

# Hyperthyroidism

## (Excessive Production of Thyroid Hormone)

### Basics

#### OVERVIEW

- Disease condition caused by high levels of thyroid hormones that increase metabolism in the body
- The thyroid gland normally produces thyroid hormones in response to stimulation by the pituitary gland, the “master gland” of the body; the thyroid hormones normally increase chemical processes occurring within cells of the body; however, in hyperthyroidism, the excessive hormone levels put the cells and body into “overdrive”
- Thyroid hormones are known as “triiodothyronine” or “T<sub>3</sub>” and “tetraiodothyronine” or “T<sub>4</sub>”

#### GENETICS

- No known genetic predisposition

#### SIGNALMENT/DESCRIPTION OF PET

##### Species

- Cats; most common hormonal (endocrine) disease of cats; one of the most common diseases seen in late middle-aged and old cats
- Rare in dogs

##### Breed Predilections

- None

##### Mean Age and Range

- Mean age in cats, approximately 13 years; range 4–22 years



#### SIGNS/OBSERVED CHANGES IN THE PET

- Involves many organ systems due to the overall increase in metabolism
- Weight loss
- Unkempt appearance
- Poor body condition
- Increased appetite (known as “polyphagia”)
- Vomiting
- Diarrhea
- Increased thirst (known as “polydipsia”)
- Rapid breathing (known as “tachypnea”)
- Difficulty breathing (known as “dyspnea”)
- Heart murmur; rapid heart rate (known as “tachycardia”); particular abnormal heart beat, known as a “gallop rhythm”

- Hyperactivity
- Aggression
- Large thyroid gland
- Thickened nails
- Less than 10% of pets are referred to as “apathetic”; these pets exhibit atypical signs (such as poor appetite, loss of appetite, depression, and weakness)

## CAUSES

- Cats—autonomously hyperfunctioning thyroid nodules (where the thyroid nodules produce excess thyroid hormones outside of the control of the pituitary gland, so-called “autonomous” production); rarely, thyroid cancer (known as “thyroid carcinoma”)
- Dogs—thyroid hormone (T4 or T3) secretion by a thyroid cancer (thyroid carcinoma)

## RISK FACTORS

- Some reports have linked hyperthyroidism in cats to some canned food diets
- Advancing age increases risk

## Treatment

### HEALTH CARE

- Outpatient management usually suffices for cats, if drugs that inhibit the production of thyroid hormones (known as “antithyroid drugs”) are used
- Treatment using a radioactive form of iodine (known as “radioiodine treatment”) or surgical removal of the thyroid gland (known as “thyroidectomy”) require inpatient treatment and monitoring
- Rare cases of congestive heart failure require emergency, inpatient intensive care

### ACTIVITY

- No alterations recommended

### DIET

- Poor absorption of many nutrients and high metabolism suggest the need for a highly digestible diet, with high availability of protein in untreated hyperthyroidism
- Resolution of signs resulting from excessive levels of thyroid hormones in the body (condition known as “thyrotoxicosis”) eliminates the need for dietary modifications in many pets
- Dietary modification may be necessary to treat or control complications (such as kidney damage)

### SURGERY

- Surgical removal of the thyroid gland (thyroidectomy) is one recommended treatment for hyperthyroidism in cats and can be both affordable and effective long term
- Surgical treatment of thyroid carcinoma (dogs and cats) is usually not curative, but can control signs (known as “palliative treatment”)

