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NEUROENDOCRINE TUMORS - CARCINOIDS

These notes are provided to help you understand the diagnosis or possible diagnosis of cancer in your pet. For general information on cancer in pets ask for our handout "What is Cancer". Your veterinarian may suggest certain tests to help confirm or eliminate diagnosis, and to help assess treatment options and likely outcomes. Because individual situations and responses vary, and because cancers often behave unpredictably, science can only give us a guide. However, information and understanding for tumors in animals is improving all the time.

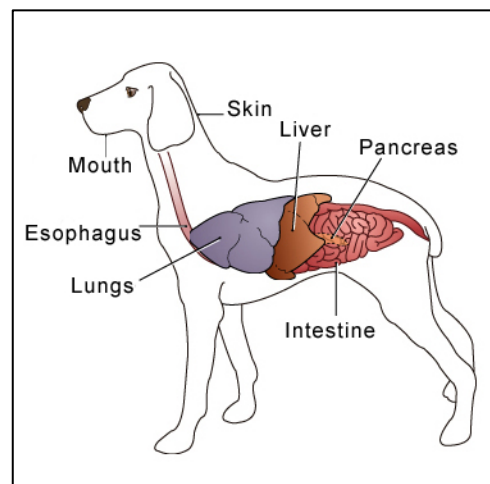
We understand that this can be a very worrying time. We apologize for the need to use some technical language. If you have any questions please do not hesitate to ask us.

What are neuroendocrine cells?

Neuroendocrine cells interact with the nervous system and produce specialized chemical substances called "neuroendocrine hormones". These hormones affect the rates of specific chemical reactions in other cells locally or in other tissues of the body. Together with the nervous system and other types of hormones they integrate and co-ordinate a wide variety of activities to maintain internal stability of the body. The neuroendocrine hormone producing cells are present in glands such as the adrenal medulla, chemoreceptors (aortic and carotid bodies) and pancreatic islets. They are also scattered throughout the body in a variety of organs including the skin, mouth, esophagus, intestine, liver and lung.

What are neuroendocrine tumors?

The scattered neuroendocrine cells produce rare tumors (**carcinoids**, **Merkel cell tumors** and **neuroendocrine tumors**). Merkel cells are present in epithelial (outer covering or lining) tissues. Tumors of these cells have been confirmed in the mouths of animals. Neuroendocrine tumors of the intestine, liver and gall bladder are called carcinoids and neuroendocrine carcinomas in the nose and lung are sometimes called "**small cell**" **carcinomas**. Neuroendocrine tumors of the aortic or carotid bodies are called **chemodectomas** (see separate handout). In general, the tumors are slow growing but will eventually spread (metastasize) to other parts of the body.



What do we know about the cause?

The reason why a particular pet may develop this, or any cancer, is not straightforward. Cancer is often seemingly the culmination of a series of circumstances that come together for the unfortunate individual.

Cancer is non-lethal genetic damage of cells (mutations in the DNA genome). Causes include radiation, chemicals, hormones and infections but we do not know if any of these is important in the development of these tumors. The mutated cells upset the normal regulation of cell death and replacement. They do this by activating growth-promoting cancer genes (oncogenes), inactivating suppressing genes and altering the genes that regulate normal, programmed cell death (apoptosis). Cancer induction is a multi-step process called tumor progression. Some cancers never progress past the first stages so remain benign. Others progress rapidly.

Why has my pet developed this cancer?

Some animals have a greater tendency (genetic susceptibility) to cancer. Some breeds have far more cancers than others, often of specific types. The more divisions a cell undergoes, the more probable is a mutation so cancer is more common in older animals.

Are these common tumors?

These are all rare tumors, primarily recognized in dogs and very infrequent in cats. They may be more common than we realize, however, because confirmation of the diagnosis requires specialized and expensive microscopic techniques and sometimes electron microscopy. Some types recognised in people have not yet been identified in domestic animals.

How will these cancers affect my pet?

Most of these tumors do not produce hormones so clinical problems are primarily associated with their size and compression of the adjacent tissues.

A few of the tumors induce signs that are not readily explained by local or distant spread of the tumors. These are known as 'paraneoplastic syndromes'. Some are due to abnormal hormone production by the cancer. In people, several different types are recognized and in animals, hair loss and increased blood calcium levels are thought to occur.

How are these cancers diagnosed?

Clinical signs of these tumors relate to the organ affected. Further specialized diagnostic techniques may include X-rays, ultrasonography and CT (computerized tomography) scans and MRI (magnetic resonance imaging). These can often provide a high probability of the presence of a tumor but definitive diagnosis of the type relies on microscopic examination of tissue (histopathology). Routine histopathology, done at a specialized laboratory by a veterinary pathologist, will give a high probability of diagnosis. Confirmation may require many different stains (immunocytochemistry) to eliminate other tumors or electron microscopy. These are expensive techniques and not routinely available.



Ultrasound



The piece of tissue may be a small part of the mass (biopsy) or the whole lump but only examination of the whole lump will indicate whether the cancer has been fully removed. The histopathology helps to predict behavior (prognosis).

What types of treatment are available?

Treatment is surgical removal of the lump(s). Radiotherapy is occasionally used for nasal tumors.

Can these cancers disappear without treatment?

It is not common, but the loss of blood supply to a cancer can make the cells die. Unfortunately, the disappearance of the cancer is rarely complete.

How can I nurse my pet?

After surgery, you will need to prevent your pet from interfering with the operation site and an "Elizabethan collar" may be needed. The site also needs to be kept clean. Any loss of stitches or significant swelling or bleeding should be reported to your veterinarian. If you require additional advice on post-surgical care, please ask.

How will I know how the cancer will behave?

Histopathology will give your veterinarian the diagnosis that helps to indicate how the tumor is likely to behave. The veterinary pathologist usually adds a prognosis that describes the probability of local recurrence or metastasis (distant spread).

How will I know if the cancer is permanently cured?

'Cured' has to be a guarded term in dealing with any cancer.

Most of these tumors grow slowly but eventually invade and destroy adjacent structures.

Neuroendocrine carcinomas in the nose tend to invade the brain. An overall metastasis rate of 41 per 120 post-mortem examinations has been reported for advanced cases. Distant metastasis is unusual but dogs seldom survive more than a year.

Carcinoids of the intestine, liver and gall bladder are malignant but slow growing. Intestinal tumors in dogs have invaded the gut wall and metastasized, especially to liver. In cats, the inside of the body cavity and lymph nodes are common sites of spread, often with adhesions. In people, removal of tumors, even in the presence of metastases in the liver, may prolong life. In animals, tumors in the abdomen take months to recur but those that appear as metastases in subcutaneous sites, progress rapidly in weeks.

Lung neuroendocrine carcinomas spread within the lung and to more distant organs in approximately a quarter of cases. Surgical removal of part of the lung of dogs can give remission in about three quarters of cases of all lung tumors but average survival times of only 28 days post-surgery is seen in the other quarter of cases. In cats, more tumors are classified as inoperable either because of extensive disease, metastasis or concurrent heart disease. Feline tumors frequently metastasize to bones, particularly those of the toes.

Are there any risks to my family or other pets?

No, these are not infectious tumors and are not transmitted from pet to pet or from pets to people.

