

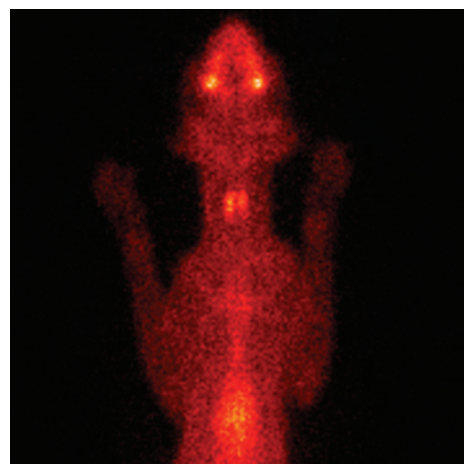
## What should you expect from the facility providing radioiodine therapy for your hyperthyroid cat patients? In a word, confidence.

### Confidence in the diagnosis:

Hyperthyroidism is caused by one or more small and usually benign tumor(s) in the thyroid gland<sup>1,2</sup>. These tumors function autonomously to produce excessive thyroid hormone levels. The diagnosis of hyperthyroidism is usually straightforward and is typically made with the combination of historical symptoms, physical findings, and laboratory evaluation<sup>3</sup>. Generally, a significant elevation in the  $T_4$  (thyroxine) level, in conjunction with appropriate historical and physical findings is sufficient to confidently allow a diagnosis of hyperthyroidism. Unfortunately, not all cats with hyperthyroidism have an elevated  $T_4$ . Sometimes cats with early

or mild hyperthyroidism have normal  $T_4$  levels<sup>4</sup>. As a result other tests have been described that allow the diagnosis of hyperthyroidism in cats with early or mild disease<sup>5,6</sup>. Currently the non-protein bound or “free”  $T_4$  as measured by a methodology called equilibrium dialysis (f $T_4$ ed) is considered the most sensitive laboratory test for the diagnosis of hyperthyroidism<sup>7</sup>. Unfortunately, this test is not perfect either. Between 6 and 12% of the cats with elevated f $T_4$ ed values are not hyperthyroid<sup>7,8</sup>.

A procedure called thyroid scintigraphy (a diagnostic imaging procedure) has long been considered the “gold standard” in the diagnosis of feline hyperthyroidism<sup>9</sup>. This procedure



*Figure 1. Thyroid scintigraphy of a cat with normal thyroid function. Note the symmetric appearance of the thyroid lobes.*

allows the direct visualization of the thyroid gland and the ability to see the small tumor(s) responsible for hyperthyroidism in cats. This procedure utilizes the physiology of the thyroid gland to create an image and is so sensitive that it can actually demonstrate the presence of these tumors long before they become clinically significant or result in laboratory value abnormalities.

At *Advanced Veterinary Medical Imaging*, thyroid scintigraphy is performed before every radioiodine therapy to ensure the accuracy of the diagnosis.

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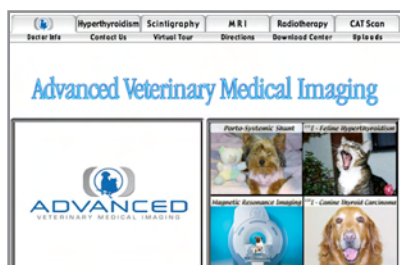
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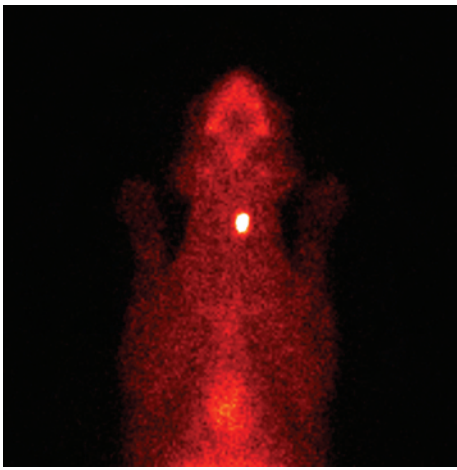
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*Figure 2. Thyroid scintigraphy of a cat with early hyperthyroidism secondary to a small left sided thyroid adenoma.*

### **Confidence in the radioiodine dosing methodology:**

Numerous methods for determining the radioiodine dose for cats with hyperthyroidism have been described in the veterinary literature<sup>10,11,12,13,14,15</sup>. These methods are quite variable but include 2 basic categories, namely 1.) individual or “patient specific” dose determination and 2.) fixed or “one size fits all” dosing.