## 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.

- Radioiodine (radioactive form of iodine) is a safe and effective treatment; use of radioactive iodine requires special facilities; availability of veterinary facilities offering this treatment is limited, but increasing
- Methimazole (Tapazole) inhibits the production of thyroid hormones (antithyroid drug) and is recommended most often
- Methimazole can be administered through the skin (transdermally); transdermal methimazole must be prepared by a pharmacist; resolution of signs resulting from the excessive levels of thyroid hormones in the body (thyrotoxicosis) takes longer with transdermal methimazole than with methimazole given by mouth
- $\beta$ -blockers—sometimes used to treat some of the heart and nervous system effects of excess thyroid hormones; can be used in combination with methimazole; mainly used to prepare the pet for surgical removal of the thyroid

gland (thyroidectomy) or radioiodine therapy; atenolol is useful for controlling rapid heart rate (tachycardia), but addition of an ACE inhibitor is necessary to control high blood pressure (known as “hypertension”) in cats with hyperthyroidism

- Carbimazole—another useful antithyroid drug that inhibits production of thyroid hormones; not available in the United States
- Propylthiouracil—is an antithyroid drug that inhibits production of thyroid hormones; it can be useful if methimazole is unavailable; side effects may be more common and more severe than with methimazole
- Iopodate—a radiographic contrast agent; can be used to treat some cases of mild hyperthyroidism, but not effective in most hyperthyroid pets; long-term effectiveness has not been established

## Follow-Up Care

### PATIENT MONITORING

- Methimazole—physical examination, complete blood count with platelet count, serum biochemical analysis, and serum thyroid hormone (T4) determination every 2–3 weeks for the initial 3 months of treatment; the dosage is adjusted to maintain serum thyroid hormone (T4) concentration in the low-normal range
- Surgical removal of the thyroid gland (thyroidectomy)—watch for development of low blood-calcium levels (known as “hypocalcemia”) and/or paralysis of the voice box (larynx) during the initial postoperative period; measure serum thyroid hormone (T4) concentrations in the first week of surgery and every 3–6 months thereafter, to check for recurrence
- Radioiodine (radioactive form of iodine)—measure serum thyroid hormone (T4) concentrations 2 weeks after treatment and every 3–6 months subsequently
- Kidney function—kidney filtration rates decline following treatment in most affected pets; therefore, perform a physical examination, serum biochemistry, and urinalysis 1 month after treatment and then as indicated by clinical history

### POSSIBLE COMPLICATIONS

- Untreated disease can lead to congestive heart failure; diarrhea that is difficult to treat; kidney damage; detachment of the retina (a layer in the back of the eye) as a result of high blood pressure (hypertension); and death
- Complications of surgical treatment include low levels of parathyroid hormone (known as “hypoparathyroidism”; the parathyroid glands are small glands adjacent to the thyroid gland, which may be removed at the time of the surgical removal of the thyroid gland); low levels of thyroid hormone (known as “hypothyroidism”); and paralysis of the voice box (larynx)
- Low levels of thyroid hormone (hypothyroidism) is rare following radioiodine therapy (radioactive form of iodine)

### EXPECTED COURSE AND PROGNOSIS

- Uncomplicated disease—prognosis is excellent; recurrence is possible and most commonly is associated with poor owner compliance with medical management; regrowth of overactive thyroid tissue is possible, but uncommon after surgical removal of the thyroid gland (thyroidectomy) or radioiodine treatment (radioactive form of iodine)
- Reported mean survival time for cats treated with radioiodine is 4 years; mean survival time for cats treated with methimazole is 2 years; mean survival time for cats treated with radioiodine and methimazole is 5.3 years
- Cats with pre-existing kidney disease have a poorer prognosis; kidney failure is the most common cause of death in hyperthyroid cats
- Dogs or cats with thyroid cancer (thyroid carcinoma)—prognosis is poor; treatment with radioiodine (radioactive form of iodine), surgery, or both usually is followed by recurrence of disease; chemotherapy is of questionable benefit

## **Key Points**

- Disease condition caused by high levels of thyroid hormones that increase metabolism in the body
- Most common hormonal (endocrine) disease of cats; one of the most common diseases seen in late middle-aged and old cats
- Rare in dogs
- Potential side effects of drugs that inhibit the production of thyroid hormones (antithyroid drugs) and surgical complications
- Be aware of possible (rare) recurrence after treatment