



PET TALK

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CT, MRI AND RADIATION THERAPY

If your veterinarian recommends a CT scan, an MRI or radiation therapy for your pet, you may have some questions. Below are answers to some commonly asked questions:

Why does my pet need a CT or an MRI?

Some areas of the body are difficult to image with conventional radiographs (X-rays) or ultrasound. Because of complex anatomy or overlying structures, tomographic (or slice) images must be used to evaluate the area. CT and MRI also both have the advantage of displaying images digitally, which can emphasize differences between normal and abnormal tissues making problems easier to detect, and the margins easier to recognize.

Is it safe?

Magnetic resonance imaging (MRI) uses radio-frequency energy to excite molecules in your pet – similar to that which a radio or TV station emits. No ionizing radiation is used. Low magnetic fields have not been demonstrated to be harmful to animals or people. Caution must be taken in animals or people that have been implanted with pacemakers or

metal clips in certain areas. Because pets cannot move during the MRI scan, they must be anesthetized during the procedure. While CT scanning uses ionizing radiation, the dose received by the patient is similar to that of conventional radiographs (X-rays) and less than that for a human receiving a similar procedure. CT should be avoided in breeding animals during the first trimester of pregnancy. Pets are usually anesthetized for CT scans. These procedures are relatively quick (15 – 30 minutes) further minimizing the risks.

Why does my pet need to be anesthetized or sedated for the procedure?

Both CT and MRI require the patient to hold still during the scanning procedure. Even small movements result in artifacts which degrade the scan quality.

Why does the procedure cost more than conventional X-rays?

Equipment costs and maintenance costs are much higher for CT and MRI equipment. A CT scanner will cost 10 – 20 times as much as a conventional X-ray unit. An MRI unit costs 20 – 50 times as much.

How does CT work?

CT units produce a very thin fan of x-rays which are directed through the patient and strike a row of radiation detectors. The amount of radiation going through a specific part of the patient, and therefore reaching the detector, is related to the density of the body part. A CT scanner takes numerous views of each part, and reconstructs an image based on the density of different areas.

How does MRI work?

When a patient is put in a strong magnet, some of the atoms become aligned with the magnetic field. If a carefully tuned radio-frequency (RF) pulse is sent into

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the patient, those atoms can be tipped over. As the atoms realign themselves with the magnetic field, they give off an RF pulse that can be detected by the MRI scanner. The amount of RF signal given off, and the time at which it is released are characteristic for certain tissues. RF signal changes can differentiate normal from abnormal tissues such as those affected by cancer, infection or trauma.

What are the indications for CT?

CT is particularly useful for looking at complex bony structures such as the skull, spine or joints. It is also useful for detecting and characterizing lung disease. Both CT and MRI are excellent for assessing blood flow to an organ or region.

What are the indications for MRI?

MRI is useful for looking at soft tissue structures which have low contrast on conventional X-rays and complex soft tissue structures. The largest indications are in imaging the brain, spinal cord, and soft tissues of the musculoskeletal system.

How does radiation therapy work?

The linear accelerator can be programmed to produce photons or electrons to treat deep or superficial tumors, respectively. These energy beams can be directed to specific sites on the body to treat the patient. Radiation therapy (RT) works by sterilizing cells, which keeps them

from being able to undergo successful division. This means a large tumor may not shrink immediately with RT. The cells will be sterilized, and will live out their natural life span. When they attempt to divide, they will be unable to do so and will die resulting in tumor shrinkage.

Why does my pet need radiation therapy?

Radiation therapy is used to treat inoperable tumors that have not spread to other sites in the body. Like surgery, this offers a potential cure for localized tumors. It may be combined with surgery or it may be combined with chemotherapy to address both local and systemic disease. Certain chemotherapy drugs act as radiation sensitizers and are used for their ability to enhance the effects of radiotherapy.

How often is radiation therapy administered?

RT can be used with curative or palliative intent (relieving clinical signs). When administered with curative intent, RT is given in small fractions over three to four weeks. For palliative effects, RT is given in large fractions once weekly for three weeks.

What types of side effects can occur with radiation therapy?

Radiation therapy in dogs and cats does NOT cause systemic side effects (tiredness, loss of appetite, nausea). Side effects of RT occur more often with

curative attempts and can be categorized into acute and chronic problems. Acute injuries begin during or shortly after the completion of therapy. They arise in tissues within the RT field that are growing and dividing rapidly; the most common acute effects are skin problems that mimic a severe sunburn. Acute side effects will resolve with minimal nursing care and they are not considered to be dose limiting. Chronic side effects arise from damage to tissues within the RT field that are slowly renewing populations (i.e., bone, retina, brain). Clinical syndromes include the formation of bony sequestra (detached bone fragments), retinal lesions, brain cataracts and neurologic signs. Chronic side effects are dose limiting and veterinary protocols are designed to minimize long term problems.

Why does my pet need to be anesthetized or sedated for the procedure?

Because pets cannot move during the radiation therapy, they must be anesthetized during the procedure. Each treatment is very short; animals are anesthetized for 10 – 15 minutes daily.

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