The patient specific dosing methodologies attempt to maximize the success of the therapy by taking into consideration a number of patient specific variables. These variables include the size of the thyroid tumor, the degree of functional autonomy demonstrated by the tumor, and several specific physiologic parameters including biologic half-life and iodine uptake<sup>16,17,18,19</sup>.

The most accurate way to determine the extent of the thyroid tumor is with thyroid scintigraphy. Some methods of radioiodine dose determination rely on the physical palpation of the thyroid gland alone to estimate tumor size. Unfortunately, a significant percentage of thyroid adenomas become intrathoracic secondary to the chronic effects of gravity on the progressively enlarging mass. Another group of cats develop hyperthyroidism secondary to adenomas of ectopic, often

intrathoracic, thyroid tissue (see figure 3). Both of these situations render these adenomas beyond the reach of palpation. Furthermore, a small percentage of cats develop hyperthyroidism secondary to functional thyroid carcinomas. The full extent of these tumors is often grossly underestimated by physical palpation alone.

The fixed dose approach assumes that most patients can be successfully treated by administering the same “fixed” dose to each patient. This method disregards the importance of the individual parameters described above. To accomplish a reasonable success rate, this method utilizes an above average dose that is administered to every cat. As a result, a large number of cats treated using this method receive excessive amounts of radioiodine, exposing both the patient and veterinary personnel to unnecessary levels of radiation.

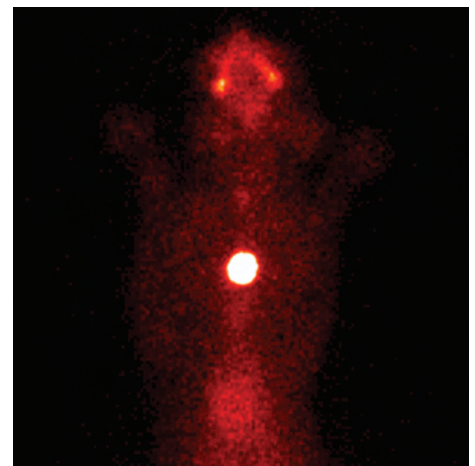
At *Advanced Veterinary Medical Imaging*, thyroid scintigraphy is performed before every radioiodine therapy to aid in determining the appropriate dose of radioiodine for each individual cat.

### **Confidence in the ongoing care provided for your cat by the facility and staff during the mandatory hospitalization associated with the procedure:**

The care needed by cats undergoing radioiodine therapy is usually minimal. The radioiodine treatment itself is not associated with any reported side effects. Never the less, the average age of the cat’s with this disease is 13 years. The effects of the chronic thyroid hormone excess on other organ systems in the body, especially the cardiovascular system, can be significant<sup>20,21,22</sup>. Major concurrent conditions necessitating ongoing therapy are common in these patients. Common concurrent conditions include but are not limited to diabetes mellitus, congestive heart failure, renal insufficiency, and inflammatory bowel disease.

Some facilities that perform radioiodine therapy rely on patient care and monitoring provided by veterinary technicians who report to off site veterinarians regarding the condition of the hospitalized patients. Furthermore, some radioiodine therapy facilities utilize the services of out of state consultants to perform the actual radioiodine therapy. These out of state consultants fly in for the few hours necessary to administer the radioiodine treatment and then leave the patients in the care of individuals unlicensed to administer radioactive materials. Needless to say, this approach is a cause for great concern among many licensed radioactive materials users.

At *Advanced Veterinary Medical Imaging* all patients receiving radioiodine therapy are evaluated, treated and then supervised for the duration of their hospital stay by Dr. Michael Broome. Dr. Broome is both a pioneer and recognized expert in the use of radioactive iodine for the treatment of feline hyperthyroidism. Following the completion of a Master’s project in comparative thyroid physiology at U.C. Davis, Dr. Broome became the first veterinarian in a private practice in the United States to receive a license for the use of radioactive iodine in the treatment of feline hyperthyroidism. Dr.



*Figure 3. Thyroid scintigraphy of a cat with hyperthyroidism secondary to an intrathoracic ectopic thyroid adenoma. This mass was NOT palpable on physical examination.*

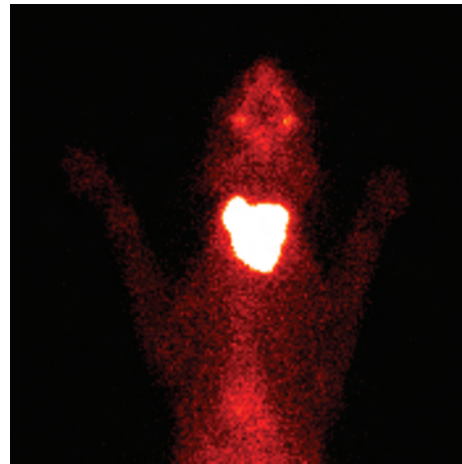
Broome has authored numerous articles on the topic and has personally cared for over 10,000 cats with hyperthyroidism using radioiodine. Dr. Broome is regularly consulted by the California Department of Health regarding issues of radiation safety relating to the use of radioiodine in animals.

### **Confidence in the release criteria utilized by the facility:**

Cats undergoing radioiodine therapy are hospitalized for a variable period of time to allow for the excretion of the majority of the radioiodine prior to their release to the client. The collected radioactive waste material is generally “held for decay” by the radioactive materials license holder. These requirements are regulated by federal codes but usually implemented by more local government agencies, generally at the State government level. Interestingly, these federal regulations are not specific to the use of radioiodine for the treatment of hyperthyroidism in cats. Indeed the regulations were written before cats were recognized as developing hyperthyroidism. Rather, the regulations were written with the general goal of ensuring that those licensed to use radioactive materials of any kind, did so with limits imposed upon them to ensure against inappropriate radiation exposure to members of the general public. Specifically, the federal codes are designed to preclude the general public from receiving greater than 0.1 rem/year as the result of the actions of radioactive materials license holders. Since clients with hyperthyroid cats are members of the general public, this is the major motivation for requiring hospitalization following radioiodine therapy.

The development of standardized release criteria based on the measured radiation exposure emitted from the cat seems at first glance to be straightforward. However, the dramatic effect of varying proximity between the person and the cat (the source of the radiation) needs to be taken into consider-

ation. Radiation exposure follows the “inverse square law”. This means that as the distance between a person and a source of radiation is doubled, the exposure level is decreased by a factor of 4. At what location relative to the cat should one measure the exposure level when determining release criteria? Ob-



*Figure 4. Thyroid scintigraphy in a cat with marked hyperthyroidism secondary to bilateral asymmetric adenomatous thyroid hyperplasia.*

viously one should attempt to reproduce the anticipated proximity between the cat and the people with whom the cat lives.

Different release criteria can therefore be chosen based on different anticipated proximities to the cat. Currently, state regulatory agencies in different states have interpreted the federal codes differently. This has led to different release criteria for facilities performing the same procedure in different states.

Anxious clients will often encourage the release of their cats following the radioiodine therapy before they have reached the release criteria established by the authoritative regulatory agency. Referring veterinarians should have confidence that the release criteria used by a facility providing radioiodine therapy have been developed with the best interest of the patient and the client in mind.

**A recent decision by the California State Department of Health supports the earlier release of cats following radioiodine therapy for hyperthyroidism. Cats can now be discharged in as little as 3 days following radioiodine therapy!**

### **Confidence in the follow-up care provided:**

The results of radioiodine therapy manifest themselves over a period of several weeks to months. A familiarity with the management of these patients and the assurance of ongoing communication with the client and referring veterinarian should be expected from the facility providing radioiodine therapy.

*Advanced Veterinary Medical Imaging* has been providing radioiodine therapy to patients in southern California since 1986. Both telephone and written follow-up with referring veterinarians and clients is a major part of our commitment to providing the best care possible for these patients.

Finally it is of paramount importance to note the following:

**Licensing by a federal or state agency to provide radioiodine therapy to cats with hyperthyroidism is NOT a guarantee of proficiency in this procedure.**

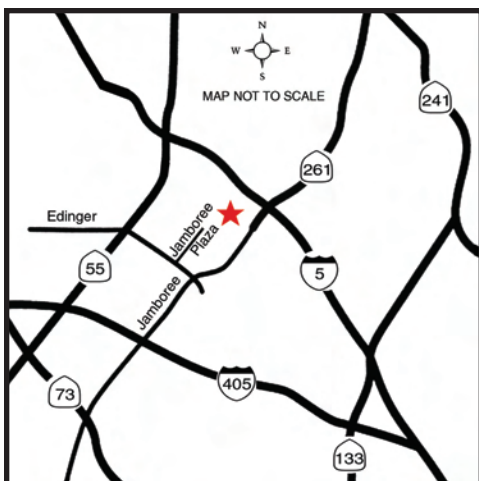
Referring veterinarians should thoroughly familiarize themselves with the methods used by facilities they refer patients to for radioiodine therapy.



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