

## SCINTIGRAPHY: THE GAMMA CAMERA and NUCLEAR IMAGING

Nuclear imaging is a very cool technology that most veterinary clients have never heard of. Though it's been around for 20 years it is usually only available at referral institutions such as veterinary colleges. The equipment used is very expensive and requires special permits by the NRC, the Nuclear Regulatory Commission. Nevertheless, it is being used more and more often in veterinary medicine.

The major piece of equipment used is the gamma camera. The gamma camera is a huge radiation detector, like a Geiger counter. It detects radioactive areas of the body and forms an image or picture of the pattern of radioactivity on x-ray film. The picture looks like a shadow outline of the pet with a bright area where radioactive activity is detected.

In nuclear imaging techniques, a radioactive substance that is taken up by a certain type of tissue is injected or introduced into the body. It travels to the selected organ and then is detected by the camera. For example, iodine is taken up by the thyroid gland and used in the making of thyroid hormones. A thyroid tumor is producing too much thyroid hormone, so the overactive thyroid tumor takes up more iodine faster than a normal thyroid gland does. If a radioactive iodine substitute is given, the thyroid tumor will absorb a lot of it, and it will be detected by the camera as a much greater than normal collection of radioactive particles. On the picture the gamma camera takes the thyroid gland will appear much larger and darker than in a normal animal.

The camera is used frequently in horses to detect tendon, ligament and bone injuries. Injured tissue that is inflamed has a greater blood flow. Radioactive substances that are used by these tissues, given intravenously, will appear in greater amounts in inflamed tissue. Thus a lameness can be pinpointed to a specific area so appropriate treatment can be given.

Another great use of this technology is in the detection of portocaval shunts. These are blood vessels that form abnormally before birth and direct the blood supply to the liver around instead of through that organ. The liver then does not have the blood supply it needs to grow and function properly. These abnormal vessels are small and difficult to detect by ultrasound and other means. The condition can be corrected surgically by tying off these abnormal vessels to redirect the blood flow back to the liver, but they have to be detected first.

To image these shunts, radioactive material is given via an enema. It is absorbed into the bloodstream through the lining of the large intestine and then flows toward the liver. If radioactivity is detected in the heart before it gets to the liver that means the blood supply diverted around the liver instead of going through it, and the diagnosis is made.

**The amount of radioactive substance needed for gamma camera imaging is small, making this technology no more dangerous than an x-ray,** which also uses radiation. It is a very safe and simple way to diagnose otherwise difficult to diagnose conditions.