older male cats appear to be most likely to develop meningiomas (benign tumors originating from the membranes covering the brain)

SIGNS/OBSERVED CHANGES IN THE PET

- Vary with tumor location
- Most frequently recognized clinical sign associated with a brain tumor of a dog or cat is seizures, particularly if the first seizure occurs after the pet has reached 5 years of age
- Other clinical signs frequently associated with a brain tumor are abnormal behavior and mental status; vision abnormalities (such as blindness); circling; wobbly, uncoordinated, or “drunken”-appearing gait or movement (known as “ataxia”); head tilt; being overly sensitive to pain or touch (known as “hyperesthesia”) in the area of the neck, signs are similar regardless of the exact cause

CAUSES

- Uncertain
- Dietary, environmental, genetic, chemical, viral, traumatic, and immune system factors may be considered

RISK FACTORS

- Uncertain

Treatment

HEALTH CARE

- The major goals of therapy for a brain tumor are to control secondary effects, such as increased pressure of the cerebrospinal fluid within the skull cavity (known as “increased intracranial pressure”) or fluid buildup in the brain (known as “cerebral edema”), and to eradicate the tumor or reduce its size
- Three methods of therapy for a brain tumor are available at this time for use in dogs and cats including surgery, radiation therapy, and chemotherapy

Surgery

- Neurosurgery for complete surgical removal, partial removal, or biopsy of the brain tumor
- Meningiomas (benign tumors originating from the membranes covering the brain) may be able to be removed completely (or almost completely) by means of surgery, especially in cats

Radiation Therapy

- Radiation therapy may be used either alone or in combination with other treatments for either primary or secondary brain tumors
- Careful treatment planning by an experienced radiation therapist is essential to the success of radiation therapy, newer approaches (stereotactic radiotherapy) allow sparing of normal tissues around the cancer.

Chemotherapy

- Chemotherapy drugs (such as carmustine [BCNU], lomustine [CCNU]), temozolomide, cytosine arabinoside (ARA-C), and hydroxyurea) may result in reduction of tumor size, and in improvement of clinical signs in dogs with glial cell tumors though studies are still in progress for effectiveness; “glial cell tumors” originate from cells that surround and support nerve cells and act as insulation between these cells

Medications

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

- Steroids may be utilized to decrease fluid buildup (edema) and, in some cases (such as for treatment of lymphoma), to slow tumor growth; “lymphoma” is a type of cancer that develops from lymphoid tissue,

including lymphocytes, a type of white blood cell formed in lymphatic tissues throughout the body

- Some pets with brain tumors will have dramatic improvement in clinical signs for weeks or months with sustained steroid treatment
- Medications to control seizures (known as “anticonvulsants”), such as phenobarbital, potassium bromide, levetiracetam may be used
- Mannitol or high concentration saline (hypertonic saline) may be used to reduce increased intracranial pressure (increased pressure of the cerebrospinal fluid within the skull cavity)

Follow-Up Care

PATIENT MONITORING

- Serial nervous system examinations
- Serial diagnostic imaging (computed tomography [CT or CAT scan], magnetic resonance imaging [MRI])

POSSIBLE COMPLICATIONS

- Aspiration pneumonia (inflammation/infection of the lungs, caused by accidentally inhaling food, vomit, or liquids) due to depressed swallowing reflexes associated with increased intracranial pressure (increased pressure of the cerebrospinal fluid within the skull cavity)
- Seizures

EXPECTED COURSE AND PROGNOSIS

- Information is limited; however, prognosis generally is guarded to poor for pets treated to control the secondary effects of a brain tumor only, without an attempt to eradicate the tumor; the results of one study indicate a mean and median survival of 81 days and 56 days, respectively, following CAT scan diagnosis of a primary brain tumor in 8 dogs
- Several studies confirm that the prognosis for a dog or cat with a primary brain tumor may be improved significantly by surgical removal of the tumor and radiation therapy (used either alone or in combination)

Key Points

